The reason this is important is because today, if you go to Amazon.com to see a copy of 1984, the NSA can see the record, the Russian intelligence service can see the record, the Chinese military can see the record, the French, the Germans, the Andorran military can see it.

Everyone can see it because it is not encrypted.

The world's library is Amazon.com, but not only does it not support encryption by default, you can't even choose to use encryption when browsing books.

This is something we need to change, not just Amazon. I'm not going to pick just Amazon, but it's a great example.

All businesses should move to default encrypted browsing habits for all users who haven't taken any action or chosen special methods of their own.

It enhances the privacy and rights enjoyed by people around the world.

CA: Ed, please come with me to this part of the stage.

I would like to show you the next slide here. (Applause) This is a program called Boundless Informant.

what is that?

ES: So I have to give the NSA credit for using the proper name for this.

This is one of my favorite NSA codenames.

Boundless Informant is a program that the NSA hid from Congress.

The NSA was previously asked by Congress if it had the ability to even give a rough estimate of the amount of US traffic being intercepted.

they said no. They said we don't track those stats and we can't track those stats.

I can't tell you how much communication we intercept around the world. To do so would be a violation of your privacy.

I really appreciate their feelings, but the fact is, when you look at this slide, they not only have the ability, but the ability already exists.

It's already installed.

The NSA has its own internal data format that tracks both ends of a communication, and if we say this communication came from America, we can tell Congress how many of that communication there are at this time.

And Boundless informants tell us that more communications about Americans are intercepted than those about Americans are intercepted in Russia.

I don't know if intelligence agencies should go for it.

CA: Ed, there was an article in the Washington Post, again from your data.

The headline reads, "NSA breaks privacy rules thousands of times a year."

Please tell me about it.

ES: We heard it in Congressional testimony last year, but for someone like me who was from the NSA and saw the actual internal documents and knew what they were about, it was amazing to see officials testify under oath that there was no abuse, there was no violation of NSA rules when you knew this story was coming.

But what's particularly interesting about this is the fact that the NSA has broken its own rules, its own laws, thousands of times a year. That includes one event by the NSA itself, one of 2,776, affecting more than 3,000 people.

In another incident, they accidentally intercepted all calls in Washington, D.C.

What's surprising about this little-noticed report is that not only were there 2,776 cases of abuse, but Senate Intelligence Committee Chairman Diane Feinstein didn't see the report until she was asked to comment on it by The Washington Post.

And she requested a copy from the NSA and received it, having never seen this before.

What does the chairman of the Senate Intelligence Committee say about the state of surveillance of America's intelligence agencies when he is completely oblivious to the thousands of times the rules are broken each year?

CA: Ed, one answer to this whole discussion is: Let's be honest, why should we care about such oversight?

So if you haven't done anything wrong, there's nothing to worry about.

What's wrong with that point of view?

ES: Well, first of all, you are giving up your rights.

What you say is I'm going to believe it because I don't think I need them, see, let's get rid of them, it doesn't really matter, they're going to do the right thing.

Your rights matter because you never know when you might need them.

Beyond that, it is part of our cultural identity, not only in America, but also in Western societies and democratic societies around the world.

People should be able to answer the phone and call family, text their loved ones, buy books online, travel by train, buy airline tickets without thinking about how these events will look to government officials, perhaps your government officials years from now, how they will be misunderstood, and what your intentions may be supposed to be.

We have the right to privacy.

We require the warrant to be based on probable cause or some sort of individual allegation. Because we recognize that surreptitious and unsupervised trust in the entirety of human communication, whether by anyone or a governmental authority, is too great a temptation to ignore.

CA: Some people are furious about what you did.

I recently heard Dick Cheney say that Julian Assange was bitten by a flea, but Edward Snowden was a lion who bit off a dog's head.

He thinks you have committed the worst act of betrayal in American history.

What would you say to those who think so?

ES: Dick Cheney is really a different person.

(Laughter) (Applause) Thank you. (Laughter) I think this is great. Back when Julian Assange was doing his best work, Dick Cheney was abolishing governments all over the world, saying the skies would catch fire and the seas boiling, and now he says it was flea bites.

Therefore, we should be skeptical of similarly exaggerated claims of harm to national security by these kinds of officials.

But let's assume these people really believe this.

I would argue that they have a kind of narrow conception of national security.

The privilege of people like Dick Cheney does not keep the nation safe.

Public interest is not necessarily the same as national interest.

Waging war in a non-threatening place with non-enemy people does not guarantee our security. It's the same in Iraq and the Internet.

The Internet is not your enemy.

Our economy is not the enemy.

American companies, Chinese companies, and all other companies are part of our society.

It's part of our interconnected world.

There are ties of fraternity that bind us together, but we will not destroy these ties by undermining the standards, security, and behaviors that nations and peoples around the world expect us to abide by.

CA: But they say you stole 1.7 million documents.

Only a few hundred of them appear to have been shared with journalists so far.

Anything more to reveal in the future?

ES: Absolutely more revelations will come to light.

I don't think there is any doubt that the most important report has yet to be done.

CA: Please come here because I want to hear about this particular revelation.

come and see this

I mean, I think this is the most shocking thing we've heard in the last few months for many techies in this room.

It's about the show "Bull Run".

Could you please explain what it is?

ES: Bull Run, for which I also have to thank the NSA for their candor, this is a program named after a Civil War battle.

The British counterpart is called Edgehill, the Battle of the English Civil War.

And the reason I think they are so named is because they target our own infrastructure.

These are programs by the NSA that deliberately mislead their corporate partners.

They tell their corporate partners that these are safe standards.

They say "I need to work with you to secure your system", but in reality they are giving these companies bad advice that makes their services less secure.

They have incorporated a backdoor that can only be exploited by the NSA, allowing anyone with the time and money to research and find it to use it to infiltrate the world's communications.

This is really dangerous. Because if you lose one standard, or lose faith in something like SSL, which was especially targeted by the Bullrun program, you make the whole world we live in less secure.

We won't be able to access banks, nor will we be able to access commerce without worrying that people will monitor those communications or subvert them for our purposes.

CA: And could those same decisions also expose America to cyberattacks from other sources?

ES: Of course.

One problem is that the NSA traditionally wears a double hat, one of the dangerous legacies we've seen in the post-9/11 era.

They have been in charge of offensive operations, namely hacking, but they have also been in charge of defensive operations, traditionally prioritizing defense over attack on the principle that American secrets are simply valuable.

Whether we hack a Chinese company and steal their secrets, or hack a government agency in Berlin and steal their secrets, to the American public that is worth less than keeping the Chinese from accessing our secrets.

So by undermining the security of our communications, we are not only endangering the world, but we are endangering America in a fundamental way. Because intellectual property is the foundation and foundation of our economy. And if we compromise it with weak security, we will pay the price over the years.

CA: But they calculated that it was worth doing this as part of America's defense against terrorism.

Indeed, it makes the price worth paying.

ES: Well, if you look at the results of these programs to stop terrorism, you'll see that it's baseless, and you don't have to take my word for it. Because the first public court to review this outside of a non-disclosure agreement, a federal court, found these programs to be Orwellian and likely unconstitutional.

Congress, which could and still has the desire to be accountable for these things, has produced congressional reform bills, and two independent White House commissions that reviewed all classified evidence said those plans could never stop a single imminent terrorist attack in the United States.

So is it really terrorism that we are trying to stop?

Are these programs even worth it?

I say no, and all three branches of the US government say no as well.

CA: So, do you think they have deeper motivations than fighting terrorism?

ES: I'm sorry I didn't hear you, say it again.

CA: Sorry. Do you think they have deeper motives besides fighting terrorism?

ES: Yes. The bottom line is that terrorism has always been a so-called cover for our intelligence community.

Terrorism provokes emotional reactions and allows people to legitimize powers and programs they would otherwise be denied.

Bullrun and Edgehill type programs, the NSA requested these authorities in the 1990s.

They asked the FBI to go to Congress and argue.

The FBI went to Congress and made a point.

But Congress and the American people said no.

They said the economy wasn't worth the risk.

They argued that it was worth the great damage to society to justify the benefits.

But what we saw was that in the post-9/11 era, they used secrecy and used the justification for terrorism to launch these plans in secret without asking Congress or the American people. It is such a backroom government that we need to protect ourselves from. Because it not only makes us less safe, it offers no value.

CA: Okay, please bear with me. I have a more personal question.

Speaking of fear, most people would find the current situation in Russia rather frightening.

We all know what happened, how Bradley Manning was treated, and what Chelsea Manning is now. Also, there was an article on Buzzfeed about people in the intelligence community wanting you dead.

How are you coping?

How do you deal with fear?

ES: No wonder there are governments that want to see me die.

I have made it clear over and over again that I go to bed every morning thinking about what I can do for the American people.

I don't want to hurt the government.

I want to help the government, but the fact that the government is trying to completely ignore due process, the fact that they are trying to convict without a trial, these are things that we as a society have to oppose and say this is inappropriate.

We should not threaten dissidents.

We should not criminalize journalism.

And whatever I can do to achieve that goal, I'm willing to risk it.

CA: So I'd really like to get feedback from the audience here, because I know there are wildly different reactions to Edward Snowden.

Suppose you have two choices:

Can you see what he did as basically a reckless act that endangered America, or basically a heroic act that serves the long-term interests of America and the world?

Those are the two options I give you.

I would like to know who will vote for the opinion that this was a reckless act in the first place.

Some have their hands up.

Some hands go up.

It's hard to raise your hand with a man standing here, but I can see it.

ES: I can see it. (laughter) CA: So who's going to choose the second choice, fundamentally heroic deeds?

(Applause) (Cheers) And I think it's true that there are a lot of people who didn't raise their hands, and I think I'm still pondering this because it seems to me that the debate around you isn't divided along traditional political lines.

It is neither left nor right, in fact pro-government or liberal, or both.

Part of it is almost a generational issue.

You're a generation that grew up with the Internet, and you seem to get angry on an almost instinctive level when you see behavior that seems to harm the Internet.

Is there truth in that?

Es: Yes. I think that's really true.

This is not a left-right issue.

Our fundamental freedoms, and when I say ours, I don't mean just Americans, people all over the world, it's not a matter of partisanship.

These are what we all believe in, it is our responsibility to uphold them, and for those who have seen and enjoyed a free and open internet, it is up to us to preserve that freedom for future generations to enjoy. If we don't change the situation, if we don't stand up to make the necessary changes to keep the internet safe, not only for us, but for everyone, we will lose it, and it will be a huge loss not just for us, but for the world.

CA: Well, I recently heard something similar from the founder of the World Wide Web, Sir Tim Berners-Lee. In fact, I think he is with us.

Tim, I actually want to come up and say, do you have a mic for Tim?

(Applause) Tim, nice to meet you. come there

By the way, traitor or hero, which side are you on? I have a hypothesis about this -- Tim Berners-Lee: I've given a pretty long answer to that question, but if I had to choose between the two, I'd be a hero.

CA: And Ed, I think you read the proposal Sir Tim talked about for a new Magna Carta to take back the Internet.

does that make sense?

ES: Of course. So my generation, I grew up in the internet, not just thinking about it. I never expected to have the opportunity to champion the internet in such a direct and practical way, embodying it in such a rare, almost avatar way, but I think there is something poetic about the fact that one of the sons of the internet actually approached the internet as a result of political expression.

And I believe the Internet Magna Carta is exactly what we need.

We need to encode our values ​​into the fabric of the internet, not just letters, and that's what I want. We encourage all audiences not only here in Vancouver but around the world to join us.

CA: Do you have any questions for Ed?

TBL: Well, I have two questions, general questions — CA: Ed, can you still hear me?

ES: Yes, I can hear you. CA: Oh, he's back.

TBL: Your line's wiretap got a little jammed for a moment.

(laughter) ES: It's kind of an NSA issue.

TBL: So, looking back over the last 25 years, what do you think is the best we can achieve from all the discussions we've had about the web we want?

ES: In terms of how far we can go, I think it's really a question only limited by our willingness to put into it.

I think the Internet that we have enjoyed so far is exactly what we needed, not only as a nation but as people all over the world, and it was championed not only by the technical part of society, but by the users, as you said, by the people around the world who contribute through the internet and social media, who just check the weather, who rely on the weather every day as part of their lives, working together and participating.

We will have not just the internet we used to have, but a better internet, a better now, and not just what we wanted, but what we can use to build a better future than we could have imagined.

CA: TED was founded 30 years ago in 1984.

Since then, much of the conversation has actually gone along the lines that George Orwell was wrong.

It's not Big Brother watching us.

We are watching Big Brother now through the power and transparency of the web.

Your revelation kind of shook the center of that rather optimistic view, but you still believe there is a way to do something about it.

And so do you.

ES: Well, there is an argument that the power of Big Brother has greatly increased.

There was a recent law paper from Yale University that established what was called the Bankston-Soltani principle. This means that our expectations of privacy are violated when government oversight functions become orders of magnitude cheaper, and each time we need to review and rebalance our privacy rights.

That hasn't happened since government oversight powers were increased by an order of magnitude, which is why we're stuck in the problems we face today, but there is still hope, as individual power is also being enhanced by technology.

I am living proof that an individual can face and triumph over the most powerful adversaries and the most powerful intelligence agencies in the world. And I think that's something we need to hope for, and we need to do more to make it accessible to the general public around the world, not just tech professionals.

Journalism is not a crime and communication is not a crime. We should not have our daily activities monitored.

CA: I'm not sure how you shake hands with bots, but I think this is probably the hand that's here. TBL: It's coming soon.

ES: Nice to meet you. I hope my beam looks as good as yours.

CA: Thank you Tim.

(Applause.) So the New York Times recently asked for your pardon.

Would you welcome the opportunity to return to America?

ES: Of course. There really is no question. The underlying principle of this project is public interest, a principle underlying the establishment of journalism in the United States and around the world. If the press is now saying, 'We support this,' 'This is what needed to happen,' I think that's a strong argument, but I think that's not the final argument, it's something that the public should decide.

But at the same time, the government has hinted that they want some kind of deal, and they want to compromise the journalists I've worked with to come back, so I want to make it clear that I'm not doing this to be on the safe side.

I did this to do the right thing and I am not going to stop working for the public good just for my own benefit.

(Applause) CA: In the meantime, thanks to the Internet and this technology, you're back in this form in North America, which is very different from America and Canada.

I'm curious, how does it feel?

ES: Canada was not what I expected.

It's a lot warmer, isn't it?

(Laughter) CA: At TED, our mission is "ideas worth spreading."

If you could boil it down to one idea, what's your idea worth spreading right now?

ES: You could say that last year was a reminder that democracy can perish behind closed doors, but we as individuals were born behind the same closed doors and don't have to give up our privacy to maintain good government.

We don't have to give up our freedom to be safe.

And I believe that by working together, we can achieve both open government and private life. We look forward to working with you all around the world to make that happen.

thank you very much.

CA: Thank you, Ed.

(applause)

What's the scariest thing you've ever done?

In other words, "What's the most dangerous thing you've ever done?"

And why did you do that?

NASA does the math so I know what the most dangerous thing I've ever done.

Looking back at the first five shuttle launches, the odds of a catastrophe in the first five shuttle launches were 1 in 9.

And even in 1995, my first time on the shuttle, with 74 shuttle flights, the odds were still 1 in 38 or so, 1 in 35, 1 in 40, looking back now.

It's not a big chance, but it's a really interesting day to wake up at Kennedy Space Center and go into space that day. Because by the end of the day, you'll either find yourself floating in space with ease and glory, or you'll die.

Enter the Kennedy Space Center suit-up room. This is the room our childhood heroes changed into, the same room where Neil Armstrong and Buzz Aldrin donned their suits to go to the moon on the Apollo rocket.

Then I put on a pressure suit and got in the van to the launch pad and got out. I got on the Astrovan and headed to the launch pad. Around the corner of the Kennedy Space Center, usually before dawn, you can see the spacecraft in the distance, illuminated by giant xenon lights. It's the vehicle that takes you off the planet.

The crew sits in silence in the Astrovan, hand in hand, watching it grow and grow.

We get on the elevator, crawl into the spaceship on all fours, one by one, climb onto the chair and collapse onto our backs.

Then the hatch closes and suddenly what has been a cycle of dreams and denials all this time is becoming a reality. What I dreamed of, what I actually decided to do when I was nine, is now suddenly becoming a reality.

In the astronaut business, shuttles are very complicated vehicles. It is the most complex flying machine ever built.

There is a saying in the astronaut's business that "no problem is too serious to make worse."

(Laughter) In the cockpit, consciousness is clear. You're thinking about all the things you might have to do, all the switches and turnstiles you have to go through.

And this excitement builds as the hour approaches.

And about three-and-a-half minutes before launch, a giant nozzle the size of a large church bell behind it rocks back and forth with such mass that it shakes the entire vehicle, as if it were alive beneath you, like an elephant rising from its knees.

And about 30 seconds before launch, the vehicle is fully reanimated, ready to go, APU up, computers all self-contained, and ready to leave Earth.

And 15 seconds before launch, this happens: (video) Audio: 12, 11, 10, 9, 8, 7, 6 -- (space shuttle ready to take off) -- start, 2, 1, booster ignition, space shuttle launch Discovery, return to space station, pave the way...

(Space Shuttle takes off) Chris Hadfield: It's incredibly powerful to be able to ride something like this.

You hold onto something far more powerful than yourself.

I tremble so much that I can't concentrate on the instrument in front of me.

It's like being in the jaws of a giant dog, with its feet in the little part of its back, pushing you into space, accelerating furiously straight into the air, crossing your shoulders and propelling you through the air. And you are in a very complicated place. Watch the carriages pass through each turnstile, paying close attention and with more and more smiles on their faces.

Two minutes later, the solid rocket explodes, leaving only liquid engines, hydrogen and oxygen available. It feels like you're in a dragster, put your feet on the floor, and accelerate like you've never accelerated before.

You are getting lighter and your strength is getting heavier.

It feels like someone is pouring cement on you or something.

After about 8 minutes and 40 seconds, you're finally at the correct altitude, correct speed, correct heading, your engines are shutting down, and you're in weightlessness.

and we are alive

Great experience.

But why should you take such risks?

Why would you do such a dangerous thing?

For me the answer is pretty simple.

When I was younger, I was inspired that this was what I wanted to do.

I saw humans walk on the moon for the first time, and to me it was just a given. I want to be like that somehow.

But the real question is how to deal with that danger and the fear that comes with it.

How do you deal with fear and danger?

And having a goal in mind, and thinking about where it would lead, led me to life to help build a space station aboard a £1 million spaceship so that I could launch and help build a space station to make this possible. This spacecraft circles the world 16 times a day at 5 miles per second and 8 kilometers per second, and there are 200 experiments inside that are being conducted to tell us what the matter in the universe is made of.

But perhaps even more importantly, you can see and look down on the world in ways otherwise impossible, and - if your jaw might drop, it will - experience the astonishing opulence of a spinning sphere, like a self-propelled art gallery of fantastical and ever-changing beauty that is the world itself.

And because of its speed, for six months the sun rises or sets every 45 minutes.

And the coolest of all is going out and doing spacewalks.

You travel with the world in a spacesuit, a one-person spacecraft.

It's a completely different perspective, you're not looking up into space, you and the Earth are traveling through space together.

And you hold on with one hand, watching the world spin next to you.

It roars quietly with color and texture as it flows seductively next to you.

And if you take your eyes off it and look at all the rest under your armpits, it's an unfathomable amount of blackness and the kind of texture you can stick your hand into.

And you hold, in one hand, a link to seven billion others.

During my first spacewalk, I lost sight in my left eye, and I didn't know why.

Suddenly my left eye closed in excruciating pain and I couldn't understand why it wasn't working.

I was wondering what to do next.

Perhaps that is why we have two eyes, so I kept working.

Unfortunately, without gravity, tears would not fall.

So, the tear mixture gets bigger and bigger, and eventually the ball becomes so big that the surface tension makes a small waterfall over the bridge of the nose and into the other eye. And now I'm completely blind outside the spacecraft.

So what's the scariest thing you've ever done?

(Laughs) Maybe it's a spider.

Many people are afraid of spiders.

I think you should be afraid of spiders. Spiders are creepy and have long, hairy legs. And brown recluse spiders like this one are terrifying. If you get bitten by a brown recluse, you'll end up with a horribly large necrotic mass on your leg. In fact, you may still be sitting in the back chair.

And how do you know?

And spiders land on you and spiders are scary, so you experience this wonderful spasmodic attack.

But then, you might say, is there a brown recluse sitting in the chair next to me or not?

don't know. Any brown recluse here?

An actual survey shows that there are about 50,000 species of spiders in the world, of which about 20 are poisonous.

And if you're in Canada, winters here in British Columbia are cold, so there are about 720, 730 different types of spiders, and one of them is poisonous. The venom is like a nasty sting that isn't even lethal.

And that spider, not only that, but that spider has beautiful markings that say, "I'm dangerous. I've got a big radioactive mark on my back, it's a black widow."

Therefore, if you are a little careful, you can avoid encountering a single spider. Spiders live close to the ground, and as you walk, you'll never go through a spider web where a black widow will bite you.

A spider web like this builds in a corner instead of building it.

And it's the black widow spider because the female spider eats the male spider. it doesn't care about you

So really, you don't have to panic and react like a caveman the next time you walk into a spider web.

Danger is quite different from fear.

But how do you get around it?

how do you change your behavior?

Well, the next time you see a spider web, take a good look and make sure it's not a black widow before you go inside.

Then find another cobweb and enter that cobweb.

It's just a little fluffy. It's not a big deal.

And spiders that may come out are no more of a threat to you than ladybugs and butterflies.

And I guarantee that walking through 100 cobwebs will change basic human behavior and caveman reactions so that you can walk in the park in the morning and walk without worrying about cobwebs. Alternatively, you can enter your grandma's attic or any other place, even your basement.

And you can apply this to anything.

If you go blind during a spacewalk, I think the natural reaction is to panic.

It will make you nervous and worried.

But we considered all poisons and practiced with different types of spider webs.

We know everything there is to know about spacesuits and have trained thousands of times underwater.

And we don't just practice things going well, we always practice things going wrong, so you always end up walking in a spider's web.

And wearing a helmet and gloves not only in the water, but also in the virtual reality lab makes it feel real.

So when you finally go out on an actual spacewalk, it feels very different than when you went out for the first time.

Even blindness does not trigger a natural panic reaction.

Instead, look around and say, "Okay, I can't see, but I can hear and speak. Scott Parazynski is here with me."

He may come and help me. ”

We actually practiced rescuing an incapacitated crew member so he could float me like an airship and push me into an airlock if necessary.

I was able to find my own way home.

It's not that big of a deal.

In fact, if you keep crying for a while, the dirt in your eyes will begin to fade and you will be able to see again. Houston, if you negotiate with them, they'll let you keep the job.

After all the spacewalks were over and we were back on board, Jeff got me some cotton and he took the crumbs around my eyes. And it turns out that the only thing that got into my eyes was the anti-fog, which was like an oil and soap mixture.

And now I'm using Johnson's "No More Tears," which I probably should have used from the beginning. (Laughter) But the key is to look at the difference between the perceived danger and the actual danger. Where is the real risk?

What are you really afraid of?

It's not just the general fear that bad things are going to happen.

You can radically change your reactions to things so that you can go to places, see things, do things that would otherwise be outright rejected...

There, you might see hardpans south of the Sahara, or an almost dreamy New York City, or the unconscious gingham checks of Eastern European fields, or the Great Lakes as a collection of tiny puddles.

You get to see water pouring out of the fault lines of San Francisco and under bridges, but it's nothing like anything else you could have seen if you hadn't found a way to overcome your fear.

You get to see beauty that otherwise would never have happened.

It's finally time to go home.

This is our spaceship, the Soyuz, that little ship.

Once the three of us were on board, the spacecraft left the station and fell into the atmosphere.

These two pieces here actually melt and we throw them out and burn them up in the atmosphere.

The only part that survives is the little bullet we're on, which falls into the atmosphere, and essentially, you end up on a meteor ride home, and it's scary to ride a meteor, and it should be.

But instead of just screaming and crashing into the atmosphere, like suddenly riding a meteorite back to Earth (laughs), instead, 20 years ago we started learning Russian, then learning Russian, then orbital mechanics in Russian, then vehicle control theory, then getting into a simulator and practicing over and over again.

And in fact, you can fly and steer this meteor and land it anywhere on Earth in a circle of about 15 kilometers.

In fact, when our crew returned to the atmosphere inside the Soyuz, we weren't screaming, we were laughing. was fun.

And we knew that when the big big parachute opened, if it didn't, there was a second parachute that worked with a nice little clockwork mechanism.

So we came back and roared back to earth. This is what it looked like when it landed on the Soyuz in Kazakhstan.

(Video) Reporter: And you can see one of the search and recovery helicopters, which is part of a dozen or so Russian Mi-8 helicopters.

Touchdown -- 3:14:48 am Central Time.

CH: And then it rolls to a stop, as if someone threw it to the ground, and it flips over. But I'm sitting in a custom-built seat and I know how shock absorbers work, so I'm ready.

And finally the Russian reached out and pulled you out and pushed you into a chair. And now you can look back on what an incredible experience it was.

You, that 9-year-old boy's dream, It's impossible, it's mind-boggling dread, put it into practice, found a way to reprogram yourself, changed your primal fears so you could come back with a set of experiences and a level of inspiration for others that would never otherwise have been possible.

Finally, they wanted me to play the guitar.

I know this song, and I think it's really an homage to the genius of David Bowie himself, but also a reflection of the fact that we're humans, not machines exploring the universe, with the ability to adapt, to understand, and to bring our own self-awareness to new places.

(music) ♫ This is Major Tom from ground control ♫ ♫ I'm gone forever ♫ ♫ And I'm floating in the strangest way ♫ ♫ And the stars look so different today ♫ ♫ Here I am floating in a can ♫ ♫ Last glimpse of the world ♫ ♫ The earth is blue and there's much left to do ♫ (music) Don't be afraid.

(Applause) Very good. thank you very much.

thank you.

Chris Anderson: Edward Snowden came in a few days ago and now it's response time.

And some people wrote me questions they wanted to ask guests here from the NSA.

In short, Richard Leggett is the 15th Deputy Director of the National Security Agency, the agency's senior civilian officer, chief operating officer, who guides strategy, sets internal policy, and serves as chief advisor to the Director.

Hello everyone, Rick Leggett and welcome to TED.

(Applause) Richard Leggett: Thank you so much for the opportunity to speak with you here.

I look forward to speaking with you, so thank you for arranging this.

CA: Thank you, Rick.

Thank you for your participation.

That the NSA intends to reach out here and show a more open face is certainly a very strong statement.

You may have seen the talk and interview that Edward Snowden gave here a few days ago.

What do you think?

RL: So I think it was fun.

We didn't know he would show up there. Kudos to everyone who organized such a lovely surprise.

Like many things that have come to light since Mr. Snowden began releasing classified information, I believe there were some core pieces of truth in it, but there were also many extrapolations and half-truths that I am interested in helping to address.

I think this is a very important conversation that we're having within the United States and internationally, and I think it's important and important, and given that, it needs to be a fact-based conversation and we want to help make that happen.

CA: So the question a lot of people have here is what do you think Snowden's motives were for what he did, and if he had a different way of doing things?

RL: Surely he could have had another way, and I actually think that characterizing him as a whistleblower undermines legitimate whistleblowing efforts.

But what if someone works for the NSA? There are over 35,000 people working for the NSA.

They are all great people.

They are just like your husbands, fathers, sisters, brothers, neighbors, nephews, friends and relatives, and they all have an interest in doing the right thing for their country and their international allies, so there are different places for people to deal with their concerns.

First, there is the boss, who runs the entire supervisory chain within the organization.

If you don't like it, there are a lot of Inspectors.

In Snowden's case, he had the choice of NSA Inspector General, Navy Inspector General, Pacific Command Inspector General, Pentagon Inspector General, or Intelligence Community Inspector General, any of which would have kept his concerns on classified channels and would have been happy to address them.

(CA and RL speaking at the same time) He did not do any of those things because he had the option to join Congressional committees and the mechanics were in place to do so.

CA: Now, you said that Ed Snowden has other avenues to express his concerns.

There are several reversals to it. First, he does believe that the avenues that a contractor would have had available to him as an employee were not available; second, other whistleblowers like [Thomas Andrews Drake] have a track record of being treated fairly harshly by some perspectives;

I mean, can't you argue that what he did was reasonable in that situation?

RL: No, I disagree with that.

I - I'm sorry, I'm getting feedback through the microphone over there - I think the actions he took were basically inappropriate given the fact that they endangered people's lives in the long run. I know that Mr. Snowden and some journalists make a lot of public statements that what is published does not endanger national security or people, but that is absolutely not true.

It actually is.

I also think there is an astonishing arrogance in the idea that we know better than constitutional authors about how government should be designed and strive for separation of powers, and the fact that the executive and legislative branches must work together, keeping checks and balances against each other, and how the judiciary, which oversees the whole process, works.

I think it's very arrogant of him.

CA: Can you give specific examples of how he endangered people's lives?

RL: Yeah, sure.

So what he publishes, what his capabilities are, and because the NSA is a capabilities-based organization, if there are foreign intelligence targets, legitimate ones of interest, such as terrorists, are iconic examples, including human traffickers, drug traffickers, people developing advanced and nuclear weapons and trying to build delivery systems for them, and nation-states that may be carrying out aggression against their neighbors. There may be some visibility for some of what is happening now. Features are applied in a highly discrete and measured and controlled manner.

So unlimited disclosure of these abilities means that when an adversary sees them and realizes, "I might be vulnerable to this," they move away from them. We have also seen targets of terrorism, nation-state regions, smugglers of various kinds, and others distanced from their ability to know what they are doing because of disclosure.

The net effect is that our people, whether diplomats or military personnel, in perilous locations abroad, and our similarly situated allies, are at greater risk because they cannot see the threat looming over them.

CA: So the general reaction is that his revelations blocked access to certain types of information.

The concern, however, is that the nature of that access was not necessarily legitimate in the first place.

So, what is this bull run program that the NSA allegedly specifically weakened in order to gain the kind of access you mentioned?

RL: So when legitimate foreign intelligence targets of the type I described earlier use a global telecommunications system as a means of communication, they actually use that system. Because it's a wonderful system, and the most complex system mankind has ever devised. This is strange. Many people there are responsible for its creation and enhancement. That's just great.

But it is also used by those who oppose us and our allies.

So if I'm going to go after them, I need to have the ability to go after them, and again, the control is not in having the ability itself, but in how I apply that ability.

Otherwise, if you could allow all the bad guys to use your corner of the Internet, you could get the badguy.com domain.

That's great and we can focus all our efforts there.

Not exactly.

We have to swim in the same space as they seek to hide from the government's ability to isolate and block their actions.

But let me just say this.

So the NSA has two missions.

One is the Signals Intelligence mission, which we unfortunately read a lot about in the press.

The other is an information assurance mission, which is to protect the U.S. national security systems, such as those used by the President, those used to control nuclear weapons, those used by U.S. forces around the world, those used with and by some of our allies.

That's why we recommend the standards we use, use those same standards, and invest in making sure that communications are secure for their intended purpose.

CA: But what you're saying, when it comes to the Internet in general, it sounds like any strategy that makes America safer is fair.

And I think that's part of the divisiveness, and that there are a lot of people in this room and around the world who think about the Internet quite differently.

They equate it with the great inventions of mankind, such as Gutenberg's publications.

It brings knowledge to all.

It's all connectors.

And it is viewed from such an idealistic point of view.

And from that lens, what the NSA has done is tantamount to German authorities inserting some sort of device into every printing press that reveals what books people have bought and what they have read.

From that point of view, can you see that it is outrageous?

RL: I understand that, and I do share my view on the usefulness of the Internet, and I would argue that the Internet is bigger than the Internet.

It is a global telecommunications system.

The internet is a big part of it, but there are many others.

And I think people have legitimate concerns about the balance between transparency and confidentiality.

It seems to be claimed as a balance between privacy and national security.

I don't think that's the right framework.

I think it's really about transparency and secrecy.

That's the national and international conversation we're having, and we want to be a part of it, and we want people to be well-informed.

So let me tell you a little more. There are things we need to be transparent about, including our mandates, processes, oversight, and who we are.

We at the NSA haven't done a good job of that, but I think that's part of the reason this has become so revealing and sensational in the media.

No one knew who we were. We were not such an institution, but an institution that said nothing.

The logo of an eagle with headphones is drawn around it.

That's the public feature.

So we need to be more transparent about those things.

We don't have to be transparent because it's bad for the United States, it's bad for all the other nations we work with and help provide information that helps keep our country and its citizens safe, and it's bad for us to expose our operations and capabilities so that they can be countered by those we're all against, the generally perceived bad guys.

CA: But wouldn't it be a bad idea to give some kind of body blow to an American company that has provided the world with most of the essential Internet services?

RL: Yes. In fact, companies and we are in a tough spot alike. Because, like the rest of the world, companies are forcing information.

Every developed country in the world has lawful interception programs that require companies to provide information necessary for their security, and the companies involved comply with these programs in the same way they operate in Russia or the United Kingdom.

Or you can choose any country name such as China, India, France, etc.

So the fact that these disclosures are loosely characterized as "you can't trust company A because your privacy is questionable at company A" is actually only accurate in the sense that it's accurate for every other company in the world that does business with any country in the world.

And that's what people take up as a marketing advantage, and it's advertised as such in some countries, including some of our allies, saying, "You can't trust America, but you can trust our telecommunications companies because we're safe."

And they are actually using it to counter the enormous technological advantage that US companies have in areas such as cloud and internet-based technology.

CA: You're sitting there with an American flag, and the American Constitution guarantees freedom from unjustified search and seizure.

How would you characterize the right to privacy of American citizens?

Do you have that right?

RL: Yes, of course.

And we spend an inordinate amount of time and pressure—indeed, an inordinate and appropriate amount of time and effort—to ensure that privacy is protected.

And beyond that includes the privacy of citizens around the world, not just Americans.

A few things come into play here.

First, we are all in the same network.

Regarding my communications, I am a user of certain Internet e-mail services. This service is the email service of choice for terrorists worldwide.

I mean, I'm right there with them in the Internet email space.

So you need to be able to distinguish between them and find relevant information.

In doing so, we will inevitably run into Americans and innocent foreign nationals who are just doing their job, so we have procedures in place to shred it. I mean, not when you find it, but when you find it, it's sure to be found, so how do you protect this.

These are called minimization procedures.

They are authorized by the Attorney General and are constitutional.

And we protect them.

And for those around the world who routinely go about their legitimate business — the people — the President explained in his Jan. 17 address some of the additional protections we offer them.

Therefore, I absolutely believe that people have a right to privacy and we work hard to ensure that that privacy right is protected.

CA: What if a foreigner uses the Internet service of an American company?

Do they have privacy rights?

RL: Yes. In a sense, the only way you can force those companies to give you information is if the information falls into one of three categories. We can identify that this particular person identified by some sort of selector is associated with counter-terrorism, proliferation, or other foreign intelligence goals.

CA: A lot has been said about the fact that much of the information obtained through these programs is metadata in nature.

It may not be the actual words someone wrote in an email or spoke on the phone.

Who did you write to and when?

But there is some debate about it, and someone in this audience was talking to a former NSA analyst, who said metadata is actually much more invasive than core data. Because Core Data represents itself exactly as it wants to present itself.

No one knows what conclusions can be drawn from the metadata.

is there anything about it?

RL: I don't quite understand the argument.

There are several reasons why I think metadata is important.

Metadata is information that allows us to find connections that people try to hide.

Therefore, when terrorists, unknown to us, correspond with someone who is conducting or supporting terrorist activities, or who is violating international sanctions by providing nuclear weapons-related material to countries like Iran or North Korea, they are trying to cover up their activity on the grounds that it is illegal.

What metadata can do is tie it together.

Alternatives to this are far less efficient, far more invasive of privacy, and end up collecting vast amounts of content.

In that sense, metadata actually enhances privacy.

And unlike some things in print, we don't sit there and polish average people's metadata profiles.

If you are not associated with any of these valid intelligence targets, you are of no interest to us.

CA: So where do you place terrorism in terms of threats facing America as a whole?

RL: I think terrorism is still number one.

I don't think there's ever been a time when things have gotten so bad that there are so many places where petri dishes are formed where terrorists take advantage of the lack of governance.

My old boss, Admiral Tom Fargo, described this as an arc of instability.

So there are a lot of arcs of instability in the world right now. In places like Syria, civil wars are ongoing and vast numbers of foreign fighters have learned how to become terrorists and have come to Syria to practice their activities. And many of those people are Westerners with passports to European countries, possibly the United States, who have basically learned how to do jihad and have expressed their intention to go out later and do jihad in their own countries.

Places like Iraq have become hotbeds of terrorism once again, with sectarian violence escalating.

We also operate in the Horn of Africa and the Sahel region of Africa.

Again, many weak governances are breeding grounds for terrorist activity.

So I think it's very serious. I think that's number one.

I think the second is cyber threats.

I believe there are three threats to cyber. One point, and perhaps the most common method people have heard of, is through intellectual property theft. So basically, a foreign country invades, steals corporate secrets, and provides that information to state-owned or government-affiliated companies to leapfrog technology or acquire business intelligence that can be used to win contracts abroad.

It is an ongoing series of enormously expensive activities.

Some nation-states do it.

The second is a denial of service attack.

We all know that since 2012 there has been a flurry of attacks against the US financial sector.

Again, it is the nation-states that carry out those attacks, and they do so as a semi-anonymous method of retaliation.

The last ones are destructive attacks, and these are the ones I'm most concerned about.

they are on the rise.

2012, there is an attack on Saudi Aramco in August 2012.

About 35,000 computers were brought down by wiper viruses.

A week later, there was a follow-up with a company in Qatar.

There was an attack by South Korea in March 2013, reportedly attributed to North Korea that destroyed thousands of computers.

These competencies are on the rise, and we can see that people are interested in them and want to hire them.

CA: Well, let me explain a few things here. Because this is exactly the crux of the matter.

So, first, many who look at risks and numbers still don't understand the belief that terrorism is the greatest threat.

Not counting 9/11, I think there are figures that in the last 30 or 40 years, about 500 Americans have been killed by terrorism, mostly by terrorists from their own country.

The chances of dying from terrorism in the last few years are much lower than the chances of dying from a lightning strike.

You would say that just one nuclear incident, bioterrorism act, or something like that would change that number.

Is it the point of view?

RL: Well, I have two things to say.

One is that the reason there hasn't been a major terrorist attack in America since 9/11 is no coincidence.

This is a tremendous effort by us, others in the intelligence community, the military, and our allies around the world.

The tip of the iceberg figure in terms of the number of terrorist attacks that the NSA program helped stop is 54, 25 of them in Europe and 18 of those 25 in three countries, some of which are allies, some of which have beaten us outright over the NSA program.

So it's no coincidence that those things happen.

It's hard work. It is that we seek out information about terrorist activities and prevent them in some way through law enforcement, through cooperation with other countries, and sometimes through military action.

I would also like to say that your ideas about the nuclear and chemical-biological threats are not at all outlandish, and in fact there are many groups that have expressed an interest and desire to acquire these capabilities over the years and are working towards them.

CA: It is also said that of these 54 alleged incidents, only 0 were actually related to these controversial programs that Mr. Snowden disclosed. It's basically another form of espionage, it's like looking for a needle in a haystack, and it's also been said that the effect of these programs, the controversial ones, is just adding haystacks, not actually finding needles.

The needle was discovered by another method.

is there anything about it?

RL: No, actually that discussion usually involves two programs.

One is the US Telephone Metadata Program, the Section 215 Program, and the other, commonly referred to as the PRISM Program, is actually Section 702 of the FISA Amendments Act.

However, Plan 215 only relates to threats directed at the United States, and there have been more than a dozen such threats to date.

Now, what people say openly is that there is no case of "otherwise," and there is no case of a threat without it.

But it really shows a lack of understanding of how terrorism investigations really work.

You think about watching a murder mystery on TV.

What do you start with? Start by investigating the body, then solve the crime from there.

We're actually starting long before that, hopefully before the bodies are found, trying to establish who these people are and what they're trying to do, but it involves a huge amount of information.

Think of it as a mosaic. It's hard to say that every part of the mosaic was necessary to build the mosaic, but all the information is needed to build the whole picture.

On the other hand, of those 54 threats, the PRISM program was heavily associated with the remaining 42, not US-related, and indeed played a key role in thwarting those attacks.

CA: Snowden said two days ago that terrorism has always been the so-called "cloak for action" in the information industry, and that terrorism evokes such powerful emotional responses in people that the launch of these programs is what allows organizations like yours to achieve powers they otherwise would not have.

Are there internal discussions about it?

RL: Right.

I mean, we're constantly debating these things, and there's a debate going on inside the executive branch, the NSA itself, and the intelligence agencies about what's right, what's right, what's the right thing to do.

And it's important to note that the programs we're talking about have all been approved by two different presidents, two different political parties, twice by Congress, and as many as 16 times by federal judges. So this is not the NSA running away and doing their own thing.

This was a legitimate act of a foreign government of the United States agreed upon by all branches of the United States government and would have made President Madison proud.

CA: Still, many of them were completely shocked when they discovered what was actually being done with that authority.

Or do you think that was not a legitimate reaction and that they really knew what they were doing with the authority given to you just because it went public?

RL: Congress is a big organization.

There are 535 of them, and in the case of the House of Commons they are frequently replaced every two years. I believe that the NSA provides all relevant information to the Oversight Board, and that the Oversight Board's dissemination of that information throughout Congress is under the control of the NSA.

I think it could be said that members of Congress had the opportunity to show awareness, and indeed I believe that a significant number of members, those who have been assigned oversight responsibilities, had the ability to do so.

And I've actually gotten the chairpersons of those committees to say that in public.

CA: Now, you mentioned the threat of cyber-attacks, and I think everyone in this room agrees that it's a big concern, but do you acknowledge that there are trade-offs between offensive and defensive strategies, and that the measures taken to "weaken the encryption" so that the bad guys can be found can themselves open the door to various forms of cyber-attacks?

RL: So I'm thinking of two things.

One is to weaken the encryption. I did not do it.

For another, the NSA has both missions and is heavily biased toward defense, and indeed, in the overwhelming majority of cases, vulnerabilities found are disclosed to those responsible for manufacturing or developing those products.

We have a great track record on this and are currently working on a proposal to be transparent and publish transparency reports in the same way Internet companies are allowed to publish transparency reports.

We want to be more transparent about that.

Again, we eat dog food that we make ourselves.

Because we use standards and use the products we recommend, it is in our interest to continue to protect our communications in the same way others need them.

CA: Edward Snowden was roaming the halls here on his bot after his talk, and I heard him say to a few people. They asked what he thought of the NSA as a whole, and he was very complimenting about the people working with you guys, and said it was a really dedicated group of employees trying to do the right thing, and that the problems simply stemmed from some poorly thought out policies.

He certainly came very reasonably and calmly.

He didn't come in like a madman.

At the very least, is it acceptable that he has initiated an important discussion, even if we disagree with his way of doing things?

RL: So I think this discussion is an important one.

I don't like the way he behaves.

I'm sure there were many other ways we could have avoided endangering our people, or the people of other countries, by not seeing what the enemy was doing.

But I think it's an important conversation.

CA: It is reported that there is mostly disagreement between you and your colleagues over the scenarios in which he may be offered a pardon agreement.

I think your boss, General Keith Alexander, mentioned that it would set a terrible example for others. You cannot negotiate with someone who breaks the law in such a way.

But you reportedly said that if you could prove that Mr. Snowden turned over all undisclosed documents, you might consider a deal.

Do you still think so?

RL: Yeah, and actually what I love most about that 60 Minutes interview is all the misquotes that came out of it.

In fact, what I said was, in response to the question, would you like to discuss any mitigation measures against Snowden, yes, it is worth discussing.

I've actually discussed this with the Attorney General of the United States and the President, but I'll leave it to the Attorney General because it's going to be the Attorney General's opinion.

But there is a strong tradition in American jurisprudence to hold talks with people accused of crimes to get something out of it, if it benefits the government, and there is always room for such debate.

Therefore, I do not envision any outcome, but there is always room for discussion.

CA: To the public, it seems like he has something to offer the United States, the government, you, and the rest of the world in helping get things right and find smarter policies, smarter ways forward.

You see, such a possibility was not considered at all?

RL: That's a non-issue for me.

It's not about the NSA.

That would be an argument for the Justice Department.

let them.

CA: Rick, when Ed Snowden finished his talk, I gave him the opportunity to share an idea worth spreading.

What are some ideas worth spreading for this group?

RL: So I think we should learn the facts.

This is a really important conversation, and it affects not only the NSA, it's not just the government, it's you and the Internet companies.

Learn the facts because privacy and personal data issues are not just a government issue.

Don't rely on headlines, soundbites, or one-sided conversations.

That's why I think this idea is worth spreading.

We have signs and badge tabs, and we wear badges with lanyards at work. If you can make a plug, the badge lanyard at work says "Dallas Cowboys."

let's go to dallas

I know I alienated half the audience.

That's why there's a "look at the data" tab on the straps worn by staff working for organizations that do cryptocurrency analysis work.

So it's an idea worth spreading.

Look at the data.

CA: Rick, I think it actually took a certain amount of courage to come to this group and speak openly.

This isn't something the NSA has done many times in the past, plus the technology has been challenging.

Thank you very much for your cooperation and participation in this very important conversation.

Thank you very much.

RL: Thank you Chris.

(applause)

Charlie Rose: So Larry emailed me. He basically said we had to avoid being seen as a couple of boring middle aged men.

I said it's an honor -- (laughter) -- because I'm a little older and his net worth is a little bit more than mine.

Larry Page: Well, thank you.

CR: So, talking about the Internet, and Google, and search and privacy, and your philosophy and your sense of how you connected the dots, and how this journey that started a while ago has some very interesting perspectives.

I would like to talk mainly about the future.

So my first question is where is Google and where is it going?

LP: Well, this is something we often think about, and our mission, which we defined long ago, is to organize the world's information and make it accessible and useful.

And people always say, is that really what you guys are still doing?

And I always think about it myself, but I'm not sure.

But the truth is, when you think about search, for all of us, understanding what we want and the information in the world is very profound, but we're still in the early stages of it, and it's just crazy.

We've been working on it for 15 years already, and we're not quite done.

CR: What will it be like when it's finished?

LP: Well, in thinking about where we're going, why isn't it over? -- A lot of it is just a kind of computing mess.

Computers don't know where you are, what you're doing, or what you know. A lot of what we're trying to do these days is just make the device work and make it understand the user's context.

Google Now knows where you are and what you need.

In other words, actually making computing work, understanding users, and understanding their information has not really happened yet.

Still very, very clumsy.

CR: Tell me, where does Deep Mind fit in when you look at Google's efforts?

LP: Well, Deep Mind is a recently acquired company.

It's in England.

First, let me tell you how I got there. It was about looking at the search and really understanding and trying to understand everything. It was also about not making the computer clunky and really understanding the user. Voice, for example, was very important.

So what is the state of the art in speech recognition?

Not very good.

It doesn't really understand you.

So we started researching machine learning to improve it.

It was very helpful.

And then we started watching YouTube and so on.

Do you understand YouTube?

But when we actually ran machine learning on YouTube, machine learning single-handedly discovered the cat.

Now that's an important concept.

And we realized that there really is something here.

If we could learn what cats are, it would be very important.

What's really cool about Deep Mind is that it's actually possible. They are learning things in an unsupervised way.

They might start with video games, play video games, and show videos just by learning how to do it automatically.

CR: Let's look at video games and how machines have become capable of doing amazing things.

LP: The amazing thing about this, of course, is that these are old games, but the system just recognizes what you're looking at, the pixels, you have controls, you have scores, and it learns to play all these games in the same program.

I learned to play all these games with superhuman performance.

You've never been able to do something like this on a computer before.

And I will probably explain this soon.

We think this is boxing and we can nail our opponents.

The computer is on the left, just accumulating points.

So imagine if this kind of information was put in to suit your schedule, your information needs, etc.

We're just the beginning of it and that's what I'm really excited about.

CR: If you look at everything that's happened with Deep Mind and boxing, some of the directions we're going in include artificial intelligence.

Where are we when we see it?

LP: Well, for me, I think this is one of the most exciting things I've seen in a long time.

Demis, who founded the company, has a background in neuroscience and computer science.

He went back to school to get his doctorate. to study the brain.

And I think we're seeing a lot of exciting research going on that's kind of a hybrid of computer science and neuroscience in terms of actually understanding what it takes to make something smart and do something really interesting.

CR: But what is that level now?

And how fast do you think we are going?

LP: Well, this is the state of the art technology at the moment, YouTube and others, understanding cats and improving speech recognition.

I've used a lot of machine learning for incremental improvement, and I find this example very interesting. Because it can do so much in one program.

CR: I don't know if I can do this, but I have an image of a cat.

It would be great to see this.

This is how the machine observed the cat and what it came up with.

Can you see that image?

LP: Right. CR: Yes. can you see the cat?

Designed by machines, seen by machines.

LP: That's right.

So you can learn this just by watching YouTube.

No training required, no cat concept. But this cat concept is important for humans to understand, and now machines can understand it to some extent.

I probably just finished the search part, but it started with the search and really understood the context of people and their information.

I had a video I wanted to show you right away and I found it.

(Video) ["Soybeans, Kenya"] Zach Matere: I planted potatoes a while ago.

Then suddenly they started dying one after another.

I checked the book, but it didn't go into much detail.

So I went and checked it out.

["Zach Matere, Farmer"] Potato disease.

One website told me that ants could be the problem.

It said to sprinkle wood ash on the plants.

And after a few days, the ants disappeared.

Excited about the internet.

I have a friend who wants to expand his business.

So I went to an internet cafe with him and checked out some sites.

The next time I saw him, he was going to set up a windmill at a local school.

I felt proud because there was suddenly something that wasn't there before.

I realized that not everyone could access what I had access to.

I thought I needed an internet that my grandmother could use.

Then I thought of a bulletin board.

A simple wooden bulletin board.

If you get information on your mobile phone, you can post that information on the bulletin board.

So it's basically the same as a computer.

I use the internet to help people.

I think I'm looking for a better life for myself and my neighbors.

So many people have access to information, but no follow up to it.

I think it's our knowledge to follow up on that.

If people are knowledgeable, they can find solutions without help.

Information is powerful, but how we use it defines us.

(Applause) LP: Well, the amazing thing about that video, actually, I just read about it in the news, is that we found these gentlemen and made that little clip.

CR: When I talk to people about you, people who know you well say that Larry wants to change the world and believes technology can show the way.

And that means access to the internet.

It has to do with language.

It also means how people can access and do things that impact their community, and this is one example.

LP: Well, that's right. As for the future, I think there's a lot more focus on access.

We recently released this Loon project using balloons.

It sounds completely crazy.

You can show the video here.

In fact, two out of three people in the world today do not have adequate access to the Internet.

We actually think this can help people cost-effectively.

CR: It's a balloon. LP: Yes, go to the Internet.

CR: So why does this balloon have internet access?

It took some interesting work to figure out how to make the balloon come true, so I didn't have to tie it up.

LP: Yes, this is a good example of innovation.

For example, we had been thinking about this idea for over five years before we started working on it, but it was really about how we could put our access points high and cheaply.

It usually requires the use of satellites and takes a long time to launch.

But I found how easy it was to launch the balloon and pull it up. In fact, this is also the power of the Internet. I did some research and found out that 30 or 40 years ago, someone had put up a balloon and circled the earth many times.

And I wondered why I can't do that today.

This is how this project got started.

CR: But are you at the mercy of the wind?

LP: Yes, but in the end we did some weather simulations that probably hadn't actually been done before. If you control the altitude of the balloons by pumping air into them or whatever, you can roughly control where the balloons actually go, so I think you can build a global mesh of these balloons that can cover the entire planet.

CR: Before we talk about the future and transportation, you've been a nerd for a while, we're going to talk about transportation and your fascination with self-driving cars and bicycles. Let me say a few words about a subject I spoke with Edward Snowden on here before.

It's security and privacy.

You should have been thinking about it.

LP: Yes, of course.

Yesterday I saw a photo of Sergey and Edward Snowden.

Some of you may have seen it.

However, privacy and security are very important to me.

We look at it both ways. I believe that privacy cannot be ensured without security. So since you asked about Snowden and all that, let me just talk about security first. After that, we'll talk a little bit about privacy.

To me, I find it very disappointing that the government did all these things in secret and didn't let us know.

I don't think a democracy works if the government has to protect you and your users from things that have never been discussed before.

And it doesn't mean that we need to know what the specific terrorist attacks they are concerned about protecting us from are, but we do need to know what its parameters are, what kind of surveillance the government intends to conduct, and how and why. And I don't think we have that kind of conversation.

So I think the government really did a lot of damage by doing all this in secret.

CR: People don't come to Google to ask anything.

LP: It's not Google, it's the public.

I think we should discuss it. Otherwise, I don't think we can maintain a functioning democracy.

It is impossible.

Therefore, we regret that Google is in a position to protect you and our users from governments doing secret things that no one knows about.

It makes no sense.

CR: Right. And there is also the privacy aspect.

LP: Yes. In terms of privacy, I think the world is changing.

you carry a phone It knows where you are.

There's a lot more information about you, and that's important. No wonder why people ask hard questions.

We spend a lot of time thinking about what's wrong with this.

I think so a little. I think the main thing we need to do is just give people choices and show them what data is being collected, such as search history or location data.

We're excited about Chrome's Incognito Mode and how we can do it in more ways, giving people more choice and more awareness of what's going on.

I find it very easy too.

What worries me is throwing the baby out with the bath water.

And on your show, I actually lost my voice, and I haven't got it back yet.

I think we'll get back together if we talk.

CR: If I can do something, I would do it.

LP: Okay. So take out your voodoo doll and whatever you need.

But I think I saw it, put it out there and got all the information.

Wouldn't it be great if everyone's medical records were made anonymously available for people with similar problems to do research on medical conditions, look at medical records, and research doctors?

And when someone accesses your medical records, research doctors can see which doctors accessed them and why, and they may be able to learn what your condition is.

If we can do that, I think we can save 100,000 lives this year.

CR: Of course. Let me go — (applause) LP: So what I'm very concerned about is Internet privacy, that we're doing what we do with medical records, that we're throwing babies out with the bath water, and that people aren't taking seriously the enormous benefits that can come from sharing information in the right ways with the right people.

CR: And a necessary condition is that people have confidence that their information will not be misused.

LP: Yes, and I had this problem with my voice.

I was afraid to share it.

Sergey encouraged me to do that and it was great.

CR: And the response has been overwhelming.

LP: Yes, and people are very positive.

There are thousands of people with similar symptoms, but we currently have no data.

So it was really good.

CR: So talking about the future, what about you and the transportation system?

LP: Right. I think I was frustrated by this when I was in college in Michigan.

I had to wait on the bus to get on the bus.

And it was cold and snowing.

I tried to find out how much it would cost, but I got a little obsessed with transportation.

CR: And that's where the idea for self-driving cars started.

LP: Well, I found out about people working on self-driving cars about 18 years ago and was fascinated by it. These projects take time to move forward, but I'm very excited about the potential they have to improve the world.

More than 20 million people are injured each year.

It is the leading cause of death for people under the age of 34 in the United States.

CR: So you're talking about saving lives.

LP: Well, you can also save space and improve your life.

Los Angeles is half parking lots and roads and half square footage, and most cities aren't really far behind.

It's just crazy that that's what we use our space for.

CR: So when will it arrive?

LP: I think we can get there very soon.

I've driven well over 100,000 miles and it's now fully automated.

I am very excited to have it out soon.

CR: But you're not the only one talking about self-driving cars.

I have a similar idea for bicycles.

LP: Well, Google came up with the idea that we should give everyone a free bike. And for most of the trip it was amazing.

I see bicycles running here and there, but they are worn out.

They are in use 24 hours a day.

CR: But you also want to put it on the road.

LP: Well, I said, how can we get people to use their bikes more?

CR: There may be a video here.

LP: Yes, let me show you the video.

I was excited about this.

(music) This is how you actually separate bikes and cars with minimal cost.

Anyway, as completely crazy as it seems, I was actually thinking about campus, working with Zippy's and the like, trying to get more bike usage. I was wondering how to separate bikes from traffic in a cost effective way.

Then I went and looked for it and found this.

We're not really working on this or anything in particular, but it captures the imagination.

CR: Let me finish with this.

What is your own philosophy of mind?

You have the idea of ​​[Google X].

We don't just want to participate in small, measurable areas of progress.

LP: Well, I think a lot of what we just talked about is like that, but actually I mostly use the economic concept of additionality. This means that you are doing something that wouldn't happen if you weren't actually doing it.

And I think the more we can do that kind of thing, the more impact we have. It's about doing what people might think is impossible.

And I am amazed. The more I learn about technology, the more I realize what I don't know. Because we can see the horizon of this technology, what it will do next, and the more we learn about the technology, the more we can learn about what is possible.

You learn that you can make balloons because you have the right materials.

CR: But what's interesting to you, to me, is that there are a lot of people thinking about the future, they're coming and going, and they're coming back, and you're never seeing it come to fruition.

It reminds me of the Tesla you knew and read about.

What is that principle for you?

LP: Well, I don't think invention alone is enough.

If he invented anything, Tesla invented the power we use, but he struggled to get it to people.

Someone else had to do it.

It took a long time.

And if we can really combine both, then we want to be a company that is focused on innovation and invention, but also really commercializes things, reaches people in ways that are positive for the world, and gives people hope.

You know, I'm amazed at how excited people were with the Loon project. Because this project has given hope to two-thirds of the world without internet today.

CR: That's the second thing about companies.

You are one of those who believe that companies are agents of change if they are run well.

LP: Right. It really disappoints me that most people think corporations are basically evil.

They get a bad reputation.

And I think that's true to some extent.

Companies are doing the same incremental things they did 50 or 20 years ago.

It's not really necessary.

We need revolutionary change, not incremental change, especially in technology.

CR: You once said, in fact, and I think you're almost right, that if you're going to keep your money for something, you might just consider donating it to Elon Musk instead of donating it to Elon Musk. Because you had confidence that he would change the future, so you would — LP: Yes, if you want to go to Mars, he wants to go to Mars, to help humanity, that's a worthy goal, but it's a corporation, it's a philanthropy.

So I think we are aiming for something similar.

I think Google has a lot of employees who have gotten pretty wealthy.

People make a lot of money with technology.

Many people in this room are quite wealthy.

You work because you want to change the world.

We want to make it better.

Why is the company you work for not worth your money as well as your time?

So we don't have that concept.

We don't think of companies that way and I think it's sad. Because companies make up most of our efforts.

They're where people spend most of their time and spend a lot of money, so they want more help than we do.

CR: I always ask this question when I finish a conversation with a lot of people. What state of mind, what quality of mind worked best for you?

People like Rupert Murdoch said they were curious, and so did other media people.

Bill Gates and Warren Buffett said they would narrow their focus.

As you left this audience, what qualities of mind enabled you to think about the future and change the present at the same time?

LP: You know, I think the most important thing. I looked at many companies and wondered why I thought they would not succeed over time.

The turnover of companies is accelerating.

And I said, what did they do fundamentally wrong?

What did these companies do wrong?

And most of the time it's just that they missed the future.

So I think that's what I'm trying to focus on there and say what that future really is and how we create it and how our organization can really focus on that and drive it at a very high rate.

That's curiosity, looking at things that people don't think about and working on things that no one else is working on. Because there is additionality, and we are willing to take that risk.

Look at android.

In the early days of Android, I felt guilty working with it.

We bought a small startup company.

It wasn't something we were really working on.

And I felt guilty for wasting my time on it.

It was stupid.

It was the future, right?

It was a good thing we worked on it.

CR: Nice to meet you here.

We are very happy to hear your opinions. I am also honored to be able to sit with you at this table.

Thank you Larry.

LP: Thank you.

(Applause) CR: Larry Page.

If you ask for the name of the microbe that lives in your gut, most people will probably say E. coli.

Many people say this. It is the most well-known of the intestinal microbes.

But E. coli is found to be about 1,000 times more numerous in the gut than other species, many of which you've probably never heard of.

These are Bacteroidetes. Prevotella is one such example.

These are the two that dominate the gut of modern man.

About 100 trillion microorganisms live in your body.

We call this the microbiome. So it's like a small world that lives inside you, actually akin to the universe.

100 trillion means that if you planted and planted all the microbes that live in your gut from a blade of grass, you could fill a million football fields.

So incredibly complicated.

Interestingly, however, as our bodies adapt to life in modern society, we are losing some of the normal microbes, and at the same time a significant number of gut-related diseases are proliferating in developed countries around the world.

And many of you probably know someone who suffers from obesity, diabetes, Crohn's disease, ulcerative colitis, allergies, and asthma.

All of these diseases, and many others related to metabolism and autoimmunity, are associated with loss of healthy diversity in the gut.

My lab first pointed this out when we were actually working with non-human primates.

We wanted to know what happens to the monkey microbiome as they move from the jungle to the zoo.

Will their microbiome change? Will they find new bugs?

how much do they lose? Is it better or worse?

We tracked two different species in the jungle (one from Vietnam and one from Costa Rica) and sequenced DNA from their feces.

This is how I study the microbiome in my lab.

And what we found in DNA is that in the wild, these two species had completely different sets of microbes.

It was kind of like a fingerprint.

In zoos, however, most of that diversity was lost and other microbes were acquired.

So this was very interesting.

We have these two different microbiomes.

In the wild, imagine a lush rainforest where the guts of these monkeys live.

That's the diversity we're talking about.

And diversity is lost in zoos.

Imagine a rainforest that has been burned down and taken over by a few invasive species.

It rather resembles the microbiome of captive primates.

Well, meanwhile, many of the animals at the zoo aren't doing very well.

They suffered from obesity, wasting, gastroenteritis, diarrhea and bloating, and some were barely surviving.

Now, of course, we were very interested in finding out what the so-called alien species were raging in the zoo.

So we went back to DNA. DNA told us that all the monkeys in the zoo were dominated by Bacteroidetes and Prevotella, the same microbes that live in the gut of modern humans.

We wanted to find a way to visualize this, and used some tools of multivariate ecology to put all the microbiomes we were studying on an axis.

What you are looking at here is a distance plot where every point is a different animal microbiome.

So every dot represents the entire zoo of microbes.

And microbiomes with many common microbes are close to each other.

The ones that are significantly different are further apart.

This shows two groups of wild monkeys on the left.

Top left is a highly endangered monkey called the red-shanked douc of Vietnam.

And the bottom left is a monkey from Costa Rica.

So you can see that they have a completely different microbiome in the wild.

And the gathering of the same two species of monkeys in zoos alters their microbiota, making them more similar to each other, despite being zoos on different continents, in different geographic regions, and eating different diets.

Well, we also studied other primate species.

What primate species do you think are more divergent with wild primates than with captive primates?

modern man.

They are humans living in developing countries.

That is, they were much more different from wild primates than zoo primates.

And the last group we studied is people who live in America all the way to the right.

And when I saw this figure, I felt like the hairs on the back of my neck stood on end. Because one way to think about this is, "Oh, that's interesting. Captive monkeys are kind of becoming like Americans."

(Laughter) But looking at it another way, Americans are like monkeys in extreme captivity.

And I was actually looking at this diagram on my computer screen when I got the news that four redshanks had died at the zoo from gut-related problems.

Therefore, the survival of some of these animals may depend on having the appropriate microorganisms living in their bodies.

Now we move on to the human part of the story.

Clearly, the U.S. microbiome doesn't cause premature death as often as zoos do, but it carries a greater risk of obesity, diabetes, and many other diseases.

And this applies not only to those who have lived in the United States for generations, but also to immigrants and refugees. Most immigrant and refugee groups arrive in the United States metabolically healthy, but within a few years they are at increased risk of obesity and diabetes, like all Americans.

And we discussed this issue with two groups who came to the United States from Southeast Asia. The Hmong began arriving in the mid-1970s as refugees from the Vietnam War and the US secret war in Laos. And the Karen people who recently came from Myanmar as refugees.

So we have been working with local communities and clinicians for several years to study what happens to Hmong and Karen microbiomes as people migrate to the United States from refugee camps and villages in Thailand.

And what we found is that when these groups of people come to the United States, they lose most of their microbiome, about 20 percent, and those who come to the United States and become obese lose about one-third of their microbiome.

So we know that moving to the US is enough to make a dramatic change in your microbiome, but probably not for the better.

Are these microbes actually causing obesity, or is obesity causing microbial changes?

This is what we are tracking, and the evidence currently in my lab, combined with evidence from many labs around the world, shows that specific alterations in the microbiome cause obesity and many other Westernized modern diseases.

The good news is that your microbiome can actually change.

Unlike your own genome, it is a living, breathing thing, and extensive research is currently underway to better understand how you can use diet and live microbes to restore your microbiome when something goes wrong.

And indeed, one of our next steps is to collect and store microbes from healthy people around the world. This allows them to be preserved as cultural assets to potentially protect those people as they adapt to modern society and to protect future generations who are now growing up as their risk of these diseases increases as generations progress.

I look forward to a future where we have the tools we need to repair and replenish our microbiome. In that world, monkeys can live happier and healthier lives, and so can we.

(applause)

In many patriarchal and tribal societies, fathers are usually known to sons, but I am proud to be one of the few fathers known to daughters.

(Applause.) Malala started her campaign for education in 2007, asserted her rights, and was awarded the National Youth Peace Award in 2011 for her efforts, making her a very famous and very popular girl in the country.

She used to be my daughter, but now I am her father.

Ladies and gentlemen, if you look back at human history, the story of women is a story of injustice, inequality, violence and exploitation.

In patriarchal societies, the birth of a girl is not celebrated from the moment it is born.

She is not welcomed by either her father or her mother.

Neighbors come and pity the mother, but no one blesses the father.

And mothers feel very uncomfortable giving birth to girl children.

When she gave birth to her first daughter, her first daughter, she was sad.

When she gives birth to a second daughter, she is shocked, and when she expects a son and gives birth to a third daughter, she feels guilty like a criminal.

Not only the mother suffers, but when the daughter, the newborn daughter, grows old, she suffers too.

At age 5, she should go to school, but she stays at home and her siblings are enrolled in school.

Until the age of 12, I was doing well.

she can enjoy

She can hang out with her friends around the city and can move around the city like a butterfly.

But when she enters her teenage years and turns 13, she is forbidden to leave the house without a male escort.

She is trapped under the four walls of the house.

She is no longer a free individual.

She becomes the so-called honor of her father, brothers and family, and if she violates the rules of that so-called honor, she can even be killed.

And it is also interesting that this so-called code of honor affects not only the life of girls, but also the life of male members of the family.

I know a family of 7 sisters and 1 brother who immigrated to the Gulf countries to support his 7 sisters and parents. Because the seven sisters learned the skills and thought it would be humiliating for them to leave home and earn a living.

So this brother sacrificed the joy of his life and the happiness of his sisters on what is called the altar of honor.

And in patriarchal societies there is another norm called obedience.

A good child should be very quiet, very humble, very obedient.

That's the standard.

A good role model should be very quiet.

She has to be silent and is supposed to accept the decisions of her father and mother and those of her elders even if she doesn't like it.

I don't want to be seen as disobedient if I marry a man I don't like, or if I marry an older man, so I have to accept that.

If she gets married very early, she will have to accept.

Otherwise she will be called disobedient.

And what happens in the end?

In the words of one poet, she gets married, goes to bed, and gives birth to sons and daughters.

And it is the irony of the situation that this mother teaches her daughter the same lesson of obedience, and her sons the same lesson of honor.

And this vicious circle continues.

Ladies and Gentlemen, if we change our minds, if women and men change their minds, if men and women in tribal and patriarchal societies in the developing world can break some of the norms of their families and societies, if we can abolish discriminatory laws in state systems that violate women's basic human rights, the plight of millions of women could change.

Dear brothers and sisters, the first time Malala was born, believe me, I don't like newborns, to be honest, but when I went and looked into her eyes, believe me, I was so honored.

And long before she was born, I thought about her name and was fascinated by the heroic and legendary warriors of Afghanistan's freedom.

Her name is Malalai of Maiwand and I named my daughter after her.

A few days after Malala was born, my daughter was born and my cousin came. And it was a coincidence. He came to my house and brought the Yousafzai family tree. When I looked at the family tree, it could be traced back to 300 years of our ancestors.

But when I looked, they were all men, so I took a pen, underlined my name, and wrote "Malala."

And when she grew up, when she was four and a half, I enrolled her in my school.

You may be wondering, then, why the need to mention admission to an all-girls school.

Yes I have to mention.

It may be commonplace in Canada, the United States, and many developed countries, but in poor countries, patriarchal societies, and tribal societies, it is a major event in a girl's life.

Enrolling in school means her identity and name are recognized.

Enrolling in school meant that she entered a world of dreams and aspirations where she could explore future life possibilities.

I have five sisters, but none of them went to school. You might be surprised to know that two weeks ago, when I was filling out my Canadian visa application and filling out the family section, I couldn't remember the last names of some of my sisters.

The reason is that I never saw my sister's name on any document.

That's why I cherished my daughter.

I thought I had to change what my father didn't give to his sisters and daughters.

I admired my daughter's intelligence and brilliance.

I encouraged her to sit with her friends when they came over.

I encouraged her to go to various gatherings with me.

And all these good values ​​I tried to instill in her character.

And this wasn't just her, it was just Malala.

I passed on all these good values ​​to my school, girls and boys.

I used my education for liberation.

I have taught my daughters and schoolgirls to forget the lessons of obedience.

I taught my boys to forget the so-called pseudo-honor lessons.

Dear brothers and sisters, we were striving for more rights for women, striving for more and more space for them in society.

However, we encountered a new phenomenon.

It was fatal to human rights, especially women's rights.

It was called Talibanization.

It means the complete denial of women's participation in all political, economic and social activities.

Hundreds of schools have been lost.

Girls were forbidden to go to school.

Women were forced to wear veils and were barred from going to markets.

Musicians were silenced, girls were whipped, singers were killed.

Millions were suffering, but few had a say. The most terrifying thing was to have people around you who would kill and whip you and claim your rights.

That's really what scares me the most.

Malala stood up for her right to education when she was 10 years old.

She journaled for the BBC blog, volunteered for a New York Times documentary, and spoke out on every platform possible.

And her voice was the most powerful voice.

It spread across the world like a crescendo.

That is why the Taliban did not tolerate her activities and on 9 October 2012 she was shot in the head at point blank range.

It was a devastating day for my family and for me.

The world turned into a huge black hole.

When my daughter was on the verge of death, I whispered in my wife's ear. "Should I be blamed for what happened to my daughter and your daughter?"

And suddenly she said to me, "Don't blame yourself.

You defended the right cause.

You risk your life for the cause of truth, the cause of peace, the cause of education. And your daughter was also inspired by you and joined you.

You two were on the right track and God bless her. ”

Those few words meant so much to me that I didn't ask this question again.

When Malala was hospitalized, suffering severe pain and severe headaches from a severed facial nerve, I often saw black shadows spreading across my wife's face.

But my daughter never complained.

She used to tell us, "It's okay to have a crooked smile and a numb face.

I think it's okay. please do not worry. ”

She was a comfort and comfort to us.

Dear brothers and sisters, we have learned from her how to bounce back in the most difficult times. I am happy to share with you that despite being a symbol of children's and women's rights, she is just like any other 16-year-old girl.

She cries when she doesn't finish her homework.

She quarrels with her brothers and I am very happy about it.

People ask me what is so special about my leadership that has made Malala so bold, courageous, vocal and poised.

I tell them not to ask me what I did.

Hear what I didn't do

I didn't clip her wings, that's all.

thank you very much.

(Applause.) Thank you. thank you very much. thank you. (applause)

A herd of wildebeest, a flock of fish, a flock of birds.

The sight of many animals gathering together in large herds is one of nature's most spectacular sights.

But why do such groups form?

Common answers include increasing numbers in search of safety, hunting in packs, and gathering together for mating and breeding. All of these explanations, while often true, make major assumptions about animal behavior that animals control their behavior and are in control of their bodies.

And often not.

Artemia of brine shrimp.

They are probably better known as sea monkeys.

They are small and usually live solitary, although they may congregate in large red flocks several meters long formed by parasites.

These shrimp are infected with tapeworms.

A tapeworm is effectively a long, living intestine with a reproductive organ on one end and a hooked mouth on the other.

As a freelance journalist, I sympathize.

(Laughter) Tapeworms deprive Artemia of nutrients, but they do other things.

It castrates them, changes their color from clear to bright red, makes them live longer, and, as biologist Nicholas Lord discovered, it makes them swim in groups.

why? This is because tapeworms, like many other parasites, have a complex life cycle involving many different hosts.

Shrimp is just one step on that journey.

Its final destination is the Greater Flamingos.

Since tapeworms can only reproduce inside flamingos, they manipulate their host shrimp to get there, forming brightly colored swarms that are easy for flamingos to spot and eat. This is the secret of the Artemia herd.

You don't become sociable out of your own will, you become sociable because you are being controlled.

Not numerically secure.

The opposite is actually true.

Tapeworms take over their brains and bodies and turn them into vehicles to become flamingos.

And this is another example of parasitic manipulation.

This is a suicidal cricket.

This cricket swallowed the larvae of the Gordian worm, or horsehair worm.

The worms grow to adult size inside their bodies, but must enter the water to mate, which releases proteins that stimulate the cricket's brain and cause the cricket to behave abnormally.

When a cricket approaches this pool-like body of water, it dives and drowns, and a wriggling worm emerges from the suicide corpse.

Crickets are really wide. did you know who?

Tapeworms and Gordian worms are not alone.

They are part of a whole swarm of mind-controlling parasites, including fungi, viruses, worms and insects that specialize in subverting and overriding the will of their hosts.

Well, I first learned about this way of life about 20 years ago in The Trials of Life by David Attenborough, and later through the wonderful book Parasite Rex by my friend Carl Zimmer.

Since then, I have continued to write about these creatures.

Nothing fascinates me more than the topic of biology.

It's like a parasite destroyed my own brain.

Because, at the end of the day, they're always compelling and delightfully creepy.

Writing about parasites fills your vocabulary with phrases like "eaten alive" and "jump out of your body."

(Laughter) But that's not all.

I'm a writer, and fellow writers in the audience will know we love stories.

Parasite invites us to resist the lure of obvious narratives.

Their world is one of plot twists and unexpected expositions.

For example, why does this caterpillar begin to rage when approached by another insect, and when approached by the white cocoon it seems to be guarding?

Maybe he's protecting his brothers?

no.

This caterpillar was attacked by a parasitic wasp that laid eggs within it.

The eggs hatched, and the young wasps ate the caterpillars alive before jumping out of their bodies.

Do you understand what I mean?

Well, the caterpillar didn't die.

Some wasps seem to stay behind and control their cocoons as they metamorphose into adults.

This caterpillar is a head-banging zombie bodyguard that protects the offspring of the creature that killed it.

(Applause.) We have a lot to overcome. We only have 13 minutes. (Laughter) Now, some of you may be desperately seeking solace in the idea that these things are strange and outliers in nature. I can understand that point of view. Because by their nature, parasites are very small and spend a lot of time in the body of other things.

These are often overlooked, but that doesn't mean they aren't important.

A few years ago, a man named Kevin Lafferty took a group of scientists to three estuaries in California to weigh, dissect, and record everything they could find, and what they found was an extremely large number of parasites.

Especially common were flukes, tiny worms that specialize in castrating their hosts, like this unfortunate snail.

Now, a single fluke is very small and microscopic, but together they weigh as much as all the fish in the estuary, and three to nine times more than all the birds.

And remember that Gordian worm I showed you, Cricket?

One Japanese scientist named Takuya Sato found that in one river, these substances drove so many crickets and grasshoppers into the water that drowning insects accounted for about 60 percent of the local trout diet.

Manipulation is not uncommon.

It's an important and common part of the world around us, and scientists are now discovering hundreds of examples of such manipulators and, more interestingly, beginning to understand exactly how these creatures control their hosts.

And this is one of my favorite examples.

This is the emerald cockroach wasp, Ampulex compressa. It's a widely accepted truth that an emerald cockroach wasp that has several fertilized eggs must be after the cockroach.

When she finds it, she pricks it with a needle, which is also a sensory organ.

The discovery was made three weeks ago.

She pricks it with a needle, a sensory organ with tiny sensory projections that allows her to feel the unique texture of a cockroach's brain.

There, like someone walking around blindly in a sack, she finds a brain and injects a venom into two very special clusters of neurons.

Israeli scientists Frederic Libersat and Ram Gall have discovered that the poison is a very special chemical weapon.

It does not kill or tranquilize cockroaches.

Cockroaches can walk, fly, and run if they choose, but they don't because the venom discourages them from walking.

A wasp can basically uncheck the escape-from-hazard box in a cockroach's operating system and, like a dog-walker, lead a helpless victim back to the nest with its tentacles.

And when she gets there she lays an egg on it and the egg hatches and is eaten alive and pops out of her body, yadda yadda yadda, you know the drill.

(Laughter) (Applause) Now, I would argue that a cockroach once stung is no longer a cockroach.

It is rather an extension of the wasp in the same way that the cricket is an extension of the Gordian worm.

These hosts cannot survive or reproduce.

They can control their own destiny as much as my car.

Once the parasite invades, the host has no say.

Of course, humans are not used to manipulation.

We take drugs to change our brain chemistry and change our mood. And what is an argument, an advertisement, a big idea, if not an attempt to influence someone's mind?

But our attempts to do this are crude and fiasco compared to the fine-grained specificity of the parasite.

Don Draper can only wish he were as elegant and precise as an emerald cockroach.

I think this is part of what makes parasites so evil and fascinating.

We value free will and independence so much that the possibility of those qualities being lost to unseen forces plays into many of our deepest social fears.

Orwellian dystopias, shadowy cabals, mind-controlling supervillains, these are tropes that fill our darkest fictions, but they happen all the time in nature.

This raises an obvious and disturbing question. Besides the NSA, are there other dark and sinister parasites influencing our behavior without our knowledge?

If anything — (Laughter) (Applause) You have a red dot on your forehead right now.

(Laughter) If there is, this is a strong candidate.

This is Toxoplasma gondii, or Toxo for short. Because this terrifying creature always deserves a cute nickname.

Toxo infects mammals, a variety of mammals, but only cats can reproduce sexually.

And scientists like Joanne Webster have shown that when Toxo invades rats and rats, it turns rodents into cat-tracking missiles.

When an infected rat smells the pleasant smell of cat piss, it will run towards the source of the odor rather than fleeing in a more sensible direction.

Cats eat mice. Toxo gets to have sex.

This is the classic story of eating, preying and loving.

(Laughter) (Applause.) You are very charitable and generous people.

Hi Elizabeth, I really liked your story.

How do parasites control their hosts?

I really don't know.

We know that Toxo releases an enzyme that produces dopamine, a substance involved in reward and motivation.

It has been found to target specific parts of the rodent brain, such as those involved in sexual arousal.

But it's not immediately clear how these puzzle pieces fit together.

What is clear is that this is a single cell.

It has no nervous system.

It has no consciousness.

It doesn't even have a body.

But is it manipulating mammals?

we are mammals

Sure, we're more intelligent than simple rats, but our brains have the same basic structure, the same types of cells, the same chemicals, and the same parasites.

Estimates vary widely, but some figures suggest that 1 in 3 people worldwide have Toxo in their brains.

This usually does not cause any obvious illness.

The parasite remains dormant for a long time.

However, there is some evidence that people who are carriers score slightly differently than others on personality questionnaires, have a slightly higher risk of road accidents, and some evidence that people with schizophrenia are more likely to be infected.

Now, I don't think this evidence is conclusive yet, but Toxo researchers are divided on whether parasites really affect our behavior.

However, given the widespread nature of such manipulations, it would be highly unlikely that only humans were not similarly affected.

And I think this ability to constantly upend the way we think about the world is what makes Parasite so great.

They always prompt us to look sideways at the natural world and ask whether the actions we see, whether simple and obvious or puzzling and puzzling, are not the result of individuals acting of their own volition, but because they are yielding to the control of something else.

And while the idea may be disturbing, and the parasite's habits may be very gruesome, I think the ability to surprise us makes them as wonderful and charismatic as pandas, butterflies, and dolphins.

At the end of On the Origin of Species, Charles Darwin writes about the greatness of life and its most beautiful and most wonderful infinite forms, and I suspect he was talking briefly about tapeworms that socialize shrimp and wasps that take cockroaches for walks.

But perhaps it's just a parasite story.

thank you.

(applause)

good morning.

When I was young, I had a life-changing experience. And in fact that is why I am here today.

That moment had a huge impact on how I think about art, design and engineering.

For background, I was fortunate to grow up in one of the world's largest cities, in a family of loving and talented artists.

My father, John Phelen, who died when I was 15, was an artist by passion and by profession, like my mother, Ray.

An Abstract Expressionist of the New York School, he, along with his contemporaries, invented contemporary American art and helped move the American zeitgeist toward modernism in the 20th century.

Isn't it remarkable that modern art, relatively speaking, only 15 minutes old, is now so pervasive, even though for thousands of years people have been primarily engaged in figurative art?

Like many other important innovations, these radical ideas do not require new technology. All it takes is fresh thinking, a willingness to experiment, and resilience in the face of almost universal criticism and rejection.

There was art all over our home.

It was like oxygen, all around us, necessary for life.

As I watched my father paint, he taught me that art is not just a decorative thing, but another way of communicating ideas, and that it can actually bridge the worlds of knowledge and insight.

Given this rich artistic environment, you might think that I had no choice but to take over the family business, but that is not the case.

I have followed the path of most children genetically programmed to drive their parents crazy.

I was never interested in being an artist, and certainly not a painter.

I loved taking electronics and machines apart, building new ones, and making them work.

Luckily, I have engineers in my family, and my parents were my first role models.

What they all had in common was that they worked very hard.

My grandfather owned and ran a sheet metal kitchen cabinet factory in Brooklyn.

On weekends, we went to Cortland Street, New York City's radio district.

There we explored a large pile of surplus electronics, and for a few bucks we were able to bring back treasures like Norden bomb sights and parts for the first IBM tube-based computer.

I found these objects useful and attractive.

I learned engineering and how things work, not in school, but by taking apart and studying these amazingly complex devices.

I would repeat this for hours every day to avoid being electrocuted.

life was good

But sadly, each summer, the machine was left behind while my parents and I traveled abroad to experience history, art and design.

We visited wonderful museums and historic buildings in Europe and the Middle East, but to encourage my growing interest in science and technology, they would only drop me off at places like the Science Museum in London, where I would wander endlessly alone for hours studying the history of science and technology.

Then, when I was about nine years old, we went to Rome.

On a particularly hot summer day, we visited a drum-shaped building that didn't look particularly interesting from the outside.

According to my father, it was called the Pantheon, the temple of all gods.

Like I said, it didn't look all that special from the outside, but as soon as I walked in, I noticed three things. First, it was pleasantly cool even though it was muggy outside.

It was very dark and the only light source was a large hole in the roof.

Dad explained that this is not a gaping hole, it is called an eyeball, an eye to heaven.

And there was something about this place that felt special, I don't know why.

As I walked to the center of the room, I looked up through the oculus.

This was the first church I visited and it gave me an unlimited perspective between God and man.

But I wondered what would happen when it rained.

Dad might have called it an oculus, but it was actually a big hole in the roof.

Looking down, I saw a floor drain cut into the stone floor.

As I got used to the darkness, I could see details on the floor and surrounding walls.

No big deal here. All the same statues that I saw everywhere in Rome.

In fact, when a marble salesman from the Via Appia appeared with a sample book and showed it to Hadrian, Hadrian apparently said, "Let's take it all."

(laughs) But the ceiling was amazing.

It looked like Buckminster Fuller's geodesic dome.

I've seen it before and Bucky was friends with my dad.

It was modern, hi-tech, imposing, a massive 142-foot transparent span, and not by chance, just that tall.

Loved this place.

It was really beautiful and unlike anything I had ever seen before, so I asked my father, "When was this built?"

"About two thousand years ago," he said.

And I said, "No, I mean the roof."

See, I thought this was destroyed in an old war and had a modern roof.

He said, "This is the original roof."

That moment changed my life and I remember it like it was yesterday.

I learned for the first time that people 2000 years ago were smart. (Laughter) I never thought of this.

So for me, the Pyramids of Giza, which I had visited the year before, was certainly impressive and well designed, but you know, unlimited budget, 20,000 to 40,000 workers, about 10 to 20 years to cut and drag blocks of stone through the countryside. Then I will build a pyramid for you too.

But 2,000 years ago and now, no amount of force will get you the dome of the Pantheon.

Incidentally, it is still the largest plain concrete dome ever built.

The construction of the Pantheon required some miracles.

By "miracle" I mean something that is technically almost impossible, very risky, and might not actually be achievable at the moment, and certainly not for you.

For example, here are some of the miracles of the Pantheon.

To make it structurally possible as well, they had to invent super-strength concrete and vary the aggregate density as they climbed the dome to control weight.

To ensure strength and lightness, the dome structure uses five ring coffers, each of which is reduced in size, giving the design a dramatic perspective.

Inside, it was surprisingly cool thanks to its enormous thermal mass, the natural convection of air rising through the eyeballs, and the venturi effect as the wind blew across the top of the building.

For the first time, I learned that light itself has substance.

The axis of light through the eyeball is beautiful and tactile, and I realized for the first time that light can be designed.

Moreover, all forms of design, visual design, are nothing without light. Because without light they see nothing.

I also realized that I wasn't the first to find this place really special.

I believe this building has survived gravity, savages, marauders, developers and the ravages of time to become the longest continuously occupied building in history.

Largely because of that visit, I came to understand that, contrary to what I was taught in school, the world of art and design is actually not at odds with science and engineering.

I've noticed that when combined, you can create amazing things that either domain alone can't do.

But in school, with some exceptions, they were, and still are, treated as separate worlds.

The teachers said we had to get serious and focus on one or the other.

But asking me to specialize only made me really appreciate polymaths like Michelangelo, Leonardo da Vinci, Benjamin Franklin, and others who did quite the opposite.

And this made me embrace and want to be in both worlds.

So how does a project of unprecedented creative vision and technical complexity like Pantheon actually work?

Perhaps Hadrian himself needed a brilliant creative vision.

It also required the storytelling and leadership skills needed to raise funds and execute, as well as technical proficiency with the ability and know-how to push existing innovations further.

I believe it takes at least five miracles to create these rare game changers.

The problem is, no matter how talented, rich, or smart you are, miracles only happen 1-1.5 times.

that's it. That's Norma.

That's a waste of time, money, and enthusiasm.

Remember, most people can't even imagine one of these technological miracles, and it takes at least five to make a pantheon.

In my experience, those rare visionaries who can think across the worlds of art, design, and engineering have the ability to notice that others have done enough miracles to achieve their goals.

Driven by a clear vision, they muster up the courage and determination to accomplish the remaining miracles, often taking what others perceive as insurmountable obstacles and turning them into features.

Let's take a look at the eyeballs of the Pantheon.

To insist on including it in the design meant that many of the structural techniques developed for Roman arches could not be used.

But by embracing it instead and rethinking the weight and stress distribution, we came up with a design that only works if you have a large hole in the roof.

When it's done, you'll get aesthetic and design benefits from light, cooling, and a vital direct connection to the heavens.

not bad.

These people not only believed that the impossible was possible, but that it must come true.

Enough ancient history.

What are some recent examples of innovation that combine creative design and technological progress so deeply that they remain memorable even millennia later?

Well, sending people to the moon was a good thing, and getting them safely back to Earth wasn't bad either.

Talk about a big leap. It is difficult to imagine a deeper moment in human history than when we first left our own world and stepped into another.

So what came after the moon?

Some people are tempted to say that today's temple is the Internet, but in fact I think that's either completely false, or at least part of the story.

The Internet is not a pantheon.

It's like the invention of concrete. Important, absolutely necessary to build the Pantheon, permanent, but totally insufficient.

But just as concrete technology was essential to the pantheon's realization, new designers will harness internet technology to create novel concepts that will last a long time.

Smartphones are a good example.

Soon, the majority of people on Earth will own it, and the idea of ​​interconnecting everyone with knowledge will persist.

So what's next?

What are the imminent advances to rival the Pantheon?

Given this, I rejected many very plausible dramatic advances to come, such as cancer treatments.

why? Because the Pantheon is anchored in a designed physical object that inspires you simply to see and experience it, and it will continue indefinitely.

It's a different kind of language, like art.

These other important contributions to extending life and alleviating suffering are of course important and wonderful, but they are part of our overall knowledge and technology continuum, much like the Internet.

So what's next?

Perhaps counterintuitive, but I suspect this was a visionary idea in the late 1930s that has been revived every decade since. That is the self-driving car.

Now you're thinking, give me a break.

How could a luxury version of cruise control be so deep?

Much of our world is designed around roads and traffic.

They were as essential to the success of the Roman Empire as the interstate highway system was to the prosperity and development of the United States.

Today, these roads that connect our world are dominated by cars and trucks that have barely changed in 100 years.

It may not be obvious today, but self-driving cars will be a key technology that will enable us to redesign our cities and, in turn, our civilization.

Here's why. Widespread use of these vehicles would save tens of thousands of lives each year in the United States alone and millions worldwide.

Automobile energy consumption and air pollution are significantly reduced.

Much of the road congestion inside and outside our cities will be eliminated.

These will enable fascinating new concepts in how we design our cities, work and lives.

We will be able to get to our destinations faster, and society will recapture vast amounts of lost productivity that is currently spent sitting in traffic jams that are basically causing pollution.

But why now? Why would you think this is ready?

Over the past 30 years, countless billions of dollars have been spent by people outside the automotive industry to create the necessary miracles, but for very different purposes.

It took people who had nothing to do with DARPA, universities, or the auto industry to realize that if they worked smart, self-driving could now be possible.

So what are the five miracles that self-driving cars need?

One is that you need to know where you are and exactly what time it is.

This was brilliantly solved by the GPS system, the Global Positioning System, introduced by the US government.

You have to know where all the roads are, what the rules are and where they are going.

Personal navigation systems, in-vehicle navigation systems, web-based maps, and more.

Understanding intent requires near-continuous communication with high-performance computing networks and other nearby networks.

Wireless technologies developed for mobile devices are perfectly suited to solve this problem, with a few minor modifications.

Perhaps it will be necessary to start some restricted roads that both society and its lawyers have agreed are safe to use.

It starts in the HOV lane and proceeds from there.

But finally, we need to recognize people, signs and objects.

Machine vision, specialized sensors, and high-performance computing can do a lot, but when your family is on board, you know it's not enough.

In some cases, humans need to do some sensemaking.

To do that, you might actually have to wake your passenger up and ask them what the big blob in the middle of the road is.

It's not that bad and it will give you a sense of purpose in this new world.

On top of that, when the first driver explains to the confused car that the giant chicken at the fork in the road is actually a restaurant and it's okay to keep driving, from that point on, every other car on the planet will know about it.

Five miracles almost come true. All that remains is a clear vision of a better world filled with self-driving cars with attractive new and functional designs, and a significant amount of money and effort to bring it home.

Although its beginnings are only a few years away, I predict that self-driving cars will change our world forever in the coming decades.

In conclusion, I've come to believe that the ingredients for the next pantheon are all around us, just waiting for visionaries with broad knowledge, multidisciplinary skills, and a strong passion to harness them to make their dreams a reality.

However, these people do not exist spontaneously.

They need to be nurtured and encouraged from an early age.

We need to love them and help them discover their passions.

We need to encourage them to work hard and make them understand that failure is as much a necessary ingredient of success as perseverance.

We must help them find their own role models and give them the confidence to believe in themselves and believe that anything is possible. Just like my grandfather took me surplus shopping, my parents took me to a science museum, we need to encourage them to find their own way, even if it's very different from ours.

But a word of caution, we also need to regularly pull our children away from the modern miracle of computers, phones, tablets, game consoles and TVs, and take them out into the sunshine so they can experience both the natural and design wonders of our world, our planet, our civilization.

Otherwise, you will never understand what these precious things are that you will one day be responsible for protecting and improving.

They also need to understand that they are underappreciated in an increasingly tech-dependent world, that art and design are not luxuries, or in any way incompatible with science and engineering.

In fact, they are the essential things that make us special.

Someday, just like my daughter Kira, why not take your kids to the actual Pantheon and experience first-hand the power of its amazing design. One ordinary day in Rome, this design reached 2,000 years into the future and set the direction for my life.

thank you.

(applause)

If you remember the first ten years of the web, it was a really static place.

You can go online and look at the pages, and they were either created by an organization that had a team to do it, or by individuals who were very tech savvy at the time.

And with the rise of social media and social networks in the early 2000s, the web has completely changed, and now the majority of the content we interact with is where the average user posts: YouTube videos, blog posts, product reviews, social media posts.

It has also become a more interactive place for people to interact, comment, and share with others rather than just reading.

So Facebook isn't the only place you can do this, but it's the biggest, and it helps explain the numbers.

Facebook has 1.2 billion monthly users.

That means half of the internet population on earth uses Facebook.

These, like others, are sites that allow people to create an online persona with little technical skill, and people have put a ton of personal data online in response.

As a result, we have access to the behavior, preferences and demographic data of hundreds of millions of people. This is historically unprecedented.

As a computer scientist, what this means is that I've been able to build models that can predict all sorts of hidden attributes about you that you don't even know you're sharing.

As scientists, we use it to help with the way people interact online, but the problem is that altruistic applications are few and users don't really understand these techniques and how they work, and even if they do, they don't have much control over them.

So what I want to talk to you about today is some of the things we can do and then I want to give you some ideas on how we can move forward to put some of the control back in the hands of the users.

This is a company called Target.

I didn't just put the logo on this poor pregnant woman's belly.

You may have seen this anecdote published in Forbes magazine. Two weeks before she told her parents she was pregnant, Target sent the 15-year-old a flyer with ads and coupons for bottles, diapers and cribs.

Yes, Dad was really angry.

"How did Target know this schoolgirl was pregnant before she told her parents?" he said.

It turns out that they have hundreds of thousands of customer purchase histories, and they calculate a so-called pregnancy score. It calculates not only if a woman is pregnant, but also what her due date is.

And they don't count it by looking at obvious things like she's buying a crib or baby clothes, but by considering things like she bought more vitamins than usual or a handbag big enough to fit a diaper.

And while those purchases alone don't seem to reveal much, when you consider it in the context of thousands of others, it's actually a pattern of behavior that begins to reveal some insights.

We do the same thing when we make predictions about you on social media.

We are looking for small patterns of behavior that allow us to learn all sorts of things by detecting small patterns of behavior among millions of people.

So, in collaboration with my lab and colleagues, we have developed a mechanism that can very accurately predict your political preferences, personality score, gender, sexual orientation, religion, age, intelligence, as well as how much you trust your acquaintances and the strength of their relationships.

We can do all this very well.

Again, it is not derived from what you consider to be obvious information.

My favorite example is this study published in the Proceedings of the National Academy of Sciences this year.

Search this on Google and you'll find it.

It's only 4 pages, so it's easy to read.

And they just looked at people's Facebook likes—what you liked on Facebook—and used that to predict all these attributes and a few others.

And in their paper, they listed the 5 likes that best indicate high intelligence.

Among them was a "like" on the page for curly fries. (Laughter) Curly fries are delicious, but liking them doesn't necessarily make you smarter than the average person.

So how does it happen that one of the strongest indicators of your intelligence is liking this page, even though the content is completely irrelevant to your predicted attributes?

And it turns out that knowing why this is possible requires a great deal of examination of the underlying theory.

One of them is a sociological theory called homosexuality, which basically claims that people are friends with people who are just like them.

So if you are smart, you tend to make friends with smart people, and if you are young, you tend to make friends with younger people, and this has been established for hundreds of years.

We also know a lot about how information spreads through networks.

It turns out that information such as viral videos and Facebook likes spread in exactly the same way that disease spreads through social networks.

This is what we have been researching for a long time.

we have a good model of it.

And we can put these things together and start to understand why this is happening.

My hypothesis is that some smart person started this page, or some of the people who first liked it scored high on that test.

And they liked it, and their friends saw it too, and speaking homosexually, he probably had smart friends, so it spread to them, and some of them liked it, and they had smart friends, so it spread to them, and it got through the network to a lot of smart people, and ultimately, the act of liking a curly fries page isn't because of the content, but because the actual act of liking reflects the common attributes of other people who did it. It shows high intelligence.

This is a pretty complicated story, isn't it?

It's a difficult thing to sit down and explain to the average user. Even if it could be explained, what can the average user do about it?

How do you know that you've fallen in love with something that's characteristic of you, completely unrelated to what you liked?

There are lots of permissions that don't require the user to control how this data is used.

And I see that as a real problem going forward.

Therefore, I think we should consider some ways to give users some control over how this data is used, as this data may not always be used for their benefit.

An example I often give is that if I get tired of being a professor, I'm going to start a company that predicts how well you'll work in a team, whether you're a drug user or an alcoholic, and all other attributes.

We know how to predict them all.

And I'm going to sell the report to HR firms and big companies that want to hire you.

It's totally possible now.

I could start that business tomorrow, but that use of your data would be totally out of your control.

It seems to me that there is a problem.

So one of the paths we should take is the policy and law path.

In some ways I think it works best, but the problem is that you really have to.

Observing the U.S. political process in action, it seems highly unlikely that we will gather a large number of members of Congress to learn about this and enact sweeping changes to intellectual property law in the United States.

So users are in control of their data.

We could go the policy route that the social media companies say. You own the data.

You have full control over how it is used.

The problem is that most social media companies' revenue models rely on sharing or leveraging users' data in some way.

People sometimes say that Facebook is a product, not a customer.

So how can companies return control of their primary assets to users?

It's possible, but I don't think that will change anytime soon.

So I think science is another more effective way we can go.

In the first place, it is the achievements of science that made it possible to develop all the mechanisms for calculating this personal data.

And this is actually very similar to the research you would have to do if you wanted to develop a mechanism to tell users, "There is a risk in what you just did."

By liking its Facebook page and sharing this personal information, it has improved its ability to predict whether you are on drugs and whether you are doing well at work.

And I think that can influence whether people want to share something, keep it private, or take it completely offline.

You can also consider things like allowing encryption of data uploaded by users. This makes the data invisible and valueless to sites such as Facebook and third-party services that access that data, but allows authors to choose who they want to see it.

This is a very exciting study from an intellectual point of view and one that scientists will be happy to work on.

Therefore, it is advantageous from the legal point of view.

One of the issues people bring up when I talk about this is that if people start keeping all this data private, all the methods they've developed to predict their traits will fail.

And I would say that for me it was an absolute success. Because my goal as a scientist is not to infer information about users, but to improve the way people interact online.

Sometimes it involves speculation about the user, but if they don't want me to use that data, I think they should have the right to do so.

For the tools we develop, we want our users to be informed and have their consent.

So, I think we can all agree that encouraging this kind of science and supporting researchers who want to give back some of that control to their users and keep them away from social media companies going forward means having an educated and empowered user base as these tools evolve and advance, and that's a pretty ideal way forward.

thank you.

(applause)

My job at Twitter is to ensure our users' trust, protect their rights, and keep us safe from each other and, in some cases, ourselves.

Let's talk about what the scale looks like on Twitter.

Back in January 2009, the platform saw over 2 million new tweets every day.

In January 2014, it exceeded 500 million.

2 million tweets were viewed within 6 minutes.

This is an increase of 24,900 percent.

Today, the majority of activity on Twitter is harmless.

No risk involved.

My job is to eradicate and stop that possible activity.

Sounds easy, right?

That might seem like a no-brainer, given that we just said that the majority of activity on Twitter is harmless.

Why spend so much time looking for potential disasters in harmless activity?

Given the size of Twitter, the one in a million chance happens 500 times a day.

So do other companies that deal with this kind of scale.

For us, edge cases, rare situations that are unlikely to occur, are rather the norm.

For example, 99.999 percent of tweets pose no risk to anyone.

The threat is irrelevant.

Maybe you're documenting travel landmarks like Australia's Heart Reef, tweeting about concerts you're attending, or sharing pictures of cute baby animals.

Excluding that 99.999 percent, the fraction of tweets that remain is around 150,000 per month.

Difficulties arise because of the sheer scale of what we are dealing with.

Did you know that some of my roles are particularly difficult?

People do weird things.

(Laughter) And I need to understand what they're doing, why they're doing it, and whether there's a risk involved, but a lot of the time it's not enough in terms of context and context.

Here are some examples I've encountered while on Twitter. These are all real life examples. It seemed cut off at first, but the truth of the matter was quite different.

Details have been changed to protect the innocent, and possibly the guilty.

Let's start easy.

["Fucking bastard"] If you see this many tweets, you may think "This is abusive".

After all, why would you want to get the message "hey, bitch"?

Now that I try to stay relatively hip to the latest trends and memes, I knew that "hey bitch" is a common greeting between friends and a popular "Breaking Bad" quote.

To be honest, I didn't expect to run into the fourth use case.

On Twitter, I've also found it used when people role-play dogs.

(Laughter) And indeed, in that case, not only is it not a rant, it's technically just an accurate greeting.

(Laughter) Okay. It's definitely hard to tell if something is abusive without context.

Let's look at spam.

Below is an example of a classic spammy account sending the exact same message to thousands of users.

This is a mockup I made using my account, but I see accounts doing this all the time.

It seems pretty simple.

Accounts engaging in this type of behavior should be automatically suspended.

It turns out that there are some exceptions to this rule.

It turns out that the message may have registered for notification that the International Space Station was passing overhead, wanting to go out and see if it could be seen.

If you accidentally suspend your account for spam, you don't get that chance.

have understood. Let's raise the stakes.

Go back to my account and show the classic behavior again.

This time the same message and link will be sent.

This often indicates something called phishing, where someone is trying to steal someone else's account information by trying to redirect them to another website.

That's obviously not a good thing.

We want to suspend accounts that engage in such behavior, and we do.

So why does this make the stakes higher?

Well, this could be a rally bystander who videotaped a police officer beating a non-violent demonstrator trying to let the world know what was going on.

We don't want to make a bet that classifying and stopping important speech as spam might silence that important speech.

This means that we evaluate hundreds of parameters when looking at account behavior, and still might be wrong and need to be re-evaluated.

Given the variety of challenges I face today, it's important to not only anticipate, but design protection against the unexpected.

And it's not just me or Twitter, it's yours too.

This is a problem for anyone building or creating something that they think will be great and let people do great things.

So what should i do?

I stopped and thought, how could this all go so horribly wrong?

I imagine catastrophe.

And it's hard. There is a kind of inherent cognitive dissonance in doing this, like when you write your wedding vows at the same time as your prenuptial agreement.

(Laughter) But you still have to do it, especially if you're getting married 500 million tweets a day.

What does it mean to “make the catastrophe visible”?

I'm trying to figure out how something as harmless and innocuous as a painting of a cat can lead to death, and what can be done to prevent it.

Here is my next example.

This is my cat, Eli.

We wanted to allow users to add photos to their Tweets.

Seeing is believing.

You can only enter 140 characters.

Adding photos to your Tweets now gives you even more content.

Adding photos to your Tweets can do all sorts of amazing things.

My job is not to think about them.

Think about what could go wrong.

How could this photo lead to my death?

Well, here's one possibility.

There are many things other than cats in the photo.

I have geographic data.

When you take a picture with your smartphone or digital camera, the image stores a lot of additional information.

In fact, this image also contains the equivalent of this, specifically this one.

Sure, it's unlikely someone will track me down and try to harm me based on the image data associated with my cat photos, but I'll start by assuming the worst.

Therefore, we have decided to remove that geographic data when publishing photos on Twitter.

(Applause.) By working backwards from the worst-case scenario, you can ensure that the protections you build will work for both expected and unexpected use cases.

Given that I spend my days and nights imagining the worst that could happen, it's no wonder my view of the world darkens.

(Laughter) It's not.

Most of the interactions I see, believe me, are positive, people reaching out to help each other, to connect, to share information.

But for those of us dealing with scale, those of us on a mission to keep people safe, we have to expect the worst. Because for us, a one in a million chance is a pretty good one.

thank you.

(applause)

Designers look deep into nature through the magnifying glass of science, distilling the principles, processes and materials that form the very foundations of design methodologies.

From synthetic structures that resemble biological materials to computational methods that emulate neural processes, nature drives design.

Design also moves nature.

In the fields of genetics, regenerative medicine, and synthetic biology, designers are developing new technologies that were neither anticipated nor anticipated by nature.

Bionics explores the interplay between biology and design.

As you can see, my feet are bionic.

Today I will tell you the story of human bionic integration. How electrical machines attached to and implanted in the body are beginning to bridge the gap between disability and ability, between human limits and human potential.

Bionics defined my physicality.

In 1982, both legs were amputated due to tissue damage caused by frostbite in a climbing accident.

At the time, I didn't think my body was broken.

I thought humans could never be "broken".

Technology is broken.

Inadequate technology.

This simple but powerful idea was a call to arms to advance technology to remove obstacles for myself, and ultimately for others.

I started by developing specialized limbs that allowed me to return to the vertical world of rock and ice climbing.

I quickly realized that the artificial part of my body was flexible. It can take any form and any function. Perhaps a blank slate to create structures beyond their biological capabilities.

Made it possible to adjust the height.

You can be five feet short or as tall as you like.

(Laughter) So when I felt bad about my self-doubt, I grew taller.

(Laughs) But when I was confident and calm, I was down a notch in height to give the competition a chance.

(Laughter.) (Applause.) Thin legs allowed me to climb steep rock cracks that a human foot wouldn't, and spiked feet allowed me to climb vertical ice walls without experiencing leg muscle fatigue.

Technological innovation has returned me to the sport stronger and better.

Thanks to technology, my disability has been eliminated and I have acquired new climbing abilities.

When I was young, I imagined a future world where technology so advanced would make the world disabilityless, a world where neural implants would make blind people see.

A world where a paralyzed person can walk, via the body's exoskeleton.

Sadly, the world is rife with disability due to technology deficiencies.

This gentleman is missing three limbs.

As a testament to current technology, he is wheelchair-free, but there needs to be a better job done in the field of bionics to ensure that someone with an injury of this level can one day fully rehabilitate.

The MIT Media Lab established the Extreme Bionics Center.

The mission of the Center is to demonstrate fundamental scientific and technological capabilities that enable human biomechatronic and regenerative repair across a wide range of brain and body disorders.

Today I will tell you how my feet work and how they work as an example of this center.

Well, I thought it was going to show off, so I made sure to shave my legs last night.

(Laughter) Bionics involves extreme interface engineering.

My bionic limbs have 3 extreme interfaces. A mechanical interface, how my limbs are attached to my biological body. Dynamic, moving like bone and flesh. And electricity, how they communicate with my nervous system.

Start with the mechanical interface.

The design community does not yet understand how to mechanically attach a device to the body.

In this day and age, it's amazing to me that shoes, one of the most mature and oldest technologies in the human timeline, still gives us blisters.

What should I do?

We don't know how to attach things to our bodies.

This is a beautiful and lyrical design piece by Professor Neri Oxman of the MIT Media Lab, showing a spatially varying exoskeleton impedance. Shown here by the color change of this 3D printed model.

Imagine a future where clothing can be stiff and soft where and when you need it, giving you optimal support and flexibility without causing discomfort.

My bionic limbs are attached to my living body via synthetic skins with varying stiffness that reflect the biomechanics of my underlying tissue.

To achieve that mirroring, we first developed a mathematical model of my biological limb.

To do so, we used imaging tools such as MRIs to look inside my body to understand the shape and location of various tissues.

We also used robotic tools. This is a circle of 14 actuators that revolves around a living limb.

Actuators come in to sense the limb surface, measure the unloaded shape, push against the tissue and measure tissue compliance at each anatomical point.

Combining these image data and robot data, I construct a mathematical description of my biological limb, shown on the left.

Can you see many points or nodes?

Each node has a color that represents organizational compliance.

Next, we make a mathematical transformation to the design of the synthetic skin, as shown on the right.

And found that the optimality is: Synthetic skin is soft when the body is stiff and stiff when the body is soft, and this mirroring occurs across all tissue compliances.

Using this framework, we have created the most comfortable bionic rims we have ever worn.

Clearly, in the future, our clothes, shoes, orthoses and prostheses will no longer be designed and manufactured using artisanal strategies, but using data-driven quantitative frameworks.

In that future, our shoes will no longer cause blisters.

We also embed sensing and smart materials into synthetic skins.

Developed by SRI International, California.

Stiffness changes due to electrostatic effects.

So under zero voltage the material is compliant and floppy like paper.

When you press the button, voltage is applied and it hardens like a board.

(tapping sound) We implant this material into the synthetic skin that connects my living limbs to my living body.

No voltage when you walk here.

My interface is soft and compliant.

When the button is pressed, a voltage is applied, which stiffens the button and improves the operability of the living limb.

An exoskeleton is also under construction.

This exoskeleton hardens and softens in the appropriate areas of the running cycle, protecting the living joint from significant impact and deterioration.

In the future, we will all wear exoskeletons for common activities such as running.

Then there is the dynamic interface.

How do my bionic limbs move like flesh and bones?

In my lab at MIT, we study how humans with normal physiology stand, walk, and run.

What do the muscles do, and how are they controlled by the spinal cord?

This basic science motivates us to make things.

We build bionic ankles, knees and hips.

We make body parts from scratch.

The bionic limbs I wear are called BiOM.

Nearly 1,000 patients have been fitted, 400 of them wounded US soldiers.

How does it work?

On heel strike, the computer-controlled system regulates stiffness to reduce the impact of the limb on the ground.

Then, midway through the stance, the Bionic Limb outputs high torque and force to lift the person into a walking stride, matching the work of muscles in the calf area.

This bio-propulsion is of great clinical importance to the patient.

On the left we see a bionic device worn by a woman, and on the right a passive device worn by the same woman, which is unable to emulate normal muscle function and allows her to do what everyone should be able to do: walk up and down stairs at home.

Bionics also enable extraordinary athleticism.

This is a gentleman running up a rocky path.

This is not a comedian, but Steve Martin, who lost his leg in the Afghan bombing.

We use similar principles to build exoskeleton structures that wrap around living limbs.

This gentleman has no foot ailments or disabilities.

Because he has normal physiology, there is no need for his own muscles to apply those torques and forces, as these exoskeletons apply torques and forces like muscles.

This is the first exoskeleton ever to actually enhance human walking.

Significantly reduces metabolic costs.

The expansion is so profound that if a normal healthy person wears the device for 40 minutes and then removes it, their biological feet feel ridiculously heavy and clumsy.

We are entering an age when machines attached to our bodies will make us stronger, faster and more efficient.

Let's move on to the electrical interface. How do my bionic limbs communicate with my nervous system?

My stump has electrodes that measure electrical pulses in the muscle.

It is transmitted to the living limb, so when I try to move the phantom limb, the robot tracks that movement desire.

This diagram basically shows how a living limb is controlled.

So we modeled a missing biological limb to discover what reflexes occurred and how spinal reflexes control muscles.

And that function is built into the bionic limb chip.

So what we've done is tune the reflex sensitivity, the modeled spinal cord reflex, with neural signals. So, if you relax the muscles of the stump, you will get very little torque and power, but the more you activate the muscles, the more torque you will have and the more you will be able to run.

And it was the first demonstration of running and walking under nerve command.

I feel good.

(Applause.) We want to go one step further.

We really want to close the loop between humans and living limbs.

We are conducting experiments to grow nerves, severed nerves, through channels or microchannel arrays.

On the other side of the channel, nerves attach to cells, skin cells and muscle cells.

Motion channels can sense how a person wants to move.

It is transmitted wirelessly to the living limb, and the [sensory information] of the living limb is translated into stimulation of adjacent channels, the sensory channels.

So when this is fully developed and available for human use, people like me will not only have artificial limbs that move like flesh and bones, but actually feel like flesh and bones.

This video shows Lisa Mallett just after being fitted with two bionic limbs.

In fact, bionics are making a big difference in people's lives.

(Video) Lisa Mallett: Wow.

LM: Oh my God, I can't believe it!

(video) (laughs) LM: It's like you have real legs!

Woman: Come on, don't run.

Man: Now turn around and do the same and walk up, but heel to toe as you would normally walk on flat ground.

Try walking up the hill.

LM: Oh my god.

Man: Does it lift you up?

LM: Yes! I can't even explain it.

Men: It lifts you up.

Hugh Herr: I'll visit the center next week -- thank you. thank you.

(Applause.) Thank you.

Next week, I plan to visit the Centers for Medicare and Medicaid Services to convince CMS to allow the appropriate code language and pricing to make this technology available to patients who need it.

(Applause.) Thank you.

(Applause.) Underestimated, more than half of the world's population suffers from some form of cognitive, emotional, sensory, or motor condition that all too often leads to disability and poor quality of life due to inadequate technology.

A basic level of physiology should be part of our human rights.

Everyone should have the right to live a disability-free life if they wish, a life free of severe depression. If you are visually impaired, the right to see your loved one. The right to walk or dance in case of quadriplegia or amputation.

As a society we can achieve these human rights if we accept the proposition that humans are not disabled.

People never break.

Our built environment, technology is broken and disabled.

We, the people, do not have to accept our limitations, and innovation allows us to overcome obstacles.

Indeed, through fundamental advances in bionics this century, we will establish the technological foundations and remove barriers to enhancing the human experience.

I would like to finish with another beautiful story.

The story of Adrian Haslet-Davies.

Adrianne lost her left leg in the Boston terrorist attack.

I met Adrianne at Spalding Rehabilitation Hospital when this photo was taken.

Adrianne is a dancer, ballroom dancer.

Adrianne breathes and lives the dance.

It's her expression. It's her art form.

Naturally, when she lost a limb in the Boston terrorist attacks, she wanted to get back on the dance floor.

After seeing her and driving home, I thought I was an MIT professor. I have resources.

Create her bionic limbs so she can get back to her dancing life.

I invited MIT scientists with expertise in prosthetics, robotics, machine learning, and biomechanics to study dance over a 200-day study period.

We took dancers with biological limbs and studied how they moved, what forces they exerted on the dance floor, and took that data and put forward the basic principles of dance, reflexive dance abilities, and embedded that intelligence into their biological limbs.

Bionics isn't just about making people stronger and faster.

Our expression, our humanity, can be embedded in electromechanics.

In the Boston terrorist attack, there was 3.5 seconds between bomb detonations.

Within 3.5 seconds, the criminals and cowards had Adrian off the dance floor.

Got her back after 200 days.

We are not threatened, defeated, undermined, subdued or stopped by acts of violence.

(Applause) Ladies and gentlemen, let me introduce you to Adrian Haslet-Davies' first post-attack performance.

She dances with Christian Leitner.

(Applause) (Music: "Ring My Bell" performed by Enrique Iglesias) (Applause) Ladies and gentlemen, members of the research team: Elliot Rouse and Nathan Villagaray-Karski.

Elliott and Nathan.

(applause)

Guys, learn the history of music and television on the Internet in 3 minutes.

TED Medley -- TEDley.

♫ It's nine o'clock on a Saturday ♫ ♫ The record stores are closing at night ♫ ♫ So I fire up the old iTunes music store ♫ ♫ And soon I'm feeling okay ♫ ♫ I know Steve Jobs will find me a melody ♫ ♫ Great pricing at $1 ♫ ♫ Type in a track and the album name will come back ♫ ♫ With my pajamas and socks on ♫ ♫ Sell me a song, you're a music man ♫ ♫ My iPod is still up to 10 gigabytes ♫ ♫ Yes, it could be better with more compatibility ♫ ♫ But Steve likes to go through the whole show ♫ ♫ I heard Desperate Housewives was great last night ♫ ♫ But there was something wrong with the cod fillet ♫ ♫ I spit up my meal and thought 'no big deal' ♫ ♫ I'll be watching tonight on the pod ♫ ♫ And now all Why don't networks join ♫ ♫ Ad-free shows cost $2 ♫ ♫ That's the business they've always wanted to try ♫ ♫ But only Steve Jobs had the "nuds" ♫ ♫ We say we're young, we don't watch TV ♫ ♫ They say all we see is the internet ♫ ♫ But that's not true. They got it wrong ♫ ♫ Look, all our shows are only two minutes long ♫ ♫ Hey ♫ ♫ We got YouTube ♫ ♫ We got YouTube ♫ And now, ladies and gentlemen, salutations to the Recording Industry Association of America and the RIAA!

♫ Young man, you were surfing together ♫ ♫ Then, young man, you downloaded the song ♫ ♫ And stupid man, you copied it to your pod ♫ ♫ Then I got a call and told you... ♫ ♫ You just got sued by R-I-A-A ♫ ♫ You just got screwed by R-I-A-A ♫ ♫ Their lawyers said you committed a crime. ♫ ♫ They've gone insane in R-I-A-A ♫ ♫ Justice's blind in R-I-A-A ♫ ♫ You're taking the rights away from the band ♫ ♫ You're learning to steal ♫ ♫ You can't do whatever you feel ♫ ♫ CD sales are declining year by year I'm just trembling with fear ♫ ♫ Yeah yeah, what if their end is near ♫ ♫ And we download all our music ♫ ♫ Yes, that will piss off R-I-A-A Who's next? ♫ ♫ What else is bothering R-I-A-A?

Chip, Poet, and Boy.

Just about 20 years ago, in June 1994, Intel announced that its Pentium chips had a core flaw.

Deep in the code of the SRT algorithm for computing the intermediate quotients needed to iterate over the floating-point arithmetic of division, meaning I don't know, Wikipedia says so. It had flaws and errors. This meant that there was a certain probability that the result of a computation would be an error, and that probability was 1 in 360 billion computations.

Therefore, Intel said the average spreadsheet would have a flaw once every 27,000 years.

They didn't think it was serious, but there was outrage in the community.

The community and techs say the flaw needs to be addressed.

Just because Intel offered these chips, they weren't going to sit on the sidelines.

And so there was a revolution all over the world.

People marched for demands, they didn't, but they stood up and demanded Intel fix the flaws.

And Intel secured $475 million to replace millions of chips to fix the flaw.

In other words, our society has spent billions of dollars trying to address a problem that occurs once in 360 billion calculations.

The second is a poet.

Martin Niemöller.

You are familiar with his poems, aren't you?

At the height of the Nazi era, he began repeating the poem: "At first they came after the communists and I did nothing, I was not a communist so I didn't speak up."

Then they hit the socialists.

Then they came for a union.

Then they picked up the Jews.

And they picked me up.

But there was no one left to speak for me. ”

Now, Niemöller offers some insight.

This is the core insight of intelligence.

You can call it insight.

This is some kind of test. Can you recognize and respond to potential threats?

Can you save yourself or your race?

It turns out that Ali is pretty good at this.

Cows are not so many.

Can you see the pattern in that?

Can you see a pattern, recognize it, and do something about it? Number two.

Number three is a boy.

This is my friend Aaron Swartz.

He is Tim's friend.

He's a friend of many in this audience, and seven years ago Aaron asked me a question.

It was right before I gave my first TED talk.

I was so proud. I was telling him about my talk, Laws Against Creativity.

Aaron looked at me and said, a little impatiently, "So how are you going to solve the problem you're talking about?"

As long as there is fundamental corruption in copyright policy, Internet policy, and the way we administer our government, how are we going to address those issues?"

So I was a little disappointed with this.

He didn't attend my celebration.

And I said to him, "You know, Aaron, that's not my field, not my field."

He said, "As an academic, is that not your area of ​​expertise?"

I said, "Well, as a scholar, that's not my area of ​​expertise."

He said, 'How are you doing as a citizen?

as a citizen. ”

Well, this is how Aaron does it.

he didn't say he asked a question

But his question spoke as clearly as my 4-year-old son's hug.

he said to me "We have to get a clue.

The core of this democracy's operating system is flawed and needs to be clued in, but not all of the 360 ​​billion times democracies attempt to make decisions are flawed.

It is done every time, every important issue.

We must end this cow nature of our political society.

We have found this term to be a four-form attitude. The internet teaches me that word. Ali's grateful attitude to make us aware of this flaw and save our tribe and save our demo.

For those of you who knew Aaron Swartz, you know we lost him just over a year ago.

It was about six weeks before I gave my TED talk. A big thank you to Chris for asking me to do this TED talk. Not because I had the chance to talk to you, but because it was wonderful, but because it lifted me out of a freak depression.

Words could not express my sorrow.

I had to concentrate.

I had to concentrate on what I was trying to say to you.

It saved me.

But after the buzz, excitement, and power that came from this community, I began to crave a less sterile, less academic way of addressing these issues—the issues I was talking about.

New Hampshire primaries are so important that we started focusing on New Hampshire as a target for this political campaign.

A group called the New Hampshire Rebellion started talking about how to bring this corruption issue to the center of 2016.

But it was another soul that captured my imagination, a woman named Doris Haddock, aka Granny D. Haddock.

Fifteen years ago, on January 1, 1999, Grandma D, who turned 88, started taking walks.

She left Los Angeles and started walking to Washington, D.C.

On his chest was a piece of paper with the words “campaign finance reform” written on it.

Eighteen months later, at the age of 90, she followed hundreds to Washington. Among them were a number of lawmakers who drove about a mile outside the city to walk with her.

(Laughter) Well, I don't have 13 months to walk across the country.

I have three kids who don't like walking, and my wife still hates me not being home after all, for some inexplicable reason, so this wasn't an option, but the question I asked was if we could do a little remix of "Granny D."

How about walking 195 miles in New Hampshire in January instead of 3,200 miles?

So we started the walk on January 11th, the anniversary of Aaron's death, and ended it on January 24th, the day Grandma D was born.

A total of 200 people attended the walk to discuss the issue from top to bottom in New Hampshire.

And what surprised me, quite unexpectedly, was the passion and anger of everyone I talked to about this issue.

A poll found that 96 percent of Americans believe it is important to reduce the influence of money in politics.

Now politicians and pundits say there is nothing we can do about this issue and that Americans don't care, because 91 percent of Americans believe there is nothing they can do about it.

And it is this gap between 1996 and 1991 that explains our politics of resignation.

So, after all, at least 96 percent of us wish we could fly like Superman, but at least 91 percent believe we can't, so we don't jump off tall buildings whenever the urge strikes.

That's because we accept our limitations, and this reform is no different.

But when you give people a sense of hope, that sense of absolute impossibility begins to dissolve.

As Harvey Milk said, if you give them hope, you give them a chance and a way to think about how this change is possible.

hope.

And it's hope that we, Aaron's friends, let him down. Because we have lost that sense of hope.

I loved the boy as I loved my own son.

But we failed him.

And I love my country, so I'm not going to betray it.

I'm not going to fail it.

However impossible this hope may seem, we will hold on to it and fight for it.

what's next?

Well, we started this march with 200 people, but next year in January there will be 1,000 people marching on various routes and gathering in Concord to celebrate the cause, and in 2016, 10,000 will march through the state and gather in Concord to celebrate the cause before the primaries.

And as we marched, people across the country started saying, "Can we do the same in our state?"

So we launched a platform called G.D. Walker, or Grandma D Walker. And Grandma D Walker across the country will be marching for this reform. number one.

Second, on this march, David Cassino, one of the founders of Thunderclap, was with us and he said, "So what can we do?"

So they developed a platform that could bring together voters passionate about this idea of ​​reform. This is what we are announcing today.

Wherever you are in New Hampshire or outside of New Hampshire, signing up will let you know first hand where the candidates are on this issue so you can decide who to vote for depending on whether this possibility becomes a reality.

And finally the third, the most difficult.

This is the age of super PACs.

In fact, yesterday Merriam announced that Merriam-Webster will adopt Super PAC.

The word is now officially in the dictionary.

So on May 1st, or May Day, we decided to try an experiment.

We will attempt to launch what we consider a Super PAC to end all Super PACs.

And the basic way this works is:

Last year, we worked with analysts and political experts to calculate how much it would cost to get enough votes in the U.S. Congress to make fundamental reform possible.

What is that number? 500 million? Billion?

what is that number?

And whatever that number is, we're going to kickstart, because you can't use Kickstarter for political activity, anyway, it's kind of like a kickstart, a bottom-up campaign that initially promises people small amounts of money contingent on them achieving very ambitious goals, and once those goals are met, we'll look to big money donors and ask them to donate to enable the operation of the super PACs we need to win this issue, and how the money will impact politics. I'm going to change. Yesterday we learned that November 8th is Aaron's 30th birthday. On November 8th, we will celebrate the 218 members of the House of Representatives and 60 US Senators who contributed to this radical reform idea.

So last night we heard about wishes.

This is my wish.

May 1st.

May the ideals of a boy unite a nation behind one critical idea that we are one people, that we are a people promised a government, that government is promised to depend only on the people, and that, as Madison told us, by people we mean the poor, not the rich.

May 1st.

And I hope you too can join this movement. Not because you are a politician, not because you are an expert, not because this is your area of ​​expertise, but because you are a citizen.

Aaron asked me.

Now I asked you

thank you very much.

(applause)

The world makes you what you are not, but you know in your heart what you are, and the question burns in your mind: How can it be?

I may be a little peculiar in this regard, but I'm not alone, not alone at all.

So when I became a fashion model, I felt that my childhood dream had finally come true.

My outer self finally aligned with my inner truth, my inner self.

I'll explain the complicated reasons later, but when I saw this picture, at that moment, Gina, I did it, I did it, I got there.

But this October, I realized that I was just getting started.

We are all boxed by our families, religions, societies, historical moments and even our bodies.

Some people have the courage to break free and not accept the restrictions imposed by the color of their skin or the beliefs of those around them.

Those people are always a threat to the status quo, a threat to what is considered acceptable.

In my case, for the past nine years, no neighbors, friends, colleagues, or even agents knew about my history.

In mysteries, I think we call this exposure.

this is mine

I was assigned a boy at birth based on the appearance of my genitalia.

When I was 5 years old when I was in the Philippines, I remember wearing this T-shirt on my head all the time when walking around the house.

And my mother asked me, "Why do you always wear that T-shirt on your head?"

I said, "Mom, this is my hair. I'm a girl."

That's when I knew how to recognize myself.

Gender has always been thought to be a fact and immutable, but we now know that it is actually more fluid, complex and mysterious.

Because of my success, I never had the courage to share my story. It wasn't because I thought I was wrong, it was because of how the world treats us who want liberation.

As a woman, I am truly grateful every day.

I have a father, mother and family who have accepted me for who I am.

Many people are not so lucky.

Asian cultures have a long tradition of celebrating the fluid mysteries of gender.

Buddhism has a goddess of mercy.

There is a Hindu goddess, the goddess Hijra.

So when I was eight years old, I was in the Philippines attending a festival celebrating these mysteries.

I remember being in front of the stage and a beautiful woman stepping out in front of me. I remember something struck me in that moment. I wanted to be that kind of woman.

So when I was 15 when I was still dressed as a man, I met a woman named T.L.

She is the manager of a transgender beauty pageant.

That night she asked me, "Why aren't you in a beauty pageant?"

She persuaded me that she would take care of the registration fee and my outfit if I attended. And that night, I won Best Swimsuit and Best Long Gown, coming in second out of over 40 nominees.

That moment changed my life.

Suddenly I was drawn into the world of beauty pageants.

Not many people can say your first job was the queen of a contest for transgender women, but I do.

So, from the age of 15 to 17, I participated in the most prestigious competitions. There, literally in the back of a truck, or sometimes on a sidewalk next to a rice field, when it rained the organizers had to move it inside someone's house.

I also experienced the kindness of strangers, especially when I traveled to remote areas of the Philippines.

But most importantly, I met my best friend in that community.

In 2001, my mother, who had moved to San Francisco, called me to tell me that my green card application had been accepted and that I could now move to the United States.

I resisted it.

I said to my mother, "Mom, it's fun."

I'm here with my friends, I love to travel, and I'm a beauty pageant queen. ”

But two weeks later she called me and said, "Did you know that you can change your name and gender once you move to America?"

It was all I needed to hear.

My mother also told me to spell my name with two E's.

She also came with me when I was 19 years old when I had surgery in Thailand.

Interestingly, some of Thailand's most rural cities have some of the most prestigious, safe and sophisticated surgeries.

In America at the time, you had to undergo surgery to change your name and gender.

So in 2001 I moved to San Francisco, and I remember my California driver's license saying my name was Gina and my gender was F.

It was a powerful moment.

For some people, an ID is to them a license to drive a car or buy a drink, but to me it was a license to live and feel dignified.

Suddenly my fear was minimized.

I felt like I could achieve my dream and move to New York and become a model.

Many people are not so lucky.

I remember a woman named Islan Nettles.

She's from New York, a young woman who bravely lived her truth, but hatred ended her life.

For most of my community, this is the reality we live in.

Our suicide rate is nine times higher than the general population.

Every year on November 20th, we hold a global all-night vigil as a day of remembrance for transgender people.

I am at this stage because of the long history of people standing up against injustice.

Marsha P. Johnson and Silvia Rivera.

Today, this moment is my true coming out.

I could no longer live my truth for myself, for myself.

I want to do my best to help others live their truth without shame or fear.

I am here exposed so that one day the November 20th wake will not be necessary.

My deepest truth has allowed me to accept who I am.

will you?

thank you very much.

(Applause.) Thank you. thank you. thank you. (Applause) Kathryn Schultz: Gina, I have one quick question.

What would you say to your parents in particular, but more broadly to your friends and family, or to anyone who meets a child or person who struggles or feels uncomfortable with their assigned gender, so that their family can be a good, caring, and loving family member for them?

Gina Rocero: Absolutely. Well, first of all, I am truly blessed.

Especially the support system of mother and family is very powerful in itself.

Every time I coached young trans women, I remember coaching them. Sometimes, when they called me and said my parents couldn't take it, I picked up the phone and told my mom, 'Mom, can you call this woman?

And sometimes it works, sometimes it doesn't. But it's just that gender identity is at the center of our existence, right?

I mean, we're all assigned a gender at birth, so what I'm trying to do is have the conversation that sometimes the gender assignment doesn't match, and that people need a space where they can be self-aware, and that's a conversation you should have with your parents and your coworkers.

Compared to how the gay movement began, the transgender movement is just the beginning.

We still have a lot to do.

There should be understanding.

There should be room for curiosity and questions. I hope you will be on my side.

KS: Thank you. It was very nice. GR: Thank you.

(applause)

Narcissus Hudson: Hello?

yes this is her

what?

Oh, yes, yes, yes of course.

When is the date again?

pen. pen. pen.

From March 17th to 21st.

Okay, okay, great. thank you.

Lab Partner: Who was that?

DH: It was TED.

LP: Who is TED?

DH: We have to be prepared.

["Give Your Talk: A Musical"] ["My Talk"] ♪ Procrastination. ♪ What do you think?

(Doorbell) Can I help you?

(music) Speaker Coach 1: ♪ Let's get ready for the main stage. ♪ ♪ It's time for you to shine. ♪ ♪ If you want to succeed, ♪ ♪ you have to prepare. ♪ Speaker Coach 2: ♪ Your slides are bad ♪ ♪ But your ideas are good ♪ ♪ So, before we finish, may I bet, ♪ ♪ Speaker, let's make a TED talk out of you. ♪ Speaker Coach 3: ♪ We know about climate change. ♪ ♪ But what makes it new? ♪ ♪ SC 1: Once you find the focus ♪ ♪ Then you can see the talk. ♪ SC 2: ♪ Never try to sell anything ♪ ♪ from the top of that stage ♪ ♪ otherwise I won't post your talk online. ♪ Everyone: ♪ Somehow, let's make a TED talk out of you guys. ♪ (Music) SC 1: Ready to practice again?

DH: Right now?

Stagehand: You break your leg.

DH: ♪ I can't remember this for the rest of my life. ♪ ♪ Does it work when you press the clicker? ♪ ♪ Why does Al Gore have to go before me? ♪ ♪ Oh, I'm scared to death. ♪ ♪ I hope I don't faint on stage ♪ ♪ And now I really wish I wasn't wearing green. ♪ Everyone: ♪ Please talk. ♪ SC 1: ♪ You must be as kind as Brené Brown. ♪ Everyone: ♪ Please talk. ♪ SC 2: ♪ You must be as funny as Ken Robinson. ♪ Everyone: ♪ Please talk. ♪ SC 3: ♪ You have to be cool like Reggie Watts ♪ Everything: ♪ And bring up props like Jill Bolte Taylor. ♪ DH: ♪ My time is over. The clock is now pointing to zero. ♪ ♪ I started to speak faster. Please still understand me ♪ ♪ I'm too nervous to do this TED Talk. ♪ Everyone: ♪ Don't give up. Please rehearse. you're good. ♪ ♪ Edit and correct your mistakes. ♪ ♪ Please talk to me. ♪ DH: ♪ I grow up like Amy Cuddy. ♪ Everyone: ♪ Please talk. ♪ DH: ♪ Inspiring like Liz Gilbert. ♪ Everyone: ♪ Please talk. ♪ DH: ♪ Fight like Hans Rosling ♪ ♪ And release mosquitoes like Bill Gates ♪ ♪ ♪ SC 2: ♪ Make a TED talk out of you. ♪ ♪ I will make a TED Talk from you. ♪ ♪ I will make a TED Talk from you. ♪ ♪ I will make a TED Talk from you. ♪ ♪ I will make a TED Talk from you. ♪ (applause) ["Brought to you by TED staff and friends"] (music)

If you look deep into the night sky, you will see stars, and if you look further into the sky, you will see more stars, more galaxies, and more galaxies.

But if you continue to look farther, you will eventually see nothing for a long time, and finally see a faint, fading afterglow. That is the afterglow of the big bang.

Well, the Big Bang was the epoch of the early universe when everything we see in the night sky condensed into an incredibly small, incredibly hot, incredibly billowing mass that gave rise to everything we see.

Now we have mapped that aftertaste very accurately. When I say us, I mean people who are not me.

We mapped the afterglow with incredible accuracy, and one of the striking things about it is that it's almost perfectly uniform.

14 billion light years over there, 14 billion light years over there, same temperature.

It's now 14 billion years after the Big Bang, and it's getting darker and colder.

The current temperature is 2.7 degrees.

But not exactly 2.7 degrees.

It is only 2.7 degrees to 10 parts per million.

It's a little hot over there and a little cool over there. It's incredibly important to everyone in this room. Because where it was a little hotter, there's a little more stuff, and where there was a little more stuff, there's galaxies, clusters, superclusters, and all the structures you see in the Universe.

And those tiny little inhomogeneities, 20 parts per million, were formed by quantum-mechanical wiggles in the early universe that spanned the size of the entire universe.

That's spectacular, but that's not what they found on Monday. The one they found on Monday was even cooler.

So here's what they found on Monday. Imagine you pick up a bell and hit it with a hammer.

what happens? It will ring.

However, if you wait, the call will fade away and eventually become unnoticeable.

Now, the early universe was incredibly dense, like metal, even denser, and when you hit it, it makes a sound, but it's the fabric of space-time itself that's making a sound, and the hammer is quantum mechanics.

What they found on Monday is evidence of space-time echoes in the early universe, or what they call gravitational waves from the elementary age, and this is how they discovered it.

That wave is long gone.

Even if you take a walk, it does not move in small steps.

Gravitational waves in the structure of the universe are completely invisible for practical purposes.

But in the early days, when the universe was producing its last afterglow, gravitational waves added a small twist to the structure of the light we see.

So, looking deeper and deeper into the night sky, indeed, they spent three years in Antarctica, looking straight up through the coldest, clearest, cleanest air possible, peering deep into the night sky, studying its glow, looking for gravitational wave symbols, signals, faint twists that are the echoes of the early universe.

And on Monday they announced they had found it.

And the great thing about this piece for me is that it doesn't just sound. That's great.

Quite amazing, the reason I'm on this stage is because it tells us something profound about the early universe.

That is, we and everything we see around us are basically one big bubble, and this is the idea of ​​inflation. You can see that one large bubble is surrounded by others.

This is not conclusive evidence of inflation, but all non-inflationary explanations for this appear to be the same.

This is a theory, an idea that has been around for a while and we never thought we would see it in action.

For good reason, I thought I would never see conclusive evidence, but this is conclusive evidence.

But the really crazy idea is that our bubble is just one bubble in a much larger, rolling jar of universals.

We'll never see the object outside, but going to Antarctica and spending three years observing the detailed structure of the night sky shows that we're probably in a universe that resembles it.

And it amazes me.

Thank you very much.

(applause)

Chris Anderson: So this is a different interview.

Based on the idea that a picture is worth a thousand words, what I did was ask Bill and Melinda to dig out some images from their archives that would help explain some of what they did, and do some things that way.

So let's start here.

Melinda, when and where was this? Who is the handsome man next to you?

Melinda Gates: You're wearing those big glasses.

This is Africa. The fall of 1993 was our first trip and our first time to Africa for both of us.

We had already promised to get married.

A few months later we got married, and this trip was a real trip to see the animals and the savannah.

It was unbelievable. Bill had never taken so long off work before.

But what really impressed us was actually the people and the extreme poverty.

We started asking ourselves questions.

Should it be like this?

And at the end of the trip, we went to Zanzibar and took a walk on the beach we used to go to when we were dating.

At the time, we were already talking about giving back to society the wealth we got from Microsoft, but it was that beach walk that really started us talking.

CA: So, given that this vacation led to the creation of the world's largest private foundation, it's going to cost a lot as the vacation goes on. (laughs) MG: I think so. it was fun.

CA: Who was the main instigator here, or was it symmetrical?

Bill Gates: Well, I think we were all excited that there would be a stage in our lives where we would work together to figure out how to get this money back.

At this stage, we were talking about the poorest, but can we make a big impact on them?

Was there anything that wasn't done?

There were many things we didn't know.

Looking back, our naivety is truly incredible.

But we had a kind of enthusiasm that it was a phase and that the post-Microsoft phase would be our philanthropy.

MG: I always thought Bill would be like that after he turned 60. So I haven't reached 60 yet, so things can change along the way.

CA: That's how it started, but it just got faster and faster.

So it was '93, actually '97 before the Foundation itself started.

MA: Well, in 1997, when we read that millions of children around the world were dying from diarrheal diseases, we kept saying to ourselves,

In America, just go to the drug store. ”

So we started gathering scientists and learning about populations, learning about vaccines, learning what worked and what didn't. It wasn't until late 1998 or 1999 that it really started to work.

CA: So you have a lot of money and the world is full of so many different problems.

How do you decide what to focus on?

BG: Well, whatever the biggest inequalities globally, we've decided to name two causes. So we looked at children dying, children not developing adequate nutrition, and countries that were really stuck. Because at this level of mortality, parents will have so many children that the population will grow significantly, and the children will be so ill that they will not be able to get an education and get back on their feet.

That was our global thing, and then in the United States, we both had great education and thought that was the American way.

It takes a phenomenal educational system to deliver on the promise of equal opportunity, but the more I learn, the more I realize that it's actually not delivering on that promise.

So we chose those two things and that's where everything the Foundation does is centered.

CA: So I asked everyone to choose their favorite image that represents their work. Melinda, this is what you chose.

what do you mean?

MG: So, one of my favorite things to do when traveling, whether in Bangladesh or India or many African countries, is to go to the countryside and talk to women, but I come in as an unnamed Western woman.

I don't tell them who I am. A pair of khakis.

And the more I traveled, the more I heard from women over and over again, "I want to be able to use this shot."

When I was there to talk about vaccines for my children, they brought up the topic, "But what about my vaccinations?"

It was an injection of a contraceptive called Depo-Provera that they were receiving.

And when I came back and spoke to health experts around the world, they said, 'Oh, developing countries are stockpiling contraceptives.'

I needed to dig deeper into the report and this was what the team suggested to me. Stocking more than 200 days a year of the best things African women said they wanted to use explained why women were telling me, ``I walked 10 kilometers without telling my husband to get to the clinic and there was nothing.''

Thanks to America's efforts to fight AIDS, condoms have been stockpiled in Africa.

and supported by others.

But women will say over and over again, "You can't negotiate condoms with your husband."

I am suggesting he has AIDS or I am suggesting that I have AIDS so I can space the births of my children, feed them and have educational opportunities so I need that tool. ”

CA: Melinda, you're a Roman Catholic, and you've really been involved in controversy on both sides of this issue, and the issue of abortion.

how do you navigate it?

MG: Well, I think this is a very important point. In other words, we, as a global community, were walking away from contraceptives.

We knew that 210 million women wanted access to contraceptives. Even though we have contraceptives in the US, we didn't offer them because of the political controversy in this country. To me it was just a crime. I kept trying to find someone to bring this back to the world stage. And finally, I realized that I had no choice but to do it.

And although I am Catholic, I believe in contraceptives, as do most Catholic women in the United States who report contraceptive use. That controversy shouldn't hold us back.

We had a consensus in the US on contraceptives, but we went back to that global consensus and actually raised $2.6 billion on this very issue for women.

(Applause) CA: Bill, here's your graph. what do you mean?

BG: Well, my graph has numbers.

(Laughter) I really like this graph.

This is the number of children under the age of five who die each year.

And there are some lesser-known but actually phenomenal success stories that show us that we're making incredible progress.

When I was born there were 20 million people, but now it's down to about 6 million people.

So this is primarily about vaccines.

Smallpox killed millions of children each year.

It has been eradicated and reduced to zero.

Measles killed millions of people a year.

It goes down to hundreds of thousands.

Anyway, this is a graph that hopes to keep getting that number, and it's possible to use the new vaccine science to distribute vaccines to children.

You can actually accelerate your progress.

Over the past decade, that number has declined at a rate never seen before in history. So I love the fact that if you can invent a new vaccine, you can bring it out there and use the latest understanding of these things and deliver it right and you can do miracles.

CA: So, if you do the math, I think we're literally saving thousands of children's lives every day compared to the previous year.

It hasn't been reported.

The story of the airliner that killed more than 200 people is much bigger than that.

does it drive you crazy?

BG: Yes, because it's happening quietly.

It's a child, one child at a time.

98% of this has nothing to do with natural disasters, but it's amazing what people do when they see natural disasters.

It's incredible how people think "this could be me" and the money is flowing.

These causes are a little less visible.

Now that the Millennium Development Goals and all that stuff is coming out, we're becoming a little more generous, so the goal is to get this to well below 1 million, which we should be able to achieve in our lifetimes.

CA: Maybe getting engaged needed someone who was excited by numbers and graphs, rather than just a big sad face.

I mean, you used that word in your letter this year, and you basically used this argument to argue that aid is actually effective, contrary to the current meme that aid is in some ways worthless and broken.

BG: Well, people can accept it, but there are also well-meaning aids that don't work.

Some venture capital investments have been well-meaning and have gone awry.

You shouldn't say, "Okay, this is a bad attempt because we don't have a perfect record."

Look, what were your goals?

How are these countries trying to improve their nutrition, survival, literacy so that they can do their own thing and wow this is working, smarter.

We can use aid more wisely.

It's not a panacea for everything.

Including blockbusters like this, I think we can do better than venture capital.

CA: The conventional wisdom is that it's pretty hard for couples to work together.

How did you all cope?

MG: Well, a lot of women have said to me, 'I really don't think I can work with my husband.

It doesn't work. ”

You know, we enjoy it, but we don't. The foundation came on a journey of continuous learning for both of us, and in fact, we never traveled together more for the foundation than when Bill worked at Microsoft.

We travel more separately, but I always know that when I get home, Bill will be interested in what I've learned. Whether it's about women and girls, something new about the vaccine delivery chain, or about this great leader.

He will listen seriously and be very interested.

And when he comes home, even if it's talking about his speeches and data and what he's learned, I'm very interested and I think we have a really collaborative relationship.

But we're not always together, that's for sure.

(Laughter) CA: But now you are, and we are so glad you are.

Melinda, in the early days you were basically the main host of the show.

I think it was six years ago, Bill joined us full-time and left Microsoft to become full-time.

It would have been difficult to adapt. no?

MG: Right. In fact, I think the Foundation personnel were much more worried about Bill's arrival than I was.

I was really excited, actually.

So Bill made this decision apparently before it was announced in 2006, and it really was his decision. But again, it was a beach vacation where we were walking on the beach and he was starting to think of this idea.

And for me, the excitement of Bill giving his mind and heart to these huge global issues, these inequalities, was inspiring to me.

Yes, Foundation personnel were uneasy about it.

(Applause) CA: That's great.

MG: But it disappeared within three months of him being there.

BG: It also includes some employees.

MG: That's what I said, employee, three months after you were there, their troubles went away.

BG: No, just kidding. MG: Oh, so the employee didn't leave.

BG: Some did, but — (laughter) CA: So what are you guys discussing?

It's Sunday, 11:00 am, I'm off work, what's the matter? What's the discussion about?

BG: We built this together from the beginning, so it's been a great partnership.

In my early days at Microsoft, I did something similar to Paul Allen.

As Microsoft grew, I went through that with Steve Ballmer, and now Melinda, and partner in an even stronger, equal sense, so we often talk about what we should be contributing more to and which groups are working well.

She has a lot of insight.

She often sits with her employees.

We take part in various trips she described.

Therefore, collaboration is flourishing.

I can't think of anything that either of us had a very strong opinion about anything.

CA: By the way, Melinda, what about you? Can you do it? (laughter) You never know.

MG: Now, here's the problem.

We approach things from different angles, which I think is really good.

So Bill can look at big data and say, "I want to act on these global statistics."

For me, it comes from intuition.

I met a lot of people on the ground, and Bill taught me to use that as a reference to read the world's data and see if it matched. I think what I taught him was to take that data and meet people on the ground to understand if we could actually distribute that vaccine.

Can you get a woman to put a polio drip in a child's mouth?

Because deliverables are every bit as important as science.

So over time, I think we've gotten closer to each other's perspectives, and frankly, I think the work has gotten better because of that.

CA: You've had amazing success in areas like vaccines and polio.

But what about failure?

Can you talk about your failures and what you learned from them?

BG: Right. Luckily, we do experience failures, so some failures are tolerable.

We are conducting a lot of research on medicines and vaccines, but various failures are expected.

For example, the one we announced called for better condoms got a lot of attention.

Well, we had hundreds of ideas.

Perhaps some of them will work.

We were very naive about medicines for Indian visceral leishmaniasis, and certainly I was. I thought that if I got this medicine, I could eradicate this disease.

Well, it turned out that I was getting injections every day for 10 days.

It took three more years than we expected to get it, and then it never made it out to the world.

Luckily, we found that if we went to kill stable flies, we could probably make it there, but we spent five years, five years and about 60 million on that road, and by the time we got there, we had very modest gains.

CA: I think we spend $1 billion a year on education.

In any case, the story of what happened there is very long and complicated.

Are there any mistakes you can talk about?

MG: Well, the big lesson from the early work is that we thought these small schools were the answer, and they definitely helped.

They lower dropout rates.

Violence and crime have decreased in those schools.

But what we learned from the job, and which turned out to be the fundamental key, is the great teacher at the front of the classroom.

It doesn't matter if the building is big or small if there is no competent teacher in front of the classroom. The trajectory of whether the student can go on to college does not change.

(Applause) CA: Melinda, this is you and your oldest daughter, Jen.

And we just shot it about three weeks ago, maybe three or four weeks ago. where was this?

MG: So I went to Tanzania.

Jen has been to Tanzania.

In fact, all my children have been to Africa quite a bit.

And we did something different. I decided to spend three days and two nights with my family.

Anna and Sanare are parents.

They invited us to stay at their Boma.

In fact, I think the goats have been there before we got there, living in that little hut on the little property.

And we stayed with their family and really learned what life is like in rural Tanzania.

And there's a big difference between just going back and forth for half a day or three-quarters of a day and staying overnight, so let me just say one thing about it.

They had 6 children. I spoke with Anna in the kitchen and that day we spent about five hours cooking in the cooking hut. When I spoke with her, she had completely planned and spaced out the birth of her child with her husband.

It was a very loving relationship.

This was a Maasai warrior and his wife, who had decided to marry, and there was clearly respect and love in the relationship.

Their children were six, the middle two being 13-year-old boy-girl twins named Grace.

And when we went to cut trees and did all the things Grace and her mother would do, Grace wasn't a child, she was an adolescent, but she wasn't an adult.

She was very, very shy.

So she wanted to talk to me and Jen.

We kept trying to keep her engaged, but she was shy.

But at night, when all the lights went out in rural Tanzania, and that night, the first night, when there was no moon or stars, when Jen came out of our hut with REI's little headlamp on, Grace immediately went and called for an interpreter and immediately came to Jen and said, "When you get home, can you lend me your headlamp so I can study at night?"

CA: Oh, that's great.

MG: So her father told me that he was worried that unlike his son who passed the second exam, she wasn't doing as well because of the housework and hadn't even attended public school yet.

"I don't know how to pay for her education," he said.

She can't afford private school, and she might end up working on the farm like her wife. ”

So they know that education makes a big and profound difference.

CA: So this is another picture of your two other children, Rory and Phoebe, and Paul Farmer.

Raising three children despite being one of the richest families in the world seems like a social experiment with little prior art.

how did you manage

what was your approach?

BG: Well, overall I think the kids are getting a great education, but we need to make sure they understand what they are capable of and what they are going to do. Our philosophy is to communicate clearly to children and most of our funds go to foundations to help them find something they can be passionate about.

We want to strike a balance where they have the freedom to do what they want, but we can't shower them with large sums of money to go out and do nothing.

And so far, they've been pretty hard-working and excited to find their own way.

CA: You've been very careful with their privacy, for obvious reasons.

I wonder why they gave me permission to show this photo at TED now.

MG: Well, it's interesting.

As they grow up, they are well aware that our family beliefs are about responsibility, that we are in an incredible situation just to live in the United States and have a great education, and that we have a responsibility to give back to the world.

So as they grow up and we teach, they go to so many countries around the world, they say, we want people to know that we believe in what you guys are doing, Dad, Mom, and it's okay to show more.

So, we have their permission to show this photo, and I think Paul Farmer will probably end up making it part of his work.

But they also take the Foundation's mission very seriously.

CA: Despite the huge donations to the foundation, you easily got enough money to make everyone a millionaire.

Is that your plan against them?

BG: No. No, they don't have anything like that.

They need to have a sense that their work is meaningful and important.

In fact, long before we got married, I read an article by Warren Buffett talking about it, and I'm pretty sure it wasn't good for society or the kids.

CA: Well, speaking of Warren Buffett, something really amazing happened in 2006. America's richest man's only real rival somehow suddenly turned around and agreed to donate 80 percent of his fortune to your foundation.

How could that have happened?

I believe there is a long version and a short version.

I have time for the short version.

BG: Okay. Well, Warren was my best friend, and I was going to ask my wife, Susie, to give it all up.

Tragically, she died before him. And he loves delegation, and — (laughter) — he said — CA: Tweet it.

BG: If someone is doing something good and they're willing to do it for free, maybe that's fine. But we were stunned.

MG: I was totally blown away. BG: It was totally unexpected and unbelievable.

It has greatly increased our ambition for what the Foundation can do.

Half of the resources we get come from Warren's amazing generosity.

CA: And I believe you promised to donate more than 95 percent of your fortune to the foundation by the time the job is done.

BG: Yes.

CA: And since this relationship, it's been amazing — (applause) and lately you and Warren have been going around convincing other billionaires and successful people to commit more than half of their fortunes to charity.

How is it?

BG: Well, about 120 people have now pledged this donation.

What's great is that we get together every year to talk about, "Will you hire staff? What will you give them?"

We are not trying to homogenize it.

So the beauty of philanthropy is in this amazing diversity.

A person gives something to something.

We look and think, "Wow."

But that's great.

The role of philanthropy is to choose different approaches, even in one area like education.

More experiments are needed.

But meeting those people and sharing their journey to philanthropy, how they relate to children, how they do things differently, etc. was amazing and much more successful than we expected.

For now, it's likely to continue to grow in size over the next few years.

MG: And getting people to see that other people are making a difference with their philanthropy, I mean, they're the ones who started their own businesses and put their own ingenuity behind incredible ideas.

When they put their ideas and brains into philanthropy, they can change the world.

And then you see other people doing it and you start saying, "Wow, I want to do that for my own money."

To me, it's an incredible piece of work.

CA: It actually seems very difficult for some people to even figure out how to spend that much money remotely on something else.

There are probably some millionaires in this room, and certainly some successful people.

I'm interested, can I attend the pitch?

what is the pitch?

BG: Well, this is the most fulfilling thing we've ever done. you can't take it home. If that's not good for your child, get together and brainstorm what you can do.

The world is a much better place thanks to philanthropists of the past, and here the strongest US traditions are the envy of the world.

And one of the reasons I'm so optimistic is that I'm confident that philanthropy will grow and shine a light on some of these things that governments are not very good at addressing and discovering.

CA: There is gross inequality in the world, and increasing inequality problems that appear to be structural.

It seems to me that if many of your colleagues took an approach similar to that of both of you, it would affect both the problem, and certainly the perception of the problem.

is that a fair comment?

BG: Oh yeah. It is good if you take from the richest and give to the least rich.

It tries to be balanced and that's just it.

MG: But you change the system.

In the United States, we are changing our education system so that it is for everyone and works for every student.

For me, it's a big shift in the balance of inequality.

BG: That's the most important thing.

(Applause.) CA: Well, I truly believe that most people here, and millions of people around the world, are simply in awe of the trajectory of your life so far and the magnificent extent to which you have shaped your future.

Thank you for coming to TED, sharing information with us, and thank you for your efforts.

BG: Thank you. MG: Thank you.

(Applause) BG: Thank you. MG: Thank you.

BG: Okay, well done. (applause)

Now we have an ambitious teacher working on a 60-page dissertation based on an old educational theory developed by a deceased professor of education. I'm asking myself what this job she's working on has to do with what she wants to do in life: be an educator, change lives, make magic happen.

Now, there is an aspiring teacher in a graduate school of education, and he watches his professor go on and on about engagement in the most indifferent way possible.

I now have a first grade teacher at home. As I create lesson plans trying to understand the standards, and trying to figure out how to properly assess my students, I keep telling myself, "Don't laugh until November." Because that's what she was taught in her teacher education program.

A student is trying to convince his father or mother that he is too sick to go to school tomorrow.

On the other hand, there are some great educators who are sharing information right now. That information is shared in such a beautiful way that students can sit on the edge of their seats and just wait for a bead of sweat to roll off that person's face and soak up all the knowledge.

Some are driving the entire audience crazy right now. Some are weaving powerful stories about worlds that listeners have never imagined or seen before. But if you close your eyes tightly, you can imagine that world because the story is so compelling.

Now there is someone who can instruct the audience to raise their hands to the sky. Then they will stay there until he says, "Put your hands down."

right now.

So people will say, 'Chris, you're portraying someone who's been badly trained, but you're also portraying these powerful educators.

Perhaps these guys will cancel each other out, especially if you're thinking of the world of education and urban education, but we'll be fine. ”

In reality, the people I described as master teachers, master story builders, master storytellers are far from the classroom.

People who know the skills of how to teach and how to engage an audience don't even know what teacher certification means.

They may not even have what you would call an education degree.

And it's sad for me.

The people I described are very indifferent to the learning process, they want to be competent teachers, but they don't have a model, which is sad.

Let me paraphrase Mark Twain's words.

Mark Twain said that proper preparation or education is so powerful that it can turn bad morals into good morals, bad habits into powerful habits, change humans, and change them into angels.

The people I mentioned earlier have been adequately prepared in teaching simply because they are in the same space as the people involved in education, not in colleges and universities.

Where do you think those places are?

Barbershops, rap concerts, and most importantly, black churches.

And I have framed this idea called Pentecostal pedagogy.

Has anyone ever been to a black church?

I got a few hands.

When you go to a black church, the preacher starts speaking, but he realizes he has to engage the audience and often starts with this kind of wordplay first. Then take a short break and say, "Oh my God, they don't pay much attention."

So he said, "Can I ask you Amen?"

Audience: Amen.

Chris Emdin: So, may I ask amen? AUDIENCE: Amen.

CE: And suddenly everyone woke up.

The preacher is tapping the pulpit to get attention.

He lowers his voice at a very low volume when he wants people to understand him. These skills are the skills most engaging teachers need.

So why does teacher education only teach theory and theory, teach standards, teach basic skills and things that have nothing to do with the magic needed to attract an audience or engage a student?

So I can restructure teacher education and focus on content and that's fine. You can focus on theory, and that's fine, but I would argue that without the magic of teaching and learning, content and theory mean nothing.

Now, people often say, "Well, magic is just magic."

Teachers with those skills are able to enter those schools and captivate their audiences, despite the various difficulties. Then the administrator walks by and says, "Wow, he's so good. I wish all my teachers were that good."

And when I try to explain what it is, it just says, "He has that magic."

But what got me here is that magic can be taught.

Magic can be taught.

Magic can be taught.

Well, how do you teach?

Teach it by allowing people to enter the space where the magic is happening.

If you want to be an aspiring teacher in the urban education field, you have to get out of the university and go out into the world.

You have to go there and hang out at the barber shop and you have to attend a black church. And one must observe those who have the power to get involved and just take note of their actions.

In my college teacher training class, I started a project where all the students who came there would sit and watch a rap concert.

They watch how the rapper moves and talks.

They study how he proudly walked that stage.

They listen to his metaphors and parables, and with enough practice begin to learn these little things that are the keys to magic.

They learn that if they look at a student and raise their eyebrows by a quarter inch, they know it means they want more, so they don't have to say anything.

And if we could change teacher education to focus on teaching teachers how to create that magic, that would be great. You can revive a dead class, rekindle your imagination, and transform your education.

thank you.

(applause)

When people think of cities, they tend to think of certain things.

They think of buildings, streets, skyscrapers and noisy taxis.

But when I think of cities, I think of people.

Cities are basically people, and where people go and meet is at the heart of what makes a city work.

So even more important than city buildings are the public spaces between them.

And today, some of the most transformative changes in cities are happening in these public spaces.

Therefore, I believe that vibrant and fun public spaces are the key to planning great cities.

They are what make it come alive.

But why do public spaces work?

What attracts people to successful public spaces and what keeps people away from unsuccessful places?

I thought that if I could answer these questions, I could make a great contribution to my city.

But one of my more oddities is that I'm an ethologist, and I don't use my skills to study animal behavior, but to study how people in cities use public spaces in cities.

One of the first spaces I researched was this little vest pocket park called Paley Park in Midtown Manhattan.

This small space became a small phenomenon and had such a big impact on New Yorkers that it left a big impression on me.

I studied this park early in my career because it happened to be built by my stepfather, and I knew a place like Paley Park didn't happen by chance.

I have seen first hand that they require incredible dedication and attention to detail.

But what is it that makes this space so special and so appealing?

Well, I was sitting in the park and observing carefully, first and foremost a comfortable and moveable chair.

Interestingly, once people came in, found their seats, actually moved a bit, and then stayed for a while, they themselves attracted others, and ironically, I felt more at peace with others around me.

and it was green.

This small park provided the comfort and greenery that New Yorkers crave.

But my question was why wasn't there more green spaces and places to sit in the middle of the city where I didn't feel lonely or trespasser?

Unfortunately the city was not designed that way.

There you will see a familiar sight.

In this way, squares have been designed for generations.

It has a stylish, spartan look that is often associated with modern architecture, but it's no wonder people avoid such spaces.

Not only do they look bleak, they feel downright dangerous.

I mean, where do you sit here?

what do you do here?

But architects love them.

They are the pedestals for their work.

They may allow a carving or two, but that's about it.

For developers, these are ideal.

No need to water, no maintenance, no need to worry about unwanted people.

But don't you think this is a waste?

For me, being a city planner meant being able to truly transform the city I lived in and loved.

I wanted to create a place that had the feel of Paley Park, but I couldn't let the developers build such a drab plaza.

But over the years, I've learned how difficult it is to create public spaces that are successful, meaningful, and enjoyable.

As I learned from my father-in-law, especially in a city like New York, you have to fight for public space first, and someone has to take every detail seriously to be successful.

Now, open spaces in cities are an opportunity.

Sure, these are opportunities for commercial investment, but they are also opportunities for the public interest of the city. These two goals often don't coincide, and that's where the conflict arises.

The first time I had to fight for great public open space was in the early 1980s when I was leading a team of planners on a huge landfill called Battery Park City in Lower Manhattan on the Hudson River.

He was told that this sandy wasteland had sat barren for 10 years and would go bankrupt if he didn't find a developer within six months.

So we came up with a radical, almost insane idea.

Rather than building parks as a complement to future development, why not reverse the equation and build small but very high quality public open spaces first and see if that makes a difference.

So everything we built had to be perfect, because we could only afford to build a two-block section of the mile-long boardwalk.

So I insisted on making a mock-up of the wooden railing and seawall just in case.

And when I sat down on the test bench with sand still swirling around me, the railing just hit eye level, blocking my view and ruining my experience on the water.

So it's the details that really make the difference.

But design isn't just about how something looks, it's about how your body feels in that seat in that space, and I believe the success of a design will always depend on that personal experience.

Everything looks very complete in this photo, but the granite edges, the lighting, the bench backs, the trees planted, the different types of sitting areas were all a small battle to turn this project into a place people wanted.

Now, twenty years later, this proved invaluable when Michael Bloomberg asked me to become a planning commissioner and be responsible for shaping the entirety of New York City.

And that very day he told me that New York's population was expected to grow from eight million to nine million.

And he asked me, "So where are you going to put another million New Yorkers?"

Hmm, I couldn't come up with anything.

Now, you know, New York places a lot of emphasis on attracting immigrants, so we were excited about the prospects for growth, but let's be honest, where in a city that's already built around every inch and surrounded by water?

How do you find housing for so many new New Yorkers?

And if we couldn't expand, which was probably a good thing, where could the new housing go?

What about cars?

We can't handle cars any more in our city.

So what were we going to do?

If you couldn't spread out, you had to climb up.

And if I had to climb, I had to climb where I didn't have to own a car.

That meant leveraging one of our greatest assets: our transportation system.

But I never thought about how to get the most out of it.

This was the answer to our puzzle.

We thought that if we could redirect and redirect all new development to transportation, we could really address population growth.

And this is the plan, what we really needed to do. We had to redo the zoning. And zoning is a regulatory tool for city planners. It essentially rebuilt the entire city, targeting where new development was possible and prohibiting any development in car-centric, suburban-style neighborhoods.

Well, this was an incredibly ambitious idea. It was ambitious because the community had to approve these plans.

So how were we going to do this?

by listening. So I actually spent thousands of hours listening to it to build trust.

As you know, communities can tell if you know your neighborhood.

It's not something that can be easily faked.

And I started walking.

Sweltering summers, freezing winters, I don't know how many blocks I walked each year to understand the DNA of each region and what each street felt like.

I have become an incredibly geeky zoning expert and have found ways that zoning can address community concerns.

So, little by little, we started setting height limits per neighborhood, per block, so that all new development was predictable and nearly passable.

Over a period of 12 years, 40 percent of the city, or 124 neighborhoods equivalent to 12,500 blocks, could be rezoned, and today 90 percent of all new developments in New York are within a 10-minute walk of the subway.

In other words, no one living in those new buildings should own a car.

Well, those zonings were exhausting, energizing, and important, but zoning was never my mission.

You can't see the zoning and you can't feel the zoning.

My mission has always been to create great public spaces.

So I decided to create a place that would make a difference in people's lives in an area that was being developed on a large scale.

Here, two miles of dilapidated and abandoned waterfront in the Greenpoint and Williamsburg neighborhoods of Brooklyn, impossible to reach or use.

The plots here were massive, so I felt obligated to create grand parks on these waterfronts and put an incredible amount of time into every square inch of these plans.

I wanted to make sure there was a tree-lined path from the highlands to the water's edge, trees and vegetation everywhere, and of course, plenty of places to sit.

To be honest, I had no idea what was going to happen.

I had to have faith.

But I put everything I studied and learned into the plan.

And then it opened and I have to say it was incredible.

People flocked from all over the city to visit these parks.

I know they changed the lives of the people who lived there, but they also changed the whole image of the city for New Yorkers.

I come here often and see people boarding this little ferry that now runs the autonomous zone. I don't know why, but I am very impressed by the fact that people are using this ferry as if it had been there for a long time.

And here is the new park in Lower Manhattan.

Well, the lower Manhattan waterfront was a total mess before 9/11.

Wall Street is essentially landlocked, and this edge could not be approached.

And after 9/11, the city had little control.

But we thought that if we could go to the Lower Manhattan Development Authority and get the money to reclaim two miles of this blighted waterfront, it would make a big difference in rebuilding Lower Manhattan.

And it happened.

Lower Manhattan finally has public waterfronts on all three sides.

i really love this park.

As you know we now need a higher railing so we put bar seating at the end. This allowed us to get almost close to the surface of the water.

And see how the railing spreads out and lays flat so you can lay your lunch or laptop on it.

And I love it when people come in there and look up and they say, "Wow, there's Brooklyn, it's so close."

So what's the trick?

How can we turn parks into places people want to go?

It's up to you as a human being, not as a city planner.

Lack of design expertise.

You use your humanity.

I mean, do you want to go there?

do you want to stay there

Can you see inside and out of it?

Anyone else?

Does it look green and friendly?

Can I find my own seat?

Well, there are places all over New York City where you can find your own seat.

A pop-up cafe is now open where the parking lot used to be.

Where Broadway traffic once ran, there are now tables and chairs.

Twelve years ago sidewalk cafes weren't allowed, but now there are cafes everywhere.

But claiming these spaces for public use is not easy, and maintaining them as such is even harder.

So this time we will talk about a very unusual park called the High Line.

The High Line was an elevated railway.

(Applause.) The High Line is an elevated railroad that runs through three sections of Manhattan's West Side, and when the trains stopped running, it became a landscape of its own, a kind of garden in the sky.

And honestly, when I saw it for the first time, when I went up that old viaduct, I fell in love the way one falls in love with another.

And when I was appointed, protecting the first two sections of the Highline from demolition became my first priority and most important project.

I knew that if I had a day where I didn't care about the High Line, it would come down one day.

And the High Line, now widely known and incredibly popular, is the city's most controversial public space.

You may see beautiful parks, but not everyone does.

Indeed, commercial interests will always be in conflict with public space.

You may be thinking, "How amazing that over 4 million people from all over the world visit the High Line!"

Well, developers only see one thing. it's the customer.

Hey, why don't we remove those plants and build a store along the High Line?

That's great, and wouldn't it mean more money for the city?

No, it wouldn't be great.

It would be a shopping mall, not a park.

(Applause.) It may mean more money for cities, but cities must have a long-term view, a view for the public good.

Most recently, the last section of the High Line, the third section of the High Line, and the last section of the High Line have been contested for development interests, with some of the city's largest developers constructing more than 17 million square feet at Hudson Yards.

And they came to me and suggested that that last third section be "temporarily dismantled."

Perhaps the High Line did not match the image of a glittering city with skyscrapers on hills.

Perhaps it was a hindrance to them.

But in any case, it took nine months of nonstop daily negotiations to finally sign an agreement banning demolition, and that was just two years ago.

That is, no matter how popular and successful public spaces are, it can never be taken for granted.

Public spaces are always a life saver. Public spaces always need a vigilant defender. It must first not only claim public use, but must also be designed for the people who use it, and second, maintain that it is for everyone, that it cannot be violated, invaded, abandoned, or neglected.

If there's one lesson I've learned in my life as an urban planner, it's that public space has power.

It's not just the number of people using it, but more and more people feel that their city is better just by knowing it's there.

Public spaces can change how you live in a city, how you feel about it, whether you choose one city over another, and they are one of the most important reasons to stay in a city.

I believe that a successful city is like a great party.

People stay because they are having a good time.

thank you.

(Applause.) Thank you. (applause)

What is the intersection of technology, art and science?

Curiosity and amazement, because it drives us to explore and surround us with the unseen.

And I love using cinema to take us on a journey through portals in time and space, to make the invisible visible. Because it expands our horizons, changes our perceptions, opens our minds, and resonates with us.

Here are some scenes from my 3D IMAX movie "Mysteries of the Unseen World".

(music) There is movement so slow that the eye can't catch it, and time-lapse gives us discoveries and broadens our perspective on life.

Learn how organisms arise and grow, and how vines see sunlight and crawl out of the forest floor to survive.

And on an epic scale, timelapse allows you to see the Earth in motion.

You can see not only the vastness of nature, but also the restless movement of mankind.

Each dot in the stripe represents an airliner, and by converting air traffic data into time-lapse images, we can see something that is always above us, but invisible: the vast air travel network above the United States.

You can do the same with ships at sea.

Turn your data into a time-lapse view of the global economy in motion.

And decades of data give us the view that our entire planet is a single organism sustained by ocean currents circulating in our oceans and swirling clouds in the atmosphere that pulsate with auroral-crowned lightning.

It may be the ultimate time-lapse image that vividly reproduces the structure of the earth.

On the other end of the spectrum, there are things that move too fast for our eyes, but we have the technology to see that world as well.

With a high speed camera you can do the opposite of a timelapse.

We can capture images thousands of times faster than our eyes can see.

And we will be able to see how nature's ingenious apparatus works, and perhaps even imitate it.

When a dragonfly flies, you may not realize it, but dragonflies are nature's greatest fliers.

It can hover, fly backwards, or even flip upside down.

Also, by tracking insect wing markers, we can visualize the air currents that insects produce.

No one knew the secret, but at high speeds you can see that the dragonfly can move all four wings in different directions at the same time.

And what we've learned could lead to new kinds of robotic flight that can expand our horizons for places that matter and are far away.

We are giants, so we don't notice things that are too small to see.

An electron microscope shoots electrons to create an image that can magnify an object a million times.

This is a butterfly egg.

And there are invisible creatures all over your body, such as mites that live in your lashes and crawl on your skin at night.

do you know what this is?

shark skin.

caterpillar mouth.

Drosophila eye.

Egg shell.

fleas.

snail tongue.

We think we know most of the animal kingdom, but there are likely millions of tiny species waiting to be discovered.

Spiders also have big secrets. Because spider silk is stronger than steel per pound, yet perfectly elastic.

This journey takes us to the nano world.

Silk is 1/100th the thickness of human hair.

Above it is a bacterium, and near that bacterium is a virus ten times smaller.

Inside it are three DNA strands that are ten times smaller.

And we're approaching the limit of our most powerful microscope, a single carbon atom.

With a powerful microscope tip, you can actually move atoms and start creating amazing nanodevices.

Someday, some may patrol our bodies for all sorts of diseases, clearing out clogged arteries along the way.

The tiny chemical machines of the future may one day be able to repair DNA.

We stand on the threshold of extraordinary progress born from our drive to unlock the mysteries of life.

So under the endless rain of cosmic dust, the air is filled with pollen, microdiamonds, gems, and supernova explosions from other planets.

People live surrounded by invisible things.

Knowing that there are so many things around us that we will never be able to see changes our understanding of the world, seeing the unseen world makes us aware that we exist within the universe we live in, and this new perspective creates wonder and inspires us to become explorers of our own backyards.

Who knows what is waiting to be seen and what new wonders will change our lives.

I have to see.

(Applause.) Thank you.

You won't understand anything in English like me.

It's good for you because you can take a break after meeting some great people.

Let me tell you, I'm that kind of person and I'm not very comfortable with it. This is because I usually think that my work is completely useless in my life.

I mean, it feels like a waste.

I feel like shit just thinking about Carolyn and the others.

And last but not least, I don't know why I'm here, but you know the nightmare you're having, like a fraud, when you get to the Opera, you're forced to sing, 'I have to sing!

don't know. (Laughter) So I have nothing to show or say, so let's talk about something else.

If you'd like, I'd like to start by understanding how I work. This is just the beginning and it's not fun.

If someone comes up to me and asks what I know, yes, a lemon squeezer, a toilet brush, a toothpick, a beautiful toilet seat, and why a toothbrush?

I'm not trying to design a toothbrush.

I'm not going to say, "Oh, that would be beautiful," or anything like that.

It doesn't interest me.

Because there are various designs.

Its design can be called a cynical design. This means a design invented by Raymond Loewy in the 50's. He said, "You can't sell something ugly, la later se Vend mal, it's terrible."

So design has to be just a weapon for marketing, because producers make their products sexier so they sell more, it's shit, it's outdated, it's silly.

I call it cynical design.

Then there's the narcissistic design. It's a great designer who only designs for other great designers. (Laughter) Then I'm so ashamed to try to make humans like me deserve to exist and do this futile work and try to do it differently, but they don't make objects for the sake of objects, they're trying to make objects for the benefit of humans, the people who use them, so do I.

If I take the toothbrush as an example, I don't think about the toothbrush.

I wonder what kind of effect it will have if I put a brush in my mouth.

And to understand what effect a toothbrush in your mouth has, you have to imagine, "Who owns this mouth?"

What is the life of this mouth lord? What kind of society does this man live in?

What civilizations make up this society?

What animal species produced this civilization?

When I reach animal species level, it takes a minute or so, and I'm not that intelligent. Once you get to the animal species level, it gets really interesting.

I have no power to change anything.

But when I come back, I understand why they don't do it. Because not doing it today is more positive than doing it.

But back in the animal realm, there is something to see.

There is something to see, but there are also big challenges.

A big challenge before us.

Because there is no human work that exists outside of what I call the 'big image'.

The big image is our story, our poetry, our romanticism.

Our poetry is our mutation, our life.

We have to remember, and in any book of my 10-year-old son, we find that life comes in four billion years ago, or four billion points two or so.

Offstage Voice: 4.5.

Yes, point 5, OK, OK, OK! (laughs) I'm a Christmas gift designer.

And before, there was this soup called "Soup Primordiale". This first soup was like thud, thud, filth, and lifeless.

Then -- hissing -- lightning -- hissing -- arrival -- hissing -- life is born -- boo-boo -- and it dies.

Millions of years later -- whoosh, whoooo, oh wake up!

Finally, it succeeds and life emerges.

We were so, so stupid. The stupidest bacteria.

I even think I'm copying the way we reproduce, you know what I mean, and something - no, forget it.

After that, we become fish. Then we become frogs. Then we become monkeys. Then we become the supermonkey we are today, and the funny thing is that the supermonkey we are today is half the story.

Can you imagine? Four billion years from those stupid germs to us with microphones, computers and iPods.

And we know, and Carolyn in particular, when the sun collapses, the earth will burn and explode, I don't know, and is this planned for four or four billion years?

Yes she said something like that. OK, that means we're halfway through the story.

wonderful! Beauty, isn't it!

Can you imagine? It's very symbolic.

Because the bacteria we once existed had no idea what we are like today.

And today we have no idea what we will be in 4 billion years from now.

And the area is wonderful.

That's our poem. That's our beautiful story.

It's our romanticism. mutation. we are mutants.

And if we don't have a deep understanding, if we don't integrate that we are mutants, we miss the story completely.

Because every generation thinks we are the last generation.

We have a way of looking at the Earth that way, you know, "I am human. I am the last human."

You know, four billion years ago we were mutating, but now we're stopping because that's me. fin. (Laughter) Finally, forever, it's the one with the red jacket. ”

something like that. I don't know. (Laughter) Because that's our intelligence, such as mutation.

There is much to be done. Very fresh.

And here's something. No one is obligated to be a genius, but everyone is obligated to participate.

And for mutants to participate, they need a minimum of exercise, a minimum of sports.

I can say that.

The first, if you want -- there are so many, but the ones that are very easy to do are the vision imperatives.

Let me explain. I'll try.

If you walk like that, it's okay, you can walk, but maybe because you're walking with that kind of eye, you can't see the holes.

and you will fall and die. dangerous.

Maybe that's why I try to take this point of view.

OK, I see, when they find something, up, up, and they keep going, up, up.

At higher viewing angles, it's still very -- selfish, selfish, egotistical -- yes, selfish.

you will survive fine.

If you raise your eyes a little higher, it's like, "I see, oh my God, I'm here, how are you doing, I can help you, I'll design a new toothbrush, a new toilet brush."

I live in society. i live in a community.

fine. I would say that you are beginning to enter the realm of intelligence.

From this level, the more you raise this perspective, the more important you become to society.

The more you stand up, the more important you are to civilization.

So the farther and higher you try to stand up and look, the more important you will be to our mutation story.

So intelligent people are at this angle. That is intelligence.

From here to here, that's genius.

Ptolemy, Eratosthenes, Einstein, etc.

No one is obligated to be a genius.

Better, but no one.

Take care to be a good mutant in this training.

There are some dangers, there are some traps. One trap: vertical.

Because when we see you like that in our vertical direction, we think, "Oh, God, there is God. Oh, God!"

God is a trap God gives us answers when we don't know them.

I mean, when your brain isn't big enough, when you don't understand, you think, "Oh, this is God, this is God." It's ridiculous.

So—jump, like that? No, don't jump.

come back. Because there is another trap after this one.

If you look like that, you are looking into the past or, if you are very flexible, looking within yourself.

It's called schizophrenia and you're dead too.

So every morning, now that you're a good mutant, raise the angle of view.

Out, more in the horizontal direction. you are intelligent

Never forget, that kind of thing, that kind of thing.

It's very, very important.

What else can you say about it? Why would you do that?

Because from a distance you can see the course of our evolution.

This evolutionary trend is clearly positive.

From a distance, this line looks very smooth.

But when I shoot through the lens, this line is, "Oh, oh, oh, oh, oh." so.

It is made of light and shadow.

It can be said that light is civilization and shadow is barbaric.

And knowing where we are is very important.

Because some cycles have a spot within the cycle and they don't have the same duties in different parts of the cycle.

I mean, we can imagine -- it's not great, but there weren't that many wars in the '80s, and there were -- we can imagine civilization can be civilized.

In this case, even someone like me is fine.

You can say, "It's a luxury time."

We have time to think, we have time to talk about art and things like that.

fine. we are in the light

But sometimes, like today, we fall, so quickly, so quickly into the shadows, and so quickly into the savagery.

With many, many, many faces of savages.

Because it isn't. The savagery we are in today is probably not the savagery we think it is.

There are many different types of barbaria.

That's why we have to adapt.

So when Bavaria comes back, forget about beautiful chairs, forget about beautiful hotels, forget about design, and - sorry - even art.

Forget all that. There are priorities. There is urgency.

You have to go back to politics, you have to go back to radicalization, sorry if not very English.

We must return to the battle, to the battle.

That is why I am so embarrassed to do this job today.

That's why I'm here and I strive to be the best possible.

But I know that's why I'm the best, even though I'm doing it the best I can, it's nothing.

Because now is not the right time.

That's why I say yes. I say this because, I repeat, nothing exists without the good rhythm of this civilization, the rhythm of our beautiful dreams.

And because we all have to work to finish this story.

Because while we're fine with this civilization's scenario -- love, progress, stuff like that -- other civilizations have so many different scenarios.

This scenario for this civilization was to become powerful and intelligent, like this idea that we invented, the concept of God.

We are gods now. we are. Almost completed.

All that's left is to finish the story.

That's very, very important.

And you can't go and fight or work or build when you don't really understand what happened.

So go to the future, go back, go back, go back.

And you can fall, which is very dangerous.

No, you should really understand that.

We're almost done, so let's repeat this story.

And the great thing about this is that in maybe 50, 60 years we will end this civilization once and for all and offer our children the possibility of inventing new stories, new poems, new romanticisms.

Thanks to the billions of people who were born, worked, lived and died before us, who have worked hard, we now have beautiful things, beautiful gifts and know so much more.

We can say to our children, "Okay, it's over, this is our story." it passed.

Now you have a duty to invent new stories. Invent new poems.

The only rule is don't think about the next story.

I will give you a white page. invention.

We give you the best tools, the best tools. And now do it.

That's why it keeps doing its job, even if it's a toilet brush.

I was born and raised in Sierra Leone. Sierra Leone is a small and very beautiful country in West Africa, rich in both material resources and creative talent.

But Sierra Leone is notorious for its decade-long rebellion in the 90s that burned down entire villages.

An estimated 8,000 men, women and children had their arms and legs amputated during this period.

When I was 12 years old and fled with my family to safety, I was determined to do everything I could to prevent my children from going through what we had.

Indeed, they will be part of a Sierra Leone where war and amputation are no longer strategies for gaining power.

As I watched people I know and love recover from this devastation, what deeply troubled me was the refusal of many of the amputees in this country to use prosthetic legs.

I later found out that the reason was that the prosthetic socket didn't fit well and was painful.

The prosthetic socket is where the amputee inserts the stump and is attached to the prosthetic ankle.

Even in developed countries, it can take anywhere from three weeks to several years before a patient can get a comfortable socket.

Prosthetists still use traditional processes such as molding and casting to create single-material prosthetic sockets.

Such sockets leave an intolerable amount of pressure on the patient's extremities, often causing pressure sores and blisters.

It doesn't matter how strong the artificial ankle is.

If prosthetic sockets are uncomfortable, you won't use your legs, which is totally unacceptable in modern times.

So, one day about two and a half years ago, when I met Professor Hugh Herr and was asked if I knew how to solve this problem, I said, "No, not yet, but I would love to."

So for my PhD. At the MIT Media Lab, we designed a custom prosthesis socket that is more comfortable than traditional prostheses, quickly and cheaply.

I used magnetic resonance imaging to capture the real shape of the patient's anatomy and then used finite element modeling to better predict internal stress and normal force distortions to create a prosthetic socket for fabrication.

We use a 3D printer to create a multi-material prosthetic socket that relieves the required pressure on the patient's anatomy.

So we are using data to create new sockets quickly and cheaply.

In a recent trial we just completed at the Media Lab, one of our patients, a U.S. military veteran who has been an amputee for almost 20 years and has dozens of legs, said of one of our printed parts, "It's so soft, it feels like you're walking on a pillow, and it feels sexy."

(Laughter) In our time, disability should not be a hindrance to a meaningful life.

My hope and desire is to use the tools and processes developed in our research group to bring high-performance prosthetic legs to people in need.

For me, to begin healing the souls of those affected by war and disease, it is necessary to create a comfortable and affordable interface for their bodies.

Whether it's Sierra Leone or Boston, I hope this will not only restore but actually change their sense of human potential.

thank you very much.

(applause)

Pat Mitchell: That day, January 8, 2011, started like any other day.

You both loved your work.

You were in Congress meeting your favorite voters, Mark, and you were happily preparing for the next Space Shuttle.

And suddenly, everything you had planned and expected in your life was irrevocably changed forever.

Mark Kelly: Yeah, it's amazing, it's amazing how everything can change in an instant for any of us.

People don't realize that.

It certainly wasn't.

Gabby Giffords: Yes.

MK: And that Saturday morning, I got the dreaded call from Gabby's chief of staff.

She didn't have much other information.

She just said, "Gabby got shot."

A few minutes later I called her back. And I actually thought for a moment that maybe I was just imagining this call coming in.

I called her back and she told me Gabby had been shot in the head.

And from that point on, we knew our lives were going to change a lot.

PM: So when you arrived at the hospital, what was the prognosis they gave you for Gabby's condition and what kind of recovery, if any, could you expect?

MK: Well, you don't usually get a lot of information about gunshot wounds to the head and traumatic brain injuries.

Each injury is different. Just as stroke, a form of traumatic brain injury, is often predictable, so too is it unpredictable.

So they didn't know how long Gaby would be in a coma, when things would change, or what the prognosis would be.

PM: Gabby, was your recovery an effort to create a new Gabby Giffords or an effort to bring back the old Gabby Giffords?

GG: The new ones are better, stronger and tougher.

(Applause.) MK: I mean, when you look at the picture behind us, it's really hard to come back from an injury like that and come back stronger than ever.

I don't know anyone tougher than my wonderful wife here.

(Applause) Prime Minister: So what was the first sign that recovery would not only be possible, but that you and Gabby would have a life that was even a little more like what you and Gabby had planned?

MK: Well, the first thing that came to my mind was that Gabby was still kind of unconscious, but when she was in her hospital bed in the ICU, she did what we always did when we went out to dinner at a restaurant. That meant she took my ring off and flipped it from finger to finger. At that point, I knew she was still there.

PM: And there were also certain words.

Didn't she startle you with her words at first?

MK: Well, it was tough at first. GG: What? what? chicken. chicken. chicken.

MK: Yes, that was it.

That was Gabby's vocabulary for the first month.

For some reason, she suffers from aphasia, which makes communication difficult.

She stuck to the word "chicken", which isn't the best, but certainly not the worst.

(Laughter) And we were actually afraid that it would be much worse than that.

PM: Gabby, what has been the hardest thing for you during this recovery?

GG: I'm talking. really hard. TRUE.

MK: Well, Gabby, who's aphasic, knows what he wants to say, but he can't quite articulate it.

She understands everything, but if you look at the picture, communication is very difficult, because the part of the brain where the communication center is located is on the left side of the head, and that is where the bullet passed.

PM: Then you have to do something very dangerous. It is to represent my wife.

MK: Yes.

It might be some of the most dangerous things I've ever done.

PM: Gabby, are you optimistic about your continued recovery, being able to walk, talk, move your arms and legs?

GG: I'm optimistic. It's going to be a long, hard road, but I'm optimistic.

PM: Don't you think that's the best thing about Gabby Giffords? (Applause) MK: Gabby was always really optimistic.

She works incredibly hard every day.

GG: On the treadmill, walking on the treadmill, Spanish lessons, the French horn.

MK: Only my wife can do that. This makes some sense if you know her before she gets hurt. Someone who has had an injury that makes communication very difficult and may see a speech therapist. And about a month ago she said she wanted to study Spanish again.

PM: Well, let's take a closer look at my wife. This was before you met Gabby Giffords.

She's riding a scooter there, which I understand is a very docile image of Gabby Giffords as a child.

MK: Yeah Gabby, she used to race motorcycles.

It's a scooter, but she had a BMW motorcycle.

PM: Will she ride it? MK: Well, it's hard not being able to move her right arm, but with some Velcro that I know, I might be able to get her back on the bike. You may be able to secure your right hand to the handlebar with Velcro.

PM: I have a feeling we'll see that picture next time, Gabby.

But when you meet you, you have already decided to dedicate your life to service.

You will join the military and eventually become an astronaut.

That's how we meet.

What attracts you to Gabby?

MK: Well, oddly enough, the last time we met was about 10 years ago when we were in Vancouver. We met at the Vancouver airport, both during our trip to China. In fact, based on my background, I'd say it's a thug.

Gabby would — GG: Fact-finding mission.

MK: She would call it an important fact-finding mission.

She was a state senator at the time and we met here at the airport before our trip to China.

PM: Would you say it's a whirlwind romance?

GG: No, no, no.

(laughs) You're a good friend.

MK: Yes, we have been friends for a long time.

GG: Yes. (laughs) MK: Then she asked me out, and about a year later she asked me out on a date.

Where have you been, Gabby?

GG: On death row.

MK: Yes. Our first date was a death row inmate at the Florence State Penitentiary in Arizona, just outside Gabby's state Senate district.

They worked on several bills related to Arizona's crime and punishment and the death penalty.

So she had no one else to go with her, so I thought, 'Of course I want to go to death row.

That was our first date.

We have been together ever since. GG: Yes.

PM: Well, maybe that's why Gabby decided to marry you.

After all, you were willing to go to death row.

MK: Yes.

PM: Gabby, what made you want to marry Mark?

GG: Well, good friends. Close friend. Close friend.

MK: I always thought we had a very special relationship.

We've been through some tough times, but it's made us stronger. GG: Stronger.

PM: But you were able to live a very independent life after marriage.

In fact, we didn't even live together.

MK: We had that kind of commuting marriage too.

In our case it was Washington D.C., Houston and Tucson.

We went to different places, sometimes clockwise, sometimes counterclockwise, but it wasn't until that Saturday morning that we actually lived together.

Less than an hour after Gabby was shot, I was on a plane to Tucson. That was the moment that changed the situation.

Prime Minister: And Gabby, you ran for Congress after being a state senator, and you served for six years.

What do you like most about being an MP?

GG: It's fast-paced. fast pace.

PM: Well, it was your way. GG: Yes, yes. fast pace.

PM: I don't know if people fully describe it that way.

(Laughter) MK: Well, the pace of legislation is often very slow, but both my wife and I have to admit, many other members of Congress I know work incredibly hard.

So Gabby was running around like crazy, never taking a day off, and only getting half a day off a month. And whenever I was awake, I was working. She really really grew up with it and still does. GG: Yes. yes.

PM: I have to say that we will put solar panels on the roof of her house.

After a tragic incident, Mark, you have decided to resign as an astronaut, even though you were supposed to be on your next space mission.

Everyone tried to convince you to go back, including Gabby, but you did.

MK: Right. The day after Gabby was injured, I called my boss, lead astronaut Dr. Peggy Whitson, and said, 'Peggy, I know that three months from now, we'll be in space.

Gabby is in a coma. I am in Tucson.

you have to find a replacement for me ”

I mean, I didn't actually quit being an astronaut, but they found me a replacement because I quit my job.

After a few months, maybe two months, I started working on getting my job back. I mean, when it comes to this primary caregiver, there are certainly people in the audience here who have been in that position as well. It's a tough role, but you have to figure out when it's time to get your life back. At the time, I couldn't ask Gabby if she wanted me to ride the space shuttle again.

But I knew she was— GG: Yes. yes. yes.

MK: She has been the biggest supporter of my career and I knew it was the right thing to do.

PM: And yet, I'm trying to imagine, Mark, what it was like to go on a mission, supposedly safe, but that's never a guarantee, and knowing that Gabby is— MK: Well, not only is she still in the hospital, but on the third day of that flight, while I was literally joining the space station, two vehicles going at 17,500 mph, and I was actually piloting it, looking out the window. , looking at a lot of computers, Gabby was in his head. Surgery, literally at that time, underwent final surgery to replace a portion of the skull taken out the day she was injured with a prosthesis, yes, the entire side of her head.

Now, if any of you were coming to our house in Tucson for the first time, Gabby would usually go to the freezer and pull out a Tupperware with a real skull in it. (laughs) GG: It's a real skull. MK: It surprises people sometimes.

PM: Is it an appetizer or a dessert, Mark?

MK: Well, it's a conversation starter.

PM: But Gabby, after Mark got on the plane, there was a lot of talk about what you did.

You, too, had to step up your courage. Here Congress is in a stalemate again, and you got out of the rehab center and into Washington so you could walk the floor of the House. I can hardly talk about this without getting emotional, but I gave a vote that could be the deciding vote.

GG: The debt ceiling. debt ceiling.

MK: Yes, there was a vote. I think it was about five months after Gabby's injury. She made the bold decision to come back.

It was a highly controversial vote, but she wanted her voice heard again.

Prime Minister: Then I resigned and started a very slow and difficult recovery.

What is your daily life like?

MK: Well, it's Gabby's service dog, Nelson.

GG: Nelson.

MK: A new member has joined our family. GG: Yes, yes.

MK: So we brought him— GG: out of prison. murder. MK: We seem to have a lot of connections with prisons. (Laughter) Nelson comes from a Massachusetts murder-raising prison.

But she did a great job with this dog.

He's a great service dog.

PM: So Gabby, what have you learned from your experiences over the last few years?

MK: Yes, what did you learn? GG: Deeper. Deeper.

PM: Your relationship has deepened.

It has to be. you are always together now

MK: I think I appreciate it too, don't you?

GG: Thank you.

PM: This is a picture of family and friends together, and I love these pictures because they show the relationship between Gabby and Mark right now.

And Gabby, you describe it over and over again as deeper on so many levels. yes?

MK: I think sometimes when something tragic happens in a family it brings people together.

This is us watching the space shuttle fly over Tucson. The Space Shuttle Endeavor, which I commanded on its final flight on a 747 bound for Los Angeles, was kindly sent over Tucson by NASA.

PM: And of course, both of you are going through the slow and difficult challenges of recovery, but how do you stay optimistic and positive, Gabby?

GG: I want to make the world a better place.

(Applause.) Prime Minister: And you're doing it even though recovery must remain top priority for both of you.

You are people who have served your country, and you continue to do so with a new commitment, a new purpose.

So Gabby, what's on the agenda now?

GG: Americans for responsible solutions.

MK: It's our Political Action Committee, trying to get our members of Congress to think more seriously about gun violence in this country and to try to pass reasonable legislation.

GG: Yes. yes. (Applause) MK: You know, this affected us very personally, but what happened to Gabby didn't involve us.

It was actually the murder of 20 first graders and kindergarteners in Newtown, Connecticut, and the reaction we saw after that was, well, look what happened so far.

So far, the country's reaction has done little.

we are trying to change that.

Prime Minister: Since Newtown, there have been 11 school shootings a week in the first two months of last year.

How is it different from other efforts to balance gun ownership rights and responsibilities?

MK: We are gun owners and support gun rights.

At the same time, we must do all we can to keep guns out of the hands of criminals and dangerous mentally ill people.

It's not that hard to do.

This issue, like many others, has become highly polarized and politicized, and we are working to bring balance to the debate in Washington.

PM: Thank you both for your efforts.

And, unsurprisingly for this brave and adventurous woman, you just keep challenging yourself and the sky seems to be the limit.

I have to share videos of your recent adventures.

look at gabby

MK: This was a few months ago.

(Video) MK: Are you okay? well done. GG: Yes, great. thank you.

Good stuff. splendid. Oh, thank you.

Mountain. wonderful mountains.

(Applause.) MK: Let me tell you, one of the guys that Gabby jumped with that day was a Navy SEAL we met in Afghanistan, and he was badly wounded in combat.

Gabby visited him when he was in Bethesda and went through a very difficult time.

He started getting better grades.

A few months later, Gaby was shot in the head and supported her while she was in a hospital in Houston.

So they have a very, very good relationship.

GG: Yes.

PM: What a wonderful moment.

This is the TED stage, so I know you've put a lot of thought into the ideas you want to leave with this audience, Gabby.

GG: Thank you.

Hi guys.

Thank you for inviting me today.

It's been a long and hard road, but it's getting better and better.

I work in many forms of therapy including speech therapy, physical therapy and yoga.

But my spirit is as strong as ever.

I am still fighting to make the world a better place, and you can too.

Join our community.

Be the leader Lead by example.

Be passionate Be brave.

Do your best. thank you very much.

(Applause) MK: Thank you. GG: Thank you.

(Applause) MK: Thank you, everyone. GG: Bye-bye. (applause)

Tyler Edmonds, Bobby Johnson, DaVonte Sanford, Marty Tanklef, Jeffrey Deskovich, Anthony Caravera, Travis Hayes.

You probably don't know their faces.

Together they served 89 years for a murder they didn't commit. A murder that they falsely confessed to having committed when they were teenagers.

I'm a forensic developmental psychologist who studies these types of cases.

As a researcher, professor, and new parent, my goal is to conduct scientific research that helps us understand how children operate within a legal system designed for adults.

In March 2006, police questioned Brendan Dussey, a 16-year-old high school student with an IQ of around 70, and put him on the range of intellectual disability.

Here's a short snippet from his four hour interrogation.

(Video) Police 1: Brendan, be honest.

As I said before, that's the only thing that can help you here.

Now you know what happened, right?

Police 2: I have to be honest here -- I'm your friend now, but I have to believe you, and if I don't believe you, I can't go to bat for you.

OK? You are nodding your head.

Please tell me what happened.

P1: Your mother said to be honest with us.

P2: And no matter what happens here, she's on your side 100 percent.

P1: She said that because she thinks you know more.

P2: We are with you.

P1: We already know what happened. Please tell me exactly this time. don't lie

Lindsey Malloy: They told Brendan that he would be "free" if he was honest, but at that point they were completely convinced of Brendan's guilt.

So, let's be honest, they meant a confession, and his confession definitely wouldn't set him free.

They eventually obtained a confession from Brendan that was widely believed to be false, making little sense and inconsistent with much of the physical evidence of the crime.

That was enough to convict Brendan of murder and sexual assault charges in 2007 and sentence him to life in prison.

There was no physical evidence against Brendan at all.

It was his own words that sent him to prison for nearly a decade before a judge overturned his conviction just a few months ago.

What makes the Dassey case unique is that it became a Netflix series called Making a Murderer. I'm sure many of you have seen it, but if you haven't seen it yet, please do so.

The Dassey case is also unique in that it has provoked such intense public outrage.

People were so angry at the way Brendan interrogated him that many thought his interrogation must be illegal.

it was not illegal.

As a researcher in the field and familiar with police interrogation training manuals, I wasn't too surprised by what I saw.

As a matter of fact, Dassey's interrogation itself isn't really all that unique, and to be honest, I've seen worse.

So the public backlash to the injustice in the Brendan Dussey personal case is understandable.

But let's not forget that about a million or so of his colleagues are arrested each year in the United States and may be questioned using similar interrogation techniques -- techniques known to increase the risk of false confessions.

And I also know that many people would struggle with the term "false confession" and believing that false confessions actually happen.

I understand that.

This is very shocking and counterintuitive. Why confess to horrific crimes such as rapes and murders, and recount even more gruesome details, if they haven't actually committed them?

has no meaning.

And the fact is, we can never know exactly how often false confessions occur.

What we do know, however, is that false confessions or confessions were present in about 25 percent of wrongful convictions of people later proven innocent by DNA evidence.

After all, they were innocent.

These cases are obvious because we have DNA.

So they didn't commit the crime, yet a quarter of them confessed to it.

And at this point, from countless research studies, we have a pretty good understanding of why people make false confessions, and why some people like Brendan Dussey are at higher risk of making false confessions.

We know that young people are particularly prone to making false confessions.

For example, in one study of exoneration, only 8 percent of adults made false confessions, while 42 percent of juveniles made false confessions.

Of course, if you're only looking at wrongful convictions and exonerations, you're only getting part of the story.

For example, many cases are left to be settled by guilty plea rather than by trial.

While TV and news headlines may make it seem like trial is the norm in our judicial system, the reality is that 97% of legal cases in the United States are settled by plea, not by trial.

97 percent.

It also excludes lesser types of criminal confessions that generally do not involve DNA evidence and are not normally considered or appealed after conviction.

For this reason, many call the false confessions we actually know to be the tip of a much larger iceberg.

Our research found an alarming rate of false confessions among teenagers.

We interviewed about 200 incarcerated 14- to 17-year-olds, and 17% reported making at least one false confession to police.

Also shocking to many is that US interrogations allow police to interrogate juveniles in the same way as adults.

So they can lie. "We have your fingerprints. We have your DNA. Your friend says in the hallway that this is all your idea."

For example, lying to suspects is prohibited in the UK, but here in the US it is legal, even for a mentally handicapped teenager like Brendan Dussey.

In our survey, most of the incarcerated teens we interviewed reported experiencing high-pressure police interrogation without the presence of a lawyer or parent.

More than 80% said they had been threatened by police, including being raped or killed in prison and the possibility of being tried as adults.

These maximization strategies are designed to make the suspect feel that denial is pointless and that confession is the only option.

You may have heard about playing the role of "good cop/bad cop"?

Well this is a bad cop.

Juveniles are susceptible to suggestions, such as accusations and allusions to strong pressure from authorities during interrogations, and are susceptible to social influence.

More than 70 percent of the teens in our survey said they had tried to "befriend" them or expressed a desire to help them during police interrogations.

These are called "minimization strategies" and are meant to convey sympathy and understanding to suspects, implying more leniency if they confess.

In other words, in the classic "good cop" and "bad cop" that oversimplify police interrogation, this is the "good cop."

(Video) P1: Honestly, Brendan, is that going to help you?

Whatever you do, we can get through it, okay?

I can't make any promises, but whatever you do, we'll be rooting for you, okay?

LM: "Whatever you do, we can get through it."

Hints of generosity, such as we saw in the case of Brendan, are especially powerful among adolescents. One reason is that they assess rewards and risks differently than adults.

A confession brings an immediate reward to the suspect, right?

The stressful and uncomfortable interrogation is over.

As such, a confession may seem like the best option for most teens. They are less concerned with the long-term risks of future conviction and punishment as a result of their confessions.

I think we can all agree that most teens we know are not great at making thoughtful, long-term plans.

And by and large, the legal system seems to think that young victims and witnesses should be treated differently than adults.

But when it comes to young suspects, it's like losing a child's glove.

And treating juveniles as if they were adults in interrogation is problematic. Literally hundreds of psychological and neuroscience studies show that boys don't think like adults, don't act like adults, and don't have the physiques of adults.

The adolescent brain is also anatomically different from the adult brain.

This means that adolescents undergo important changes in brain structure and function, particularly in the prefrontal cortex and limbic system, which are important areas for self-control, decision-making, emotional processing and regulation, and sensitivity to reward and risk, all of which can affect how we function in stressful situations such as police interrogations.

We need to educate law enforcement, lawyers, judges and jurors about juvenile developmental limitations and how they can be dealt with in high-stakes interrogations.

In one national survey of police officers, 75% actually wanted specialized training in how to talk to children and adolescents, and most received none.

Consideration should also be given to providing special protections for adolescents.

Earlier this year, in a 91-page ruling overturning Dassey's conviction, the judge highlighted the fact that Dassey's interrogation room was not attended by a parent or other sympathetic adult.

Here's a clip of Brendan talking to his mom after he confesses, apparently too late.

(Video) Mom: What do you mean?

Brendan: Like if I hadn't done anything if he hadn't said anything.

Mother: Was it?

teeth?

B: Not really.

Man: What do you mean by "not so"?

B: It just popped into my head.

LM: So he sums it up very beautifully. "They got into my head."

I don't know if the outcome would have been different had Brendan's mother been in the interrogation room with him.

But it is certainly possible.

In our study, most of the incarcerated teens had multiple encounters with the police, and only 7 percent had a parent or lawyer in the room when they were questioned as suspects.

Few requested the presence of a parent or lawyer.

And this is seen even in low-risk situations.

We conducted mock interrogation experiments here at the FIU lab. Of course, all parental permission and appropriate ethical approval for all minors was obtained.

We falsely accused teens and adults of cheating on learning assignments. I told them that this was academic misconduct and was as serious as cheating in class.

In fact, participants had witnessed co-workers cheating. The person was actually part of our research team and was allegedly on academic probation.

And we all have tough choices to make. You could lose extra credit for participating in research, or you could accuse a colleague and possibly get expelled because of your probation status.

Of course, in practice, none of these results worked. We then gave a full debriefing to all participants.

However, most teens (59% of them) signed a confession under false charge of wrongdoing.

Only 3 out of 74, or about 4%, asked to speak to their parents when we accused them of wrongdoing. Yet, for most of them, their parents literally sat in the next room during the study.

Of course, cheating is far from murder, and we know that.

But what is interesting is that so many teens, far more than adults, have signed confessions that they have cheated.

They weren't cheating, but they signed this paper saying they had cheated anyway, and there was little to try to involve the parent in the situation.

The same is true for other studies.

Over 90% of boys waive Miranda's rights and respond to police interrogation without the presence of a lawyer or parent.

In England and Wales, interrogation of juveniles must be conducted in the presence of an 'appropriate adult' such as a parent, guardian or social worker.

And this is not what young people should ask for. That is wonderful. Because research shows they don't. it is done automatically.

Now, here in the United States, having adults take appropriate protective measures against juveniles is not a panacea for improving police investigations of juveniles.

Unfortunately, parents often lack the knowledge and legal knowledge to properly advise their children.

Take the case of the Central Park Five. Five teenagers who falsely confessed to a brutal gang rape in 1989 were accompanied by their parents.

And it took more than a decade to clear their name.

Therefore, the appropriate adult should be a lawyer or perhaps a trained child advocate.

Overturning Dassey's conviction, the judge said there is no federal law requiring police to inform a boy's parents that the boy is being investigated or even honor the boy's request to have a parent stay with him.

Putting all this together for a moment, we as a country have decided that adolescents can't be trusted when it comes to voting, buying cigarettes, watching R-rated movies, driving cars, etc., but we can decide to give up Miranda's rights. This is a right we know from research, but most adolescents do not understand or appreciate it.

And all the guardians who are in attendance. Depending on your state, children may waive these rights without the parent's knowledge or prior consultation with an adult.

Now, no one, and certainly not me, wants to interfere with the very important investigative work that the police do every day.

But we need to make sure they have the proper training to speak to young people.

As parents and researchers, I think we can do more.

I think we can take steps to prevent a relapse of Brendan Dussey while getting the critical information we need from children and teens to solve crimes.

thank you.

(applause)

So I've been thinking about the difference between resume virtues and eulogy virtues.

The virtues of your resume are the things you put on your resume and the skills you bring to the market.

The virtues mentioned in the eulogy are deeper: who are you, deep down what is your relationship nature, are you bold, loving, trustworthy and consistent?

And most people, including myself, would say that of the virtues, the virtue of mourning is more important.

But are they what I think most, at least in my case? And the answer is no.

So I've been thinking about that issue for a long time. A thinker who has helped me think about this issue is Rabbi Joseph Soloveichik, who wrote the book The Lonely Man of Faith in 1965.

Mr. Solovetik said that there are two sides to our nature, which we call Adam I and Adam II.

Adam I is the outer side of our nature, worldly and ambitious.

He wants to build a company, create, create, create innovation.

Adam II is the humble side of our nature.

Adam II wants not just to do good, but an inner way of life that honors being good, God, creation, and our potential.

Adam I want to conquer the world.

Adam II has heard the vocation and wants to follow the world.

Adam feels a sense of accomplishment.

Adam II tastes inner consistency and strength.

Adam I asks how things work.

Adam II asks why we are here.

Adam I's motto is "success".

Adam II's motto is "Love, Salvation and Return".

And Solovetik argued that these two aspects of human nature are at war with each other.

We live in a constant self-conflict between external success and internal value.

And I think the tricky thing about these two aspects of human nature is that they operate by different logics.

External logic is economic logic. Inputs lead to outputs and risks lead to rewards.

Inside our very nature is a moral logic, and often the other way around.

You must give in order to receive.

To gain strength within yourself, you must surrender to something outside of you.

You have to overcome your desire to get what you want.

To fulfill yourself, you must forget yourself.

To find yourself, you must lose yourself.

We happen to live in a society that favors Adam I and disrespects Adam II.

And the problem is that it turns you into a shrewd animal who treats life like a game, some sort of ruthless and calculating creature who falls into mediocrity and realizes there is a difference between who you think you are and who you really are.

You can't get the compliment you want and hope someone else will give it to you.

You have no depth of conviction.

It doesn't sound emotional.

You don't have to commit to a task that takes more than a lifetime to commit.

I was reminded of common reactions throughout history about how to build a solid Adam II and how to build character depth.

Throughout history, people return to their own past, sometimes to precious moments in their lives, to childhood, and often their minds are drawn to past moments of shame, sins committed, selfish acts, omissions, shallowness, sins of anger, sins of self-pity, striving to please others, lack of courage, etc.

Adam I is built around your strengths.

Adam II is built by fighting your weaknesses.

You go into yourself and find sins that you have committed over and over again throughout your life. And others find your characteristic sins from which they emerge. And you fight that sin, you wrestle with that sin, and out of that wrestling and suffering the depth of character is built.

And we are often not taught to recognize sin within ourselves, and in this culture we are not taught how to wrestle with it, how to face it, how to fight it.

We live in a culture that has an Adam I mentality, and Adam II is not explicitly mentioned.

Finally, Reinhold Niebuhr summed up this conflict, the lives of fully lived Adam I and Adam II:

What is true, beautiful and good does not make complete sense in the immediate context of history. Therefore, we must be saved by faith.

Nothing we do, however noble, can be achieved alone. Therefore, we must be saved by love.

Seen from the point of view of friend or foe, no act is more virtuous than that of our own.

Therefore, we must be saved by the final form of love, which is forgiveness. "thank you.

(applause)

When I was born, there was really only one book on parenting, and it was written by Dr. Spock.

(laughs) Thank you for entertaining me.

i always wanted to do that.

No, it was Benjamin Spock, and his book was called "The Book of Baby and Parenting Common Sense."

By the time he died, the book had sold about 50 million copies.

Today, as the mother of a 6 year old, I went to Barnes and Noble and saw this.

And you will be amazed at the variety of products on the shelves.

There are guides to raising eco-friendly kids, gluten-free kids, and disease-tolerant kids, but if you ask me, they're a little creepy.

We have a guide to raising bilingual children, even if you only speak one language at home.

There are guides to raising financially savvy kids, science-minded kids, and kids who are masters of yoga.

There are guides for almost everything besides teaching toddlers how to defuse a nuke.

All these books are written with good intentions.

I think there are a lot of wonderful people out there.

But in aggregate, I'm sorry, but I can't find any help with that shelf.

I see anxiety.

Seeing the giant candy-colored monuments that symbolize our collective panic made me want to know why raising our children involves so much pain and confusion.

Why are we now getting a 6 or 7 on the one thing that humans have been successful for thousands of years, long before parenting message boards and peer-reviewed research?

Why do so many mothers and fathers experience parenting as a crisis of sorts?

Crisis may seem like a strong word, but there is data that suggests it probably isn't.

In fact, there was a paper published in 1957 with the very name, “Parental Rights as a Crisis,” and over the fifty years since then there has been a plethora of studies documenting fairly clear patterns of parental distress.

Parents experience more stress than non-parents.

Their marital satisfaction is low.

Numerous studies have looked at how parents feel when spending time with their children, and often the answer is not so good.

Last year, I spoke with a researcher named Matthew Killingsworth, who has a very imaginative project to track people's well-being. He told me what he found: “Friendship is better than spouse, better than other relatives, better than acquaintances, better than parents, better than children.

A person on a par with a stranger. ”

(Laughter) But here's where the problem starts.

I've been looking at the bottom of these data for 3 years now, and the kids aren't the problem.

Something about parenting at the moment is problematic.

Specifically, I don't think we know what parenting should be.

It wasn't until 1970 that "Parent" came into common use as a verb.

Our roles as mothers and fathers have changed.

Children's roles have changed.

We are all desperately trying to improvise through unscripted situations. If you're a great jazz musician, improvisation is great, but if you're not, it can feel like a crisis of sorts.

So how did you get here?

Why on earth are we living in the world of parenting without any guidelines now?

First of all, there was a big historical change.

Until recently, children worked mainly on farms, but also in factories, factories and mines.

Children were viewed as economic assets.

At some point in the Progressive Era, we put an end to this arrangement.

We acknowledged children's rights, banned child labor, focused instead on education, and made school their new job.

And thank God, it has come true.

But it only made the parental role even more confusing in a way.

The previous arrangement may not have been particularly ethical, but it was reciprocal.

We provided our children with food, clothing, shelter and moral education, and in return they provided us with an income.

When children stopped working, the economics of raising children changed.

In the words of one brilliant but utterly ruthless sociologist, children became "economically worthless, but emotionally precious."

We came to work for them instead of them working for us, because in just a few decades it became clear that if we wanted our children to succeed, schools alone weren't enough.

Now, extracurricular activities are our children's new jobs, but they are our jobs too. We are taking the children to soccer practice.

A lot of homework is a new job for kids, but it's a job for us too. because we have to check it.

About three years ago, a Texas woman said something to me that completely broke my heart.

She said almost casually, "Homework is a new dinner."

The middle class is now pouring all of its time, energy and resources into its children, even though the middle class has less and less to give.

Mothers are spending more time with their children today than they did in 1965, when few women were even in the workforce.

Perhaps it would be easier for parents to take on new roles if they knew what they were preparing their children for.

This is another thing that makes modern parenting so confusing.

We have no idea what part, if any, of our wisdom will help our children.

The world is changing so quickly that it is impossible to say.

This was true even when I was young.

When I was a kid, especially in high school, I was told that if I didn't understand Japanese, I would be embarking on a new global economic wave.

And with all due respect to the Japanese, it didn't turn out that way.

There are some kind of middle-class parents now who are obsessed with teaching Chinese to their children. They probably understand something, but we don't know for sure.

So even though we can't predict the future, what we all do as good parents is try to prepare our children for every kind of future possible, hoping that only one of our efforts will pay off.

We teach chess because we think children may need analytical skills.

We put them in team sports, knowing that they will probably need coordination skills in preparation for Harvard Business School.

We strive to teach our children to be financially savvy, scientifically minded, eco-friendly and gluten-free, but maybe it's a good time to say that when I was a kid, I wasn't eco-friendly and gluten-free.

I had a jar of pureed macaroni and beef.

And what do you know? I'm fine.

I pay taxes

I am looking for a stable job.

I was also invited to speak at TED.

But now what was good enough for me or my family is no longer considered good enough.

So we all sprint to that bookshelf. Because if I'm not trying everything, I feel like I'm not doing anything and I feel like I'm neglecting my obligations to my children.

Therefore, it can be very difficult to navigate your new role as a mother or father.

Now, add another thing to the problem. As most women enter the workforce today, we are also grappling with new roles as husbands and wives.

I think this is another reason why being a parent can feel like a crisis.

Now that fathers and mothers are the breadwinners, we have no rules, no scripts, no norms of what to do when a child is born.

Writer Michael Lewis once said this very well.

He said the surest way for a couple to start a fight is to go out to dinner with another couple whose roles are slightly different from theirs. Because the conversation in the car on the way home goes like this: "So did you know that Dave drives them to school every morning?"

(Laughter) Without a script to tell us who's going to do what in this wonderful new world, couples fight and mothers and fathers each have legitimate grievances.

Mothers are much more likely to multitask when they are at home, and fathers are much more likely to single-task when they are at home.

If you have a man at home, chances are you're doing only one thing at a time.

In fact, UCLA recently conducted a study examining the most common family structures in middle-class households.

what was that?

Dad is alone in his room.

American Time Use Surveys show that mothers still do twice as much childcare as fathers, which is better than in Elma Bombeck's time, but I still think her quote "I haven't been alone in the bathroom since October" makes a lot of sense.

(Laughter.) But the point here is that men are trying hard enough.

They spend more time with their children than fathers have ever spent with them.

They work more paid hours than their wives on average and want to be good, loyal and supportive fathers.

Today, fathers, not mothers, report the most work-life conflicts.

In any case, by the way, if you find it difficult for traditional families to organize these new roles, imagine what non-traditional families are like now: families with two fathers, families with two mothers, single-parent families, and so on.

They really improvise.

Now, in a more progressive country, succumbing to the cliché, yes, forgive me for bringing up Sweden here, parents can rely on state support.

Some countries recognize the insecurity and changing roles of mothers and fathers.

Unfortunately, the United States is not among them.

This is what we have in common with Papua New Guinea and Liberia. We do not have a paid maternity leave system.

Our country is one of eight countries known not to.

In these turbulent times, there is only one goal that all parents can agree on. Whether it's a tiger mother or a hippie mother, a helicopter or a drone, the happiness of the children is paramount.

That is what it means to raise children at a time when they are economically worthless, but spiritually precious.

We are all guardians of their self-esteem.

The only creed that parents do not question is, "All I want is for my children to be happy."

Don't get me wrong. I think happiness is a great goal for children.

But it is very elusive.

Teaching children happiness and self-confidence is different than teaching them how to cultivate a field.

It's not like teaching you how to ride a bike.

There is no curriculum for that.

Happiness and self-confidence can be by-products of other things, but they are never real goals in and of themselves.

Children's happiness is a very unfair burden on parents.

And happiness becomes an even more unfair burden for children.

And I have to say, I think that leads to some very strange excesses.

We are now trying to protect our children from the ugliness of the world, so we are protecting them from "Sesame Street."

I'm joking, but out of nostalgia, if I bought the first few episodes of Sesame Street on DVD, I'd be greeted with a warning at the beginning that the content was not suitable for children.

(laughs) Can I say that again?

The original "Sesame Street" is not intended for children.

In an interview with The New York Times, the show's producers offered various explanations.

For one, Cookie Monster smoked and swallowed a pipe in the skit.

Bad modeling. don't know.

But what stuck with me was that she said, ``The moody Oscar is so depressing, I don't know if I can invent it today.

I cannot express how much this bothers me.

(Laughter) You see a woman hanging the Muppets periodic table on the wall of her cubicle.

The Muppets in question are out there.

It was the day my son was born.

I was kite high on morphine.

I had an unexpected caesarean section.

But even in the confusion of opium, I managed to have one very clear idea when I held him for the first time.

I whispered it in his ear.

I said, "I'll do my best not to hurt you."

It was the Hippocratic Oath, but I didn't know I was saying it.

But I now think that the Hippocratic Oath is a much more realistic goal than happiness.

In fact, as any parent will tell you, it's very difficult.

We have all said or done hurtful things that we wish God would take back.

I don't think we expected so much from ourselves in another era. It's important that we all remember that next we're staring at that bookshelf.

I'm not sure how to create a new norm for this world, but I think we may be carrying the wrong moral burden in our desperate efforts to create happy children.

I think a better goal, dare I say a nobler one, is to focus on raising productive and moral children, and just wish them happiness through their actions and accomplishments, and the love they feel from us.

Either way, that's one response to the lack of a script.

With no new script, we just follow the oldest things in the book: politeness, work ethic, love, and only happiness and self-respect matter.

If we all do, I think the kids will still be fine, their parents will be fine, and maybe even better in both cases.

thank you.

(applause)

Now let's talk about synthetic cell construction and print life.

Before that, let me tell you a little story.

On March 31, 2013, my team and I received an email from the International Health Organization informing us that two men in China died shortly after being infected with H7N9 bird flu.

There were fears of a global pandemic as the virus began to move rapidly across China.

A way to produce a flu vaccine and stop the spread of the disease existed, but it would be at least six months before it was available.

The only option was a slow, outdated flu vaccine manufacturing process developed more than 70 years ago.

The virus must be isolated from infected patients, packaged, and sent to a facility. There, scientists need to inject the virus into chicken eggs and spend weeks cultivating the eggs to prepare them for the start of the multi-step, months-long flu vaccine manufacturing process.

My team and I got this email because we had just invented a biological printer that could instantly download and print flu vaccine instructions from the internet.

It could greatly speed up how flu vaccines are made, potentially saving thousands of lives.

Biological printers will harness the human ability to read and write DNA and begin to focus on what we call biological teleportation.

I'm a biologist and an engineer who builds things out of DNA.

Believe it or not, one of my favorite things to do is break down DNA and put it back together to better understand how it works.

I can edit and program DNA to do things the way a programmer programs a computer.

But my app is different.

they create life.

From self-replicating living cells to vaccines and therapeutics that work in ways never before possible.

This is US Medal of Science recipient Craig Venter and Nobel laureate Ham Smith.

The two shared a similar vision.

The idea was that the functions and characteristics of all living organisms, such as viruses and living cells, were written in the code of DNA, and that if the code of DNA could be read and written, it could be restored even at a distance.

This is what biological teleportation means.

To prove this vision, Craig and Ham set the goal of creating the first synthetic cell, starting with a DNA code in a computer.

In short, for scientists looking for work while doing cutting-edge research, it doesn't get much better than this.

(Laughter) Well, the genome is the complete set of DNA within an organism.

Following the Human Genome Project in 2003, an international effort to identify the complete human genetic blueprint, a genomics revolution has taken place.

Scientists began mastering the art of reading DNA.

To determine the order of As, C, T, G within an organism.

But my job was very different.

I had to master the art of writing DNA.

Like the author of the book, this started with writing short sentences, a series of DNA codes, but soon progressed to writing paragraphs and then full-fledged novels of DNA codes to give important biological instructions to proteins and living cells.

Living cells are nature's most efficient machines for manufacturing new products, accounting for 25 percent of the total multi-billion dollar pharmaceutical market.

We knew that writing DNA would drive this bioeconomy further if cells could be programmed like computers.

We also knew that writing DNA would enable biological teleportation...

Printing of defined biological substances, starting with the DNA code.

As a step towards realizing these promises, our team set out to create the first synthetic bacterial cell, starting with a DNA code in a computer.

Synthetic DNA is a commodity.

You can order very short DNA fragments from several companies. They start with four chemical bottles that make up DNA, G, A, T, and C, and build those very short DNA fragments.

Over the past 15 years or so, my team has developed techniques for piecing together these short pieces of DNA to create complete bacterial genomes.

The largest genome we constructed contained over 1 million characters.

It was more than twice the size of the average novel, and I had to put those letters in the correct order without mistyping a single one.

We were able to achieve this by developing a procedure we call the 'one-step isothermal in vitro recombination method'.

(Laughter) But surprisingly, the scientific community didn't like the technically correct name and decided to call it the Gibson Assembly.

Gibson Assembly is now the gold standard tool used in laboratories around the world to assemble short and long DNA.

(Applause.) After chemically synthesizing the complete bacterial genome, our next challenge was to find a way to convert it into a free-living, self-replicating cell.

Our approach is to think of the genome as the cell's operating system, and the cell contains the hardware necessary to boot the genome.

Through much trial and error, we have developed procedures that can even transform one bacterial species into another by reprogramming cells and replacing the genome of one cell with that of another.

This genome transplant technology has paved the way for booting genomes written by scientists rather than by Mother Nature.

In 2010, when we announced the creation of our first synthetic cell (called Synthia, of course), all the technologies we had developed for reading and writing DNA came together.

(Laughter) Since the first bacterial genome was sequenced in 1995, thousands more entire bacterial genomes have been sequenced and stored in computer databases.

Our synthetic cell work was a proof of concept that this process can be reversed. That is, pulling the complete bacterial genome sequence out of the computer and translating that information into a free-living, self-replicating cell with all the expected characteristics of the species we constructed.

Now I understand why there are concerns about the safety of this level of genetic manipulation.

This technology has the potential to bring great benefits to society, but it can also cause harm.

With this in mind, our team began working with the public and governments to jointly find solutions to responsibly develop and regulate this new technology, even before we conducted our first experiments.

One of the outcomes of these discussions was screening all customers and their DNA synthesis orders to ensure that pathogens and toxins were not mistakenly made by bad guys or scientists.

All suspicious orders will be reported to the FBI and other relevant law enforcement agencies.

Synthetic cell technology will drive the next industrial revolution, transforming industries and economies in ways that address global sustainability challenges.

The possibilities are endless.

So you can think of clothes made from renewable bio-based resources, cars that run on biofuel made from artificial microbes, plastics made from biodegradable polymers, and customized treatments printed at the patient's bedside.

Massive efforts to create synthetic cells have made us the world leader in writing DNA.

Throughout that process, we found ways to write DNA faster, more accurately, and more reliably.

We have found that the robustness of these technologies makes it easy to automate processes and move laboratory workflows out of the hands of scientists and onto machines.

In 2013, we built our first DNA printer.

We call it BioXp.

And it has been absolutely essential in describing DNA across the many applications that my team and researchers around the world are working on.

Shortly after building BioXp, I received an email about the H7N9 bird flu scare in China.

A team of Chinese scientists had already isolated the virus, sequenced its DNA, and uploaded the DNA sequence to the internet.

At the request of the US government, we downloaded the DNA sequences and printed them on BioXp within 12 hours.

Collaborators at Novartis then quickly began converting that synthetic DNA into a flu vaccine.

Meanwhile, the CDC, using technology dating back to the 1940s, was still waiting for the virus to arrive from China so it could begin its egg-based approach.

For the first time, a potentially dangerous new flu vaccine has been developed in advance and the US government has ordered a stockpile.

(Applause.) At this point, I began to realize more than ever the power of biological teleportation.

(Laughter) Naturally, with this in mind, we started building the biological teleporter.

We call it DBC.

It stands for Digital Biological Converter.

Unlike BioXp, which starts with pre-manufactured short pieces of DNA, DBC starts with a digitized DNA code and transforms that DNA code into biological entities such as DNA, RNA, proteins, and even viruses.

BioXp can be thought of as a DVD player, requiring a physical DVD to be inserted, while DBC is Netflix.

To build DBC, my team of scientists worked with software and instrumentation engineers to combine multiple lab workflows all in one box.

This includes software algorithms that predict how DNA will be built, chemistry that joins the G, A, T, and C building blocks of DNA into short pieces, Gibson assembly that stitches those short pieces together into much longer pieces, and biology that transforms DNA into other biological entities such as proteins.

Here is the prototype.

It wasn't pretty, but it was effective.

They were also making cures and vaccines.

And lab workflows that once took weeks or months can now be done in just a day or two.

And it's all triggered simply by receiving an email that can be sent from anywhere in the world, without human intervention.

We like to liken the DBC to a fax machine.

But whereas fax machines receive images and documents, DBCs receive biological material.

Now think about how fax machines have evolved.

The 1840s prototype is indistinguishable from today's fax machines.

In the 1980s, most people still didn't know what a fax machine was. And even if they did, the concept of instant image reproduction on the other side of the earth was difficult to grasp.

Today, however, everything that a fax machine does is integrated into our smartphones, and we naturally take this rapid exchange of digital information for granted.

Today's DBC is:

I imagine DBCs will evolve just like fax machines.

We are working to reduce the size of our equipment, and we are working to make the underlying technology more reliable, cheaper, faster and more accurate.

Accuracy is very important when synthesizing DNA. A single change in a DNA letter can mean the difference between whether a drug works or not, whether a synthetic cell is alive or dead.

DBC helps decentralized manufacturing of medicines starting from DNA.

All hospitals around the world can use DBC to print personalized medicines for patients at the bedside.

You can even imagine the day when people routinely connect their DBCs to their home computers and smartphones as a way to download prescriptions for things like insulin and antibody therapies.

DBCs are also useful when deployed in strategic regions around the world to respond quickly to disease outbreaks.

For example, the CDC in Atlanta, Georgia can send flu vaccine instructions to the DBC on the other side of the world where flu vaccines are being manufactured on the front lines.

The flu vaccine may also be tailored specifically for the influenza strains circulating in the region.

Sending vaccines in digital files, instead of stockpiling and shipping identical vaccines, promises to save thousands of lives.

Of course, the applications are only limited by your imagination.

It's not hard to imagine placing the DBC on another planet.

Scientists on Earth can send digital instructions to that DBC to create new medicines or synthetic organisms that produce oxygen, food, fuel, and building materials as a means of making the planet more habitable.

(Applause.) Because digital information travels at the speed of light, it takes only a few minutes to send a digital instruction from Earth to Mars, but it would take months to physically deliver the same sample by spacecraft.

But for now, I'd be content to send new drugs around the world fully automated and on demand, save lives from emerging diseases, and print personalized cancer remedies for those who don't have time to wait.

thank you.

(applause)

The universe is full of planets.

Within the next 10 years, I hope to build a space telescope that can photograph the Earth around another star and determine if it can harbor life.

My colleagues at the NASA Jet Propulsion Laboratory in Princeton and I are working on technology that will allow us to do just that in the next few years.

Astronomers now believe that every star in our galaxy has a planet, and it's speculated that up to one-fifth of them may have potentially habitable Earth-like planets, but we've never seen any of them.

We only detected them indirectly.

This is NASA's photo of the famous pale blue dot.

This picture was taken in 1990 by the Voyager spacecraft, which turned around on its way out of the solar system and took a picture of Earth from 6 billion kilometers away.

I want to take pictures of an Earth-like planet around another star.

why didn't you do that? Why is it so difficult?

Let's say you take out the Hubble Space Telescope, turn it around, and move it to the orbit of Mars.

We're a pretty small telescope in Mars orbit, so you're going to see something like that, a slightly blurry picture of Earth.

Now let's go another 10 times further.

Here we are in the orbit of Uranus.

Smaller, less detail and less resolution.

We can still see a small moon, but let's go 10 times farther.

We are at the edge of the solar system, in the Kuiper belt.

It's not resolved at all now.

Carl Sagan's pale blue dot.

But let's move 10 times farther again.

Here we are in the outer Oort cloud of our solar system. And we are beginning to see the Sun move into the field of view and enter where the planets are.

One more time, ten times ahead.

Now we are on our nearest neighbor, Alpha Centauri, and this planet has disappeared.

All we see is a large, bright image of a star ten billion times brighter than the planet, which must be inside that small red circle.

That's what we want to see. That's why it's so hard.

Light from stars is diffracted.

It scatters within the telescope, creating a very bright image that washes out the planet.

Therefore, in order to see the planet, some measure must be taken against all that light.

you have to get rid of it.

I have a lot of colleagues working on really great technologies to make that happen, but today I want to talk to you about the coolest technology I can think of, and probably the one most likely to bring the planet to life in the next ten years.

It was first proposed in 1962 by the father of the space telescope, Lyman Spitzer, who took inspiration from a solar eclipse.

You've seen it too, haven't you? It's an eclipse.

The moon has moved in front of the sun.

Since most of the light is blocked, we can see the dim corona around us.

It's the same thing if you put your thumb up and block the spotlight from your eyes, you're in the back row.

Well what's going on?

Now the moon casts a shadow on the earth.

Placing a telescope or camera in its shadow and looking back at the Sun removes most of the light and reveals the dim, fine structure of the corona.

Spitzer's proposal was to do this in space.

We build a big screen, fly it in space, set it up in front of a star, block out most of the light, fly a space telescope in the resulting shadow, and observe the dawn and the planets.

Well, it goes like this.

It has a big screen and no planets. Unfortunately it doesn't work very well in practice. Because light waves of light and waves diffract around that screen, just like in a telescope.

It's like water bending around rocks in a stream and all that light just destroys the shadows.

A terrible shadow. And we cannot see the planet.

But Spitzer actually knew the answer.

If you can blur the edges, soften the edges and control the diffraction, you will be able to see the planet. And over the last decade or so, we've figured out the best solution for that.

Sounds like that.

We call it Petal Starshade.

Precisely creating the edges of the petals and controlling the shape allows you to control the diffraction and get nice shadows.

About 10 billion times dimmer than before, we see the planet glow just like that.

Of course it has to be bigger than my thumb.

Its starshade is about half the size of a football field and must be flown 50,000 kilometers away from the telescope and held directly in its shadow. Then we can see those planets.

This sounds daunting, but a brilliant engineer colleague of mine at JPL came up with a great design to make it happen. It's like this:

It begins to wrap around the hub.

Detach from telescope.

The petals spread, open, and the telescope rotates.

Then you'll see it flip and pop out of the telescope 50,000 kilometers away.

If you move in front of the star as it is, a wonderful shadow will be born.

Dawn, a planet is orbiting around it.

(Applause.) Thank you.

It's not sci-fi.

We've been working on this for the last five or six years.

Last summer we did some really great testing at Northrop Grumman in California.

So these are 4 petals.

It is a sub-scale star shade.

It's about half the size of the one I saw earlier.

You can see that the petals are spreading.

These four petals were created by four undergraduate students participating in a summer internship at JPL.

The deployment is now confirmed.

These petals need to be rotated and put into place.

The base of the petal must go to the same place each time within a tenth of a millimeter.

I ran this test 16 times, and 16 times it got to the exact same spot by a tenth of a millimeter.

This has to be done with great precision, but if we can do this, if we can build this technology and bring it into space, we might see something like this.

It's a picture of our closest star taken by the Hubble Space Telescope.

If we could put out a similar space telescope, slightly larger, and fly an occulter in front of it, we might see something like that. It's a family portrait of our solar system, but not ours.

We hope it is someone's solar system, seen through the occult, through such starshades.

You can see Jupiter, Saturn, Uranus and Neptune. And next to the residual light in the center, there's that pale blue dot. That's the Earth.

We want to look at it and see if there is water, oxygen, ozone, or anything else that tells us that life could exist.

I think this is the coolest science imaginable.

Because I think it will change the world.

Everything changes when you see it.

thank you.

(applause)

Print is something we consume in large quantities.

In many parts of the world it is completely unavoidable.

But few consumers want to know where a particular typeface came from, when and by whom it was designed, whether there was actual human involvement in its creation, or whether it was simply software enabled.

But I have to care about those things.

that's my job.

I'm one of the few people out there who bends badly and loses shape because of the bad spacing between T and E found there.

You have to remove that slide.

I can not stand it. Neither can Chris.

There. good.

So my talk is about the relationship between technology and type design.

Technology has changed many times since I started working: photography, digital, desktop, screen, web.

I had to work through those changes and try to understand the impact on what I was doing for the design.

This slide explains how the tools affect the form.

The two letters, the two K's, your left and mine's right are modern, computer-generated.

All straight lines are straight.

Curves have the mathematical smoothness that the Bezier formula imposes.

The right side is ancient Gothic, hand-cut from durable steel.

No straight line is actually straight.

The curves are kind of weird.

There is a brilliance of life from human hands that cannot be captured by machines or programs.

What a contrast.

Okay, I'll lie.

Lies at TED. really sorry.

Both of these were created with a computer, the same software, the same Bezier curves, and the same font format.

The one on your left was made by Zuzana Licko from Emigre and the other one by me.

The tools are the same, but the letters are different.

The characters are different because the designers are different.

that's all. Zuzana wanted to be like that too.

I wanted it to look like that too. End of story.

It is a highly adaptable type.

Unlike fine arts such as sculpture and architecture, printing hides the technique.

I consider myself an industrial designer.

The things I design are manufactured and have the function of being read and conveying meaning.

But that's not all.

It has a certain aesthetic element.

What is the difference between these two characters and the different interpretations by different designers?

What gives the work of some designers, such as fashion designers and automotive designers, a certain distinctive personal style?

As a designer, I admit that there have been a few cases where I have felt the impact of technology.

This is the mid-60s, the change from metal types to photography, from hot to cold.

Although this had some advantages, it also had one particular drawback. That is, the spacing system for accommodating the characters provided only 18 individual units.

I was then asked to design a series of condensed sans serifs containing as many different variations as possible within this 18 unit box.

A quick look at the calculations reveals that only three relevant designs can really be created. You can see them here.

With Helvetica Compressed, Extra Compressed, and Ultra Compressed, this austere 18-unit system really got me hooked.

That determined the proportions of the design.

Below are the typefaces, at least lowercase.

So do you look at these things and say, "Poor Matthew, he had to follow the problem, but God has shown it to be the result."

I hope not.

If I were doing the same job today, I would have 1,000 interval units instead of 18.

We could obviously create more variations, but would three members of this family be better?

It's hard to say until you try it, but I can tell you that a 1,000 to 18 ratio wouldn't be good.

My gut feeling is that the improvement will be fairly minor. Because they are designed as a function of a system that is designed to fit, and as I said, characters are very adaptable.

It hides that method.

All industrial designers work within constraints.

This is not art.

The question is, do constraints force compromises?

By accepting constraints, are you working towards a lower bar?

I don't believe that, but I've always been encouraged by the words of Charles Eames.

He said he is conscious of working within constraints, but not of compromising.

The distinction between constraints and compromises is obviously very subtle, but it's very central to my attitude to work.

Do you remember this reading experience?

Phone book. I will bring slides so that you can enjoy the nostalgia.

This is from an early prototype in the mid 70's of a Bell Centennial typeface I designed for a US phone book, and it was my first experience with digital type and quite a baptism.

As I said earlier, the telephone directory was designed for small size printing on newsprint on ultra-high speed rotary presses using kerosene and lamp black ink.

This is not a comfortable environment for typography designers.

The challenge for me was therefore to design a type that would perform as high as possible even under such highly unfavorable production conditions.

As I said earlier, we were in the early days of digital type.

All letters had to be drawn by hand on graph paper. The bell centennial has 4 weights, per pixel and encoded per raster line for the keyboard.

It took me two years, but I learned a lot.

These letters look like they've been bitten by a dog or something, but the missing pixels in the intersections of strokes and crotches are the result of studying the effect of ink spreading on cheap paper and modifying the font accordingly.

These strange artifacts are designed to compensate for the unwanted effects of scale and production processes.

Initially, AT&T wanted to set the phone book to Helvetica, but as my friend Erik Spiekermann said in the Helvetica movie, the Helvetica characters were designed to resemble each other as much as possible.

This is not the way to achieve readability at small sizes.

It looks very elegant on slides.

As you can see at the bottom of the slide, the Bell 100th anniversary had to make these shapes as unambiguous as possible by opening up some shapes.

Now, we move on to the mid-eighties, the early days of digital outline fonts and vector technology.

At the time, there was a problem with font sizes, or the amount of data required to locate and store fonts in computer memory.

This limited the number of fonts the typesetting system could retrieve at once.

Analysis of the data showed that the typical serif face on the left requires almost twice as much data as the middle sans serif face due to all the points needed to define an elegantly curved serif bracket.

By the way, the numbers at the bottom of the slide represent the amount of data required to store each font.

In other words, sans-serif without a middle serif was much more economical, 81 vs. 151.

"Oh," I thought. "Engineers have a problem.

A designer can help. ”

I created a serif type without curved serifs as you can see on the right.

Polygons made from straight segments and chamfered brackets.

And look, it's as data economical as sans-serif.

On the right we call it the Charter.

So I took the number to the head of the engineering department and proudly said, "I solved your problem."

"Oh," he said. "What's wrong?"

So I said, "It's a problem with the huge amount of data you need for things like serif fonts."

"Oh," he said. "We fixed the problem last week.

I wrote a compression routine that reduces the size of all fonts by an order of magnitude.

You can have as many fonts as you like on your system. ”

"Well, thanks for letting me know," I said.

Foil stamping again.

We were left with a design solution to a non-existent technical problem.

But this is where the story gets interesting to me.

I didn't throw my design away in anger.

I endured.

What started as a technical exercise has actually become an aesthetic exercise.

In other words, I fell in love with this typeface.

Forget its origin. That's no good.

I like the design itself.

The simplified form of the Charter lends a kind of plain language and unadorned generosity, which I really liked.

As you know, when it comes to innovation, designers want to be influenced by what's in the air.

We would like to respond to that. We want to be driven to explore something new.

So for me Charter is a kind of fable.

Ultimately, there was no solid cause-and-effect relationship between technology and Charter design.

I really misunderstood technology.

Technology suggested something to me, but it didn't force my hand. I think this happens very often.

Engineers, as you know, are very smart, so I have always enjoyed working with them and learning from them, even though it has sometimes frustrated me because I am not very smart.

Just in the mid-90s, I started talking to Microsoft about screen fonts.

Of course, up to that point, all on-screen fonts were taken from previously existing print fonts.

But Microsoft correctly predicted the move to electronic communication—the rush to electronic communication—reading and writing printed output on screens—to be secondary in importance.

In other words, the priority was tilting at that point.

They wanted a small core font set, uncalibrated but designed for screens, to address the screen problem of coarse resolution displays.

I told Microsoft that a typeface designed for a particular technology is an automatically obsolete typeface.

I've designed too many facets with the goal of alleviating technical issues.

Thanks to the engineer, the technical problem was solved.

So did my typeface.

It was just a temporary stopgap.

Microsoft once again said affordable computer monitors with better resolutions are at least a decade away.

So I thought 10 years wasn't bad, more than a stopgap.

So I was persuaded, convinced, and for the first time to work not on paper, but directly from pixels on the screen, and set to work on what would become Verdana and Georgia.

Back then, screens were binary.

Pixels were either on or off.

Here, the outline of the character, the cap H (thin black line), and the outline (how the character is stored in memory) are superimposed on a bitmap, which is the gray area visible on the screen.

Bitmaps are rasterized from outlines.

Here in cap H (all straight lines) the two are almost perfectly synchronized on the Cartesian grid.

Not so for O.

This looks more like brickwork than type design, but believe me. This is a good bitmap O for the simple reason that it is symmetrical about both the x and y axes.

You can't really ask for more with a binary bitmap.

Sometimes, I don't know, I made 3 or 4 different versions of a difficult letter like a lowercase A and stopped to choose which one was the best.

Well, it wasn't the best. As such, the designer's judgment is required when deciding which is the worst.

Is it a compromise?

Not for me, but if you're working to the highest standards the technology allows, even if those standards are far from ideal.

This slide may display two different bitmap fonts.

I think the top 'a' is better than the bottom 'a', but it's still not great.

If you reduce it, you may be able to see the effect better. Well, maybe not.

So inevitably I become a realist, not an idealist.

For certain temperaments, there is a certain satisfaction in doing the best you can, even if you can't do it perfectly.

This is a lowercase H in Georgia Italic.

Bitmaps look jagged and grainy.

It's jagged and rough.

However, through experimentation, I have found that there is an optimal slant for on-screen italics so that strokes break nicely at pixel boundaries.

In this example, see how the left and right legs actually fold at the same level, albeit roughly.

It's a victory. That's fine, there it is.

And of course, deeper down, there aren't many options.

For reference, this is an S.

Well, it's been 18 years since Verdana and Georgia were released.

Microsoft's decision was absolutely correct. It took 10 years, but screen displays now have better spatial resolution and much better photometric resolution thanks to things like anti-aliasing.

So if their mission is accomplished, does that mean the end of the screen fonts I designed for coarse displays at the time?

Will they survive the now obsolete screens and the flood of new web fonts on the market?

Or has it established its own evolutionary niche that is technology agnostic?

In other words, has it been absorbed into the mainstream of typography?

I'm not sure, but so far they've done well.

18 is a good age for anything given the current rate of decline, so I'm not complaining.

thank you.

(applause)

I feel very fortunate that my first job was to work on a retrospective of painter Elizabeth Murray at the Museum of Modern Art.

I learned so much from her.

I fell in love with looking at paintings from the 1970s after curator Robert Stowe selected all the paintings from her lifetime body of work.

There were some motifs and elements that reappeared later in her life.

I remember asking her what she thought of those early works.

If I hadn't known it was hers, I might not have guessed.

She told me some were not quite up to the standard of what she wanted.

In fact, one of them didn't live up to her standards, and she threw it in the studio's trash bin until an appreciative neighbor took it away.

In that moment, my perspective on success and creativity changed.

I realized that while success is fleeting, what we always celebrate is creativity and mastery.

But the question is what turns success into proficiency.

This is a question I have been asking myself for a long time.

I think that's when we start cherishing the gifts that are close to winning.

I started to understand this one chilly May day when I went to see the all-female varsity shooters at Columbia's Baker Athletics Complex on the north end of Manhattan.

I wanted to know what is called Archer's Paradox. The idea is that in order to actually hit the target, you need to aim at something slightly off target.

I stood watching as the coach drove the women off in this gray van. They came out looking relaxed and focused.

One held a half-eaten ice cream cone in one hand and an arrow with a yellow arrow in his left.

And they passed me, they smiled, but they measured me on the way to the lawn, and they were discussing positions not in words, but in numbers, angles and, as I thought, a plan to reach a goal.

I stood behind one shooter and watched her stand between us as her coach assessed who needed support, but I couldn't understand how even one could hit the ten ring.

At a standard 75-yard distance, the ten ring looks as small as the tip of a matchstick held out with your arm outstretched.

This is when holding a draw weight of 50 lbs on each shot.

I remember she shot a 7 first, then a 9, then two 10s, and the next arrow didn't even hit the target.

And I could see that it added to her tenacity and she chased it again and again.

For 3 hours this went on.

At the end of practice, one of the shooters was so tired that he lay down on the ground he had just stargazed, his head up at the sky, trying to find out what T.S. was doing. Eliot might call it the still point of the turning point of the world.

It's very rare in American culture, and hardly professional anymore, to look at what it's like to be stubborn at this level of accuracy, what it means to have your body poised for three hours to hit a target.

But I stayed because I realized I was witnessing something elusive: the difference between success and mastery.

So success is reaching those 10 rings, but proficiency is knowing that it's pointless if you can't repeat it over and over again.

However, proficiency does not simply mean excellence.

That's different than success. I believe that success is an event, a moment, a label the world gives you.

Mastery is not a commitment to a goal, but a constant pursuit.

What drives us to do this and push us further is our emphasis on close wins.

How many times have we called something a classic, a masterpiece, even though the author considers it hopelessly unfinished, full of difficulties and flaws, in other words close to triumph.

I was surprised that Elizabeth Murray confessed about her early paintings.

The painter Paul Cézanne often considered his work unfinished, so he deliberately set it aside with the intention of picking it up again, but at the end of his life he signed only 10 percent of his paintings.

His favorite novel was Honoré de Balzac's "[Unknown] Masterpiece", and he felt that the protagonist was the painter himself.

Franz Kafka realized his imperfection when others could find nothing but works to admire, so much so that he wished to burn all his diaries, manuscripts, letters, and even sketches upon his death.

His friend refused to accept the request, so that we now have all of Kafka's "America," "The Trial," and "The Castle," but this work is so unfinished that it stops mid-sentence.

In other words, the quest for mastery is almost forever.

"Lord, grant me more than I can fulfill," Michelangelo, as if pleading to the Old Testament God in the Sistine Chapel, and himself being that Adam with his finger outstretched, not quite touching God's hand.

Mastery is not about getting there, but about getting there.

It's about always wanting to bridge the gap between where you are and where you want to be.

Mastery is making sacrifices for your craft, not for building a career.

How many inventors and obscure entrepreneurs are living through this phenomenon?

We see it in the life of indomitable Arctic explorer Ben Saunders. He tells me that his victory was not simply the result of great achievement, but the promotion of a near-victory lineage.

We thrive by staying on the cutting edge.

This is a wisdom understood by Duke Ellington, who said that his favorite song in his repertoire was always the next one and always the one he had yet to compose.

One of the reasons nearly winning is built into proficiency is that the higher proficiency you get, the more clearly you realize that you don't know everything you thought you knew.

It's called the Dunning Kruger effect.

The Paris Review came up with this answer when James Baldwin was asked, "What do you think more knowledge will add?"

And he said, "Learn how much you know."

Success motivates us, but anything close to victory can drive us to continuous quest.

One of the most vivid examples of this occurs when observing the difference between Olympic silver and bronze medalists after a competition.

Cornell University's Thomas Gilovich and his team studied this difference and found that silver medalists were more frustrated than bronze medalists, and that bronze medalists were usually a little more satisfied with not winning a medal just because they didn't finish fourth, which allowed silver medalists to focus on their subsequent competition.

The gambling industry once took note of this near-win phenomenon, creating scratch-off tickets with higher-than-average near-win rates, and dubbed them Heartstoppers, forcing people to buy tickets, making them the target of gambling industry abuse in the UK in the 1970s.

Proximity to victory is impetus because it changes the way we see the landscape and puts goals that we tend to put far away closer to where we stand.

When you say imagine a great day next week, you might describe it in more general terms.

But if I asked you to describe a great day at TED tomorrow, you might describe it with concrete and practical clarity.

And here is almost a triumphant result.

That way we can focus on what we're trying to do now to deal with the mountain in front of us.

It was Jackie Joyner-Kersey, who missed out on gold in the 1984 heptathlon by a third of a second, and her husband predicted it would give her the tenacity she needed in subsequent competitions.

In 1988 she won gold in the heptathlon and set a record of 7,291 points that no athlete has ever come close to since.

We grow not when we've done it all, but when we still have work to do.

I'm standing here thinking and wondering about the different ways you can almost win in this room and how your life will play out. Because I think we know it on an intuitive level.

We know that by staying on the cutting edge of ourselves, we can succeed. That is why the deliberately imperfect is incorporated into the creation myth.

In the Navajo culture, some artisans and women deliberately included imperfections in textiles and pottery.

It's called the Spirit Line, an intentional flaw in the pattern that gives the weaver or maker a way out, but it's also a reason to keep making the pieces.

A master is not an expert because he brings the subject to a conceptual end.

They are masters because they are aware that masters do not exist.

As I thought about this, it occurred to me why an archery coach told me at the end of practice, out of earshot of the archery players, that he never felt that he or his colleagues could do enough for their team, that they never thought they had enough visualization techniques and postural training to help them overcome a constant stream of victories.

It didn't exactly sound like a complaint, but just a sort of tender confession to let me know, reminding me that I knew he was giving himself up to a greedy, unfinished road that always needed more.

We build from an unfinished idea, even if that idea is who we used to be.

This is the mechanics of mastery.

As you get closer to what you wanted, chances are you'll be able to achieve more than you ever dreamed you could.

I imagine what Elizabeth Murray thought when he saw her smiling at these early paintings in the gallery one day.

Even if you create a utopia, I think there will still be something unfinished.

Completion is the goal, but I hope it's not the end.

thank you.

(applause)

Wow this is bright.

It should consume a lot of power.

Well, it must have taken some energy to fly you here as well.

Therefore, the planet as a whole needs a lot of energy, and so far we have mainly used fossil fuels for our activities.

We've been burning gas.

It was a good run.

That's what got us here, but we have to stop.

I can't do that anymore.

So we are currently experimenting with different types of energy, alternative energy, but have found it very difficult to find anything as convenient and cost effective as oil, gas and coal.

My personal favorite is nuclear energy.

Today, it is very energy dense, produces stable and reliable electricity, and emits no carbon dioxide.

We now know that there are two ways to make nuclear energy: fission and fusion.

Nuclear fission takes out a large atomic nucleus and breaks it into pieces or halves, producing large amounts of energy. This is how nuclear reactors work today.

It works pretty well.

and fusion.

I love fusion now. Fusion is much better.

Take two small nuclei and combine them to make helium. This is great.

A lot of energy is generated.

This is how nature generates energy.

The sun and all stars in the universe run on nuclear fusion.

Well, fusion plants are actually very cost effective and also very safe.

It produces only short-lived radioactive waste and never melts down.

Now, the fuel from fusion comes from the ocean.

In the ocean, the fuel can be extracted at about 1/1,000th of a cent per kilowatt-hour, making it very cheap.

And if the entire planet were powered by nuclear fusion, we could extract fuel from the oceans.

It will last billions of years.

Now, if nuclear fusion is so great, why not do it?

where is it?

Well, there are always little pitfalls.

Fusion is really difficult.

The problem is that these two nuclei are both positively charged and we don't want them to fuse.

they go like this. they go on like that.

Therefore, in order to fuse them, they need to be thrown at each other with very high speed, and with enough speed they can come into contact against the repulsive force and create energy.

Here, particle velocity is a measure of temperature.

In other words, the temperature required for nuclear fusion is 150 billion degrees Celsius.

This is rather warm, which is why fusion is so difficult to do.

Well, I noticed a little fusion bug when I did my Ph.D. I got a big job here at the University of British Columbia and then in a laser printer factory printing for the printing industry.

I worked there for 10 years and got a little bored. Then I turned 40 and had a midlife crisis. It happens often. "Who am I? What should I do?

what should i do? what can i do?

Then I had my eye on my good job, and I was clearing the woods around here in British Columbia.

And all of you are buried under millions of tons of junk mail.

Well, it wasn't very satisfying.

That's why some people buy Porsche.

Some make mistresses.

However, I decided to contribute even a little to solving global warming and realizing nuclear fusion.

Well, the first thing I did was look at the literature and see how fusion works.

So physicists have been working on nuclear fusion for some time, and one way to do it is with something called a tokamak.

It's a big ring of magnetic coils, superconducting coils. Inside these rings, you create a magnetic field, and in the middle of it is a hot gas called plasma.

Particles orbit around the circle on the wall.

Then you throw a lot of heat in there and try to cook it to its melting temperature.

This is the interior of one of the donuts, and you can see the fusion plasma on the right.

A second way to do this is with laser fusion.

Now, in laser fusion, there is a small ping-pong ball, the fusion fuel is placed in the center, and a large amount of laser is emitted around it.

The laser is very powerful and crushes ping pong balls really quickly.

And if you squeeze something hard enough, it heats up and it gets really, really fast, and if it's done in a billionth of a second, enough energy and enough heat is produced to cause nuclear fusion.

Here is the inside of such a machine.

You can see the laser beam and pellet in the center.

Most people now think that fusion is going nowhere.

They always think that physicists are in their labs and working hard, but nothing is happening.

That's actually not true at all.

This is the curve of fusion growth over the last 30 or so years, and we can see that it is now about 10,000 times what it was when it started.

That's a pretty good profit.

In fact, this is as fast as the legendary Moore's Law, which defined the amount of transistors that can be put on a chip.

Now, this point here is called the JET (Joint European Torus).

This is the big tokamak donut in Europe and in 1997 the machine produced 16 megawatts of fusion power with 17 megawatts of heat.

Now, say it doesn't help much, but it's actually pretty close, considering it's about 10,000 times more profit than it was originally.

The second point here is NIF.

National Ignition Facility.

This is a large U.S. laser machine that, last month, rather clamorously announced that it had succeeded in producing more fusion energy than it put into the center of a ping-pong ball from fusion.

This is not enough because the energy of the laser injecting energy was higher than that, but it was pretty good.

This is ITER, pronounced EE-tairh in French.

It's a massive joint effort of nations building a giant magnetic donut in the south of France that, when completed, will generate 500 megawatts of fusion power with just 50 megawatts of electricity.

So this is the real deal.

It works.

It is a machine that produces energy.

Looking at the graph, we can see that these two points are slightly to the right of the curve.

Somehow I've strayed from progress.

In fact, the science to build those machines really came just in time to fuse in that curve.

But there was a little bit of politics going on, and I didn't have the will to do it, so I turned right.

For example, ITER could have been built in 2000 or 2005, but being a major international collaboration, politics got in the way and delayed it a bit.

For example, it took me about three years to decide where to put it.

Well, fusion is often criticized for being a little too expensive.

Admittedly, it cost us $1 billion or $2 billion a year to make this progress.

But you have to compare that to the cost of creating Moore's Law.

It cost much more than that.

The result of Moore's Law is this phone in my pocket.

This phone and the internet behind it cost me about $1 trillion just to take selfies and post them on Facebook.

Then my father will be very proud when he sees it.

It also spends about $650 billion annually on subsidies for oil, gas and renewable energy.

We are currently spending half a percent of that on nuclear fusion.

So personally I don't think it's that high.

Given that it could cleanly solve all energy problems for the next billion years, I think it's actually short-lived.

I can say that now, but I'm a little biased because I just started a fusion company and don't even have a Facebook account.

So when I started this fusion company in 2002, I knew I couldn't compete with the big guys.

They had far more resources than I did.

So we decided we needed to find a cheaper and faster solution.

Now magnetic and laser fusion are very good machines.

These are great technologies, great machines, and have shown that fusion is possible.

However, I don't think it's a very good power plant.

They're too big, too complex, too expensive, and they don't really deal with fusion energy.

When nuclear fusion occurs, energy is released as neutrons. Fast neutrons emerge from the plasma.

Those neutrons hit the walls of the machine.

It will deal damage.

You also need to take the heat from the neutrons and send steam somewhere to turn the turbines, but with these machines it was all kind of an afterthought.

So I decided there had to be a better way.

So back to the literature, I read about fusion here and there.

One method that particularly caught my attention is called magnetized target fusion (MTF for short).

Now, what you want to do in MTF is fill a large vat with liquid metal and spin the liquid metal to open a vortex in the middle. It's like a sink.

Pulling the plug on the sink creates a vortex.

And then there's the piston driven by the pressure on the outside, which compresses the liquid metal around the plasma, compresses it, heats it up like a laser, and then fuses it.

So it's kind of a mix of magnetization fusion and laser fusion.

So they have some very nice advantages.

Liquid metal absorbs all neutrons and there are no neutrons hitting the walls, so there is no damage to the machine.

The liquid metal gets hot so it can be pumped through a heat exchanger to create steam that can turn a turbine.

So it's a very convenient way to do this part of the process.

And finally, all the energy to achieve fusion comes from steam-powered pistons, which are far cheaper than lasers or superconducting coils.

Well, all this was very good, except for the issue of not working perfectly.

(Laughter) There are always pitfalls.

When I compress it, the plasma cools faster than it compresses, so I try to compress it, but the plasma cools down and cools down, and after that it had no effect at all.

So when I saw it, I said, It's such a shame because it's a very, very good idea.

So hopefully we can improve that.

So I thought for a moment and said, "How can I do better?"

So let's think about impact.

What if you used a big hammer and instead of putting the hammer on the nail and pushing it in, you could try pounding the nail like this? It doesn't work.

The key here is to use the idea of ​​impact.

So steam accelerates the piston. It will take a while, but then boom! When you push the piston, wow, all the energy is instantly transferred to the liquid, compressing the plasma faster.

So I decided, okay, this is good, let's make it.

So we built this machine here in our garage.

We built a little machine out of which we were able to squeeze out a few neutrons. That's my marketing neutrons, and with those marketing neutrons, I raised about $50 million and hired 65 people. That's my team here.

And this is what we want to build.

It becomes a big machine about 3 meters in diameter, liquid lead rotates, a large vortex is formed in the center, plasma is arranged up and down, the piston hits the side, it is compressed with "Burn!"

Running this about once every second produces 100 megawatts of power.

Well, we also made this injector. In other words, this injector creates plasma first.

Plasma is produced at a lukewarm temperature of around 3 million degrees Celsius.

Unfortunately the life isn't long enough so the plasma needs to last a little longer, but it's been pretty good in the last month so I think it's compressing the plasma now.

Then I made a small sphere about this size and placed 14 pistons around it. This compresses the liquid.

However, plasma is difficult to compress.

When you compress it, it tends to flex a bit like this, so you have to time the pistons very well, and they use some control systems to do that, which wasn't possible in 1970, but now you can do it with good new electronics.

Finally, while most people think nuclear fusion is a future thing and will never happen, in reality it is very close.

we are almost there.

Major research institutes have shown that fusion is feasible, and some small and medium-sized companies are now considering it.

General Fusion is one such small company, and hopefully sooner or later someone will solve that problem and maybe it will become General Fusion.

thank you very much.

(applause)

I would like to start with a mathematician named Georg Cantor in Germany in 1877.

Cantor then decided to take the line, erase the middle third of the line, and put the resulting two lines back into the same process, a recursive process.

So first line 1, then line 2, then line 4, then line 16, and so on.

And if you repeat this infinitely (as you can do with mathematics), you end up with an infinite number of lines, each containing an infinite number of points.

There he realized that there are sets whose number of elements is greater than infinity.

And this surprised his mind. literally. He checked into a sanatorium. (Laughter) And when he came out of the sanatorium, he was convinced that he was sent to Earth to discover the superfinite set theory, because the greatest set of infinity is God Himself.

He was a very religious person.

He was a mathematician on a mission.

And other mathematicians have done the same.

Swedish mathematician von Koch decided to add lines instead of drawing them.

So he came up with this beautiful curve.

There is no particular reason why you should start with this seed shape. You can use any seed shape you like.

Rearrange this and paste it somewhere. OK, it's under there. As you iterate, the shape of the seed expands into a completely different looking structure.

Therefore, they all have self-similar properties. In other words, the parts look like the whole.

It's the same pattern at different scales.

Now, the mathematicians thought this was very strange, because when you shrink the ruler, the length gets longer and longer.

And since the iterations were done infinitely, when the ruler shrinks to infinity it also has an infinite length.

This made no sense at all, so they ended up putting these curves in the back of their math book.

They said these were pathological curves and there was no need to argue.

(Laughter) And it worked for 100 years.

And in 1977, French mathematician Benoît Mandelbrot created computer graphics and realized that using these shapes, which he called fractals, we could get natural shapes.

You get human lungs, acacia trees, fern plants, these beautiful natural forms.

Take your thumb and forefinger and see where they meet -- do it now -- and loosen your hand and you'll see wrinkles, wrinkles within wrinkles, and wrinkles within wrinkles. right?

Your body is covered with fractals.

The mathematician who said these were pathologically useless figures?

They were breathing those words in fractal lungs.

It's very ironic. Here's a bit of natural recursion.

Again, take these lines and recursively replace them with the entire shape.

Here is the second iteration, followed by the third, fourth, and so on.

In other words, nature has this self-similar structure.

Nature uses self-organizing systems.

In the 1980s, I happened to see fractals in aerial photographs of African villages.

And I thought, "This is great! Why?"

And of course I had to go to Africa and ask people why.

So I won a Fulbright scholarship so I could travel all over Africa for a year asking people why they build fractals. Great job if you get it.

(Laughter) So I finally arrived in this city. Then I created a small fractal model of the city to see how it would play out. But when I got there, I got to the chief's palace. My French is not very good. I said something like, "I'm a mathematician, so I'd like to stand on your roof."

But he was really chill about it and took me there and talked about fractals.

And he said, "Oh, yes, yes! I knew there was a rectangle within a rectangle, I know all about it."

And it turned out that the royal insignia had a rectangle within a rectangle, and that the road through the palace was actually this spiral.

And you have to be more and more polite as you go along.

So they are mapping social scaling to geometric scaling. It's a conscious pattern. It's not unconscious like a termite mound fractal.

This is a village in southern Zambia.

Ba-ila built this village about 400 meters in diameter.

You have a big ring.

The ring that represents the family enclosure becomes larger and larger as it goes deeper, and toward the back there is the ring of the chief, and within that ring are the direct family members of the chief.

So here's a little fractal model.

Here is a house with a sacred altar, here are the houses, the family enclosures, here are the humans where the sacred altar is placed, and here is the whole village - here are the chief's relatives, here are the chief's direct families, and here is a small village no larger than this.

Now you may wonder how people can live in such a big little village.

Because they are spirits. These are your ancestors.

And of course, the spirit village has a small mini-village, right?

So, as Georg Cantor said, recursion goes on forever.

It is located in the Mandala Mountains of Mokolek, near the Nigerian border of Cameroon.

When I saw this drawing by a French architect, I thought, "Wow, what a beautiful fractal!"

So I tried to come up with a seed shape that would look like this when iterated.

I came up with this structure here.

Let's look at the first, second, third and fourth iteration.

Well, after running the simulation, I noticed that the whole village was spiraling like this. This is its replication line, the self-replicating line that unfolds into a fractal.

Now I realized that the line was around the only square building in the village.

So when I got to the village, I said, "Could you take me to the square building?"

I think something is going on there. ”

And they said, "We can take you there, but you cannot enter it, for it is a sacred altar, where we offer yearly sacrifices to maintain the fertile annual cycle of the fields."

And I began to realize that the fertility cycle is exactly the same as the recursive cycle in the geometric algorithm that builds this.

And relapses continue on a very small scale in some of these villages.

This is Nankani village in Mali.

And as you can see, inside the family enclosure, pots are recursively stacked in the fireplace.

This is the gourd that Issa showed me, and it's recursively stacked.

Well, the tiniest gourd here stores a woman's soul.

And when she dies, they perform a ritual to break this bundle called Zaranga and her soul disappears forever.

Again, infinity is important.

Now, at this point, ask yourself three questions.

Aren't these scaling patterns universal to all indigenous architecture?

And that was actually my first hypothesis.

When I saw these African fractals for the first time, I thought, "Well, indigenous peoples who don't have state societies or such hierarchies must have a kind of bottom-up structure."

However, it turned out not to be true.

I started collecting aerial photographs of Native American and South Pacific architecture. Only the African ones were fractals.

And come to think of it, all these different societies have different geometric design themes that they use.

As such, Native Americans use a combination of circular and quadruple symmetry.

The pattern can also be seen on pottery and baskets.

This is an aerial view of one of the Anasazi ruins. You can see that at the maximum scale it is circular, but at smaller scales it is rectangular.

Not the same pattern on two different scales.

Then you might ask, "Dr. Egrash, are you ignoring the diversity of African cultures?"

And three times the answer is "no".

First of all, I agree with Mudimbe's excellent book "African Inventions". Africa is the artificial invention of first colonialism and later rebel movements.

No, because a widely shared design practice does not necessarily result in cultural unity. And it's definitely not "hard-wired into our DNA."

And finally, fractals are self-similar. That is, fractals resemble themselves, but not necessarily each other. Fractals have very different uses.

It's a technology shared in Africa.

And finally, isn't this just an intuition?

It's not really mathematical knowledge.

Africans can't really use fractal geometry, can they?

It wasn't invented until the 1970s.

Indeed, some of the African fractals are pure intuition as far as I am concerned.

So I walked around the streets of Dakar and asked people, "What is the algorithm? What are the rules for making this?"

And they'll say, "Well, I'm doing it that way because it looks pretty and stupid." (Laughter) But sometimes that's not the case.

In some cases, algorithms actually exist, and sometimes very sophisticated ones.

We see this recursive geometric pattern in the Mangetu carvings.

The Ethiopian cross shows this wonderful development of form.

In Angola, the Chokwe people draw lines in the sand, which the German mathematician Euler called graphs. We call this the Euler path. The stylus can never be lifted off the surface, nor can it cross the same line twice.

But they do it recursively and they do it in a system of age stages, so little kids learn this, then older kids learn this, and then at the start of the next age stage they learn this.

And every time you iterate through that algorithm, you learn a repeating myth.

Learn the next level of knowledge.

And finally, we will see this board game all over Africa.

In Ghana where I studied, it is called Owari. It is called Mancala here on the east coast, Bao in Kenya and Sogo elsewhere.

This board game shows spontaneous self-organization patterns.

And the people of Ghana knew these self-organizing patterns and intended to use them strategically.

So this is very conscious knowledge.

Here's a nice fractal.

Wherever you go in the Sahel, you will see this windshield.

And of course all fences in the world are in Cartesian coordinates and are all strictly linear.

But here in Africa we have a non-linear scaling fence.

So I tracked down one of the people making these things, this guy in Mali, outside Bamako, and asked, "Why are you making fractal fences? Because no one else is."

And his answer was very interesting.

He said, "If I lived in the jungle, I would only use long rows of straw because it's so fast and so cheap.

It doesn't take long and doesn't use a lot of straw. ”

He said, "But wind and dust pass through very easily.

Well, the tight rows at the top do a good job of keeping the wind and dust out.

But it takes a lot of time, and it's so hard that you need a lot of straw. ”

"Well, we know from experience that the farther you go from the ground, the stronger the wind," he said.

right? It's just like a cost-benefit analysis.

The length of the straw was then measured and placed on a log-log plot to obtain the scaling index. It matched almost exactly the scaling index for the relationship between wind speed and height given in the Wind Engineering Handbook.

In other words, they are on target for the practical application of scaling technology.

The most complex example of an algorithmic approach to fractals I found wasn't really geometry, it was symbolic code, and this was Bamana's Sand Divination.

And the same fortune-telling system can be found all over Africa.

These symbols have 4 bits each and are 4-bit binary words because they can be found on the East Coast as well as the West Coast and the symbols are often very well preserved. Draw these lines randomly on the sand, then count and put 1 stroke for odd numbers and 2 strokes for even numbers.

And they did this very quickly, and I didn't understand where they were getting - they only ran randomness 4 times - I didn't understand where they were getting the other 12 symbols.

And they didn't tell me.

They said, "No, no, we can't talk about this."

And I said, "Look, I'll pay you, you can be my teacher, and I'll come and pay you every day."

They said, "It's not about money, it's about religion."

And finally, in despair, I said, "Let me explain Georg Cantor in 1877."

And I started explaining why I was in Africa, and they were so excited to see Cantor's set.

Then one of them said, "Come here, I think I can help you here."

So he took me to the ceremony of initiation into the priesthood of Vamana.

And of course I was only interested in mathematics, so all the while he kept shaking his head and saying, "Look, I didn't study like this."

But I had to sleep with cola nuts buried in the sand next to my bed and give 7 coins to 7 lepers.

And finally he revealed the truth.

And it turned out to be a pseudo-random number generator using deterministic chaos.

If you have a 4-bit symbol, combine it horizontally with another symbol.

Therefore, adding an even number and an odd number gives an odd number.

If you add an odd number and an even number, you get an odd number.

An even number plus an even number is an even number. If you add an odd number and an odd number, you get an even number.

This is a modulo 2 addition, similar to a parity bit check in a computer.

And when you take this symbol out and put it back together, it becomes a symbol of self-generated diversity.

They just use a kind of deterministic chaos in doing this.

Since this is binary code, we can actually implement this in hardware. This is a great teaching tool that should be in any African engineering school.

And the most interesting thing I found out about it was historical.

Hugo of Santara brought it to Spain from Islamic mystics in the 12th century.

And there it entered the alchemical community as geomancy, divination through the earth.

This is a Feng Shui chart drawn for Richard II in 1390.

German mathematician Leibniz talks about geomancy in his doctoral dissertation called "De Combinatoria".

And he said, "Instead of using strokes 1 and 2, let's use 1 and 0 so we can count in powers of 2."

right? 1 and 0, binary code.

George Boole used Leibniz's binary code to create Boolean algebra, and John von Neumann used Boolean algebra to create the digital computer.

So all these little PDAs and laptops, all the digital circuits in the world started in Africa.

I know Brian Eno says computers don't have enough Africa, but I don't think Brian Eno has enough African history.

(Laughter) (Applause) So I'd like to finish by saying a little bit about the uses we've found.

All applets are free when you visit our website. They just run inside the browser.

Anyone in the world can use it.

A grant was recently awarded by the National Science Foundation's Broad Participation in Computing Program to create programmable versions of these design tools. So within three years, we expect everyone to be able to create their own simulations and artifacts on the Web.

In the United States, we have focused on African American students as well as Native Americans and Latinos.

We found that children who used the software in their math classes experienced statistically significant improvements compared to controls who did not use the software.

So we are very successful in teaching our children that they have a tradition of mathematics and that it is not just about singing and dancing.

We have started a pilot program in Ghana.

We received a small seed grant to see if people would be willing to help with this. We are very excited about its future possibilities.

We are also working on the design.

I didn't put his name here -- my colleague in Kenya, Kelly, had the brilliant idea of ​​using fractal structures for postal addresses in villages with fractal structures. Because trying to impose a grid-structured postal system on a fractal village doesn't fit perfectly.

Bernard Tschumi of Columbia University finished using it in the design of the Museum of Africa.

David Hughes of Ohio State University has written a primer on Afrocentric architecture using some of these fractal structures.

And finally, I would like to point out that, as we heard earlier, this idea of ​​self-organization resides in the brain.

It's in the Google search engine.

In fact, the reason Google has been so successful is because they were the first to take advantage of the web's self-organizing properties.

It's ecological sustainability.

It lies in the power of entrepreneurship and the ethical power of democracy.

There are bad things too.

The AIDS virus is spreading so quickly because of its self-organization.

And if you don't believe that self-organizing capitalism can have devastating effects, you haven't opened your eyes enough yet.

So, as I said earlier, we need to think about traditional African ways of doing self-organization.

These are robust algorithms.

These are gentle, egalitarian ways of doing self-organisation, or entrepreneurship.

So if you want to find better ways to do this kind of work, just look to Africa to find these powerful self-organizing algorithms.

thank you.

Potentially life-saving scientific advances sometimes lie dormant in the open, as we discover them, for example, in the accumulated stories of human evolution and the time-tested adaptations we observe in the natural world around us.

Science begins with observation, and the trick is to identify patterns and symptoms that you might dismiss as myths or coincidences, isolate them, and test them with scientific rigor.

And when you actually do it, you often get surprising results.

Western Australia has been particularly plagued by shark attack problems over the last three years and unfortunately there have been five fatal shark attacks in the last 10 months.

But it's not just Western Australia.

Incidents of shark encounters with humans are escalating around the world.

And perhaps it should come as no surprise that in July of this year, the Shark Attack Mitigation System, in collaboration with the University of Western Australia Institute of Oceanography, made an announcement on the development of technology to reduce or reduce the risk of shark attacks based on the science of what sharks can see, which caught the attention of global media and ocean users worldwide.

And today I would like to introduce you not only to the story of that journey, but also to the concept that science can be as powerful a translator as it is an invention.

That's what we were looking for when we started this process. That was about three years ago, after the first two deadly shark attacks in Western Australia. And by chance, I was having dinner with Harry Butler in my previous role.

Well, Harry Butler, who most Australians know to be a renowned naturalist, spent a lot of time in the marine environment.

Harry Butler is a precursor to the late Steve Irwin, if you will.

When I asked him what the solution to the problem was, his answer was quite astonishing.

"If you put on a black wetsuit and wear a yellow-striped band like a bumblebee, you're mimicking most marine life's warning systems," he said.

I didn't really think about it at the time, but it wasn't until after three shark deaths that I began to wonder if there was some merit to this idea.

And then I turned to the web to see if there were any clues.

And it turns out that the web is full of evidence supporting this kind of thinking.

Biologically, therefore, there are many species that exhibit stripes and patterns, warning patterns to be cryptic in water or to warn of being attacked. Especially for pilot fish, who spend most of their lives around the shark's business end.

On the human side, oceanographer Walter Starck has been painting wetsuits since the 1970s, and anthropologically, Pacific island tribes banded themselves in sea snake rituals to ward off shark gods.

So what is going on here?

Is this a widely publicized idea for us to consider and define?

We know that sharks use different sensors when attacking, especially for attack, but it is the visual sensor that is used to identify the target, especially in the last few meters of the attack.

It makes sense to pay attention to biological anecdotes. Because it is a proven evolution over thousands of years.

But isn't the human anecdote also a kind of evolution? The idea is that a kernel of truth that is considered important is passed down from generation to generation, and that it eventually becomes what actually shapes human behavior.

I wanted to try this idea.

I wanted to add science to this anecdotal evidence. If science can back up this notion, at least some of the solutions to shark attacks may be on our doorstep.

To do that, we needed experts in shark vision and shark neurology. Then, as a result of researching all over the world again, the University of Washington was founded.

The Oceans Institute is right next door.

And Professor Nathan Hart and his team had just written a paper proving that predatory sharks perceive things in black and white, or grayscale.

So I actually, a little embarrassed, called Nathan about this idea that maybe I could use these patterns and shapes to make a wetsuit to reduce the risk of being attacked by sharks. And luckily he thought it was a good idea.

Therefore, a joint research project was carried out with the support of the Western Australian Government.

And we did three important things.

First, we mapped the eye features, or physical features, of the three major predatory sharks: the great white, tiger, and bull shark.

We did it genetically, we did it anatomically.

Our next step was to use complex computer modeling to understand what that eye would see at different depths, distances, light conditions, and water clarity in the ocean.

And from there, we were able to pinpoint two key features. Patterns and shapes that give the wearer a cryptic impression when hidden or obscured in the water, and patterns and shapes that allow the maximum splitting of the profile while providing maximum contrast so that the wearer is not confused with shark prey or shark food.

The next thing we had to do was turn this into a wetsuit that people could actually wear. To that end, I invited Ray Smith, the surfer, industrial designer, wetsuit designer, and the guy who actually designed the original Quiksilver logo, to sit down with the science team to interpret that science and create an aesthetic wetsuit that people could actually wear.

Here is an example of one of the first drawings.

So this is what I call a "don't eat" wetsuit.

I mean, this takes that striped idea, takes that striped idea, and provides a very noticeable, very destructive profile, meant to keep sharks from thinking you're normal food, and potentially even cause confusion for sharks.

And this one is configured to fit a surfboard.

A dark, opaque panel can be seen in the foreground, but it is particularly suitable for surfaces where backlit silhouettes are difficult to see.

The second iteration is an impenetrable wetsuit, or one that attempts to hide the wearer in the water column.

The suit has three panels, and under any given condition one or more of those panels will match the reflectance spectrum of the water and disappear completely or partially, leaving the last panel to create a destructive profile within the water column.

And this is especially good for diving settings when you are deep in the water.

So it turns out that there is really solid science here.

We knew that if we wanted to stand out, we needed to look striped, and if we wanted to be enigmatic, we needed to look like this.

But the acid test is always going to be how sharks really behave in the context of these patterns and shapes.

And testing simulating wetsuit-wearing humans and predatory sharks in the water in a natural environment is actually much more difficult than it sounds.

(Laughter) So we need to get a statistical number of samples to have scientific evidence, so we need to feed the rig. And by feeding the rig, you're obviously changing the shark's behavior.

You can't put humans in water.

We are ethically forbidden to use humanoids or even feed them underwater.

Nevertheless, we started the trial process in January of this year, targeting first tiger sharks and then great white sharks.

The method was to take perforated drums full of bait, wrap them in neoprene skins, and run two stereo underwater cameras to see how the sharks actually engage with the gimmick.

And because we're using stereo, we can get all the stats about how big the shark is, what angle it comes in at, how fast it leaves, what the shark's behavior is like, all in an empirical rather than subjective way.

We needed to maintain the scientific method, so we ran the control rig, a black neoprene rig similar to a regular black wetsuit, against the so-called SAMS technology rig.

And the results were not only exciting, but very encouraging. Today I would like to present a snapshot of just two of those efforts.

Here, a 4-meter long tiger shark engages a black control that it encountered about a minute and a half ago.

Now, that very same shark engaged or encountered this SAMS rig, the Erud SAMS rig, about eight minutes ago and spent six minutes circling it, hunting, looking for things it could smell and feel but not see. This was the final engagement.

Great whites are more confident than tigers and here they are seen engaged in a control rig. So you're wearing a black neoprene wetsuit, heading straight to the bottom, coming up and engaging.

In contrast to the SAMS technology rig, this is a striped rig, more tactile, more investigative, more anxious and reluctant to go straight in and out.

(Applause.) So it's important to us that all testing is done independently and that WA University is doing the testing.

It becomes an ongoing process.

It may be peer-reviewed and published.

It is very important that this concept is grounded in science.

From a shark attack mitigation system perspective, we are a biotechnology licensee, so we don't manufacture our own wetsuits.

We license others to do it as well.

However, I thought you might be interested in seeing how SAMS technology is embedded in a wetsuit. So, for the first time ever, we can show the world live -- (laughter) -- what biological adaptation, science, and design looks like in real life.

So you can welcome Sam the surfer from this side. Sam, where are you?

(Applause.) And Eduardo.

(Applause.) Cheers, folks.

cheers.

Thank you gentlemen. (Applause.) So what have we done here?

Well, my view is that rather than using science as a tool of invention with a clean slate, we have paid attention to biological evidence, emphasized human anecdotal evidence, and used science as a tool for translation, translating what already exists into something that can be used for the benefit of humanity.

And it occurred to me that this idea of ​​science as a tool of translation rather than invention has much broader applicability in the pursuit of innovation.

After all, did the Wright brothers discover manned flight, or did they observe the biological fact of flight, translate it mechanically, and reproduce it in a way that humans can use?

When it comes to plain wetsuits, who knows what oceanwear will look like in two, five, or fifty years, but with this new way of thinking, I think it's quite possible that it's not all black.

thank you.

(applause)

Earth needs no explanation.

The Apollo 17 astronauts snapped this iconic image in 1972 as they flew around the Moon at breakneck speed, so no explanation is needed.

This event was a catalyst for an entire generation of humanity to realize that we are aboard Spaceship Earth, that we are fragile and finite and that we need to take care of it.

But as beautiful as this picture is, it is static and the Earth is constantly changing.

It changes on a timescale of several days due to human activities.

And the satellite images we have today are old.

How old are you usually?

This is important because you can't fix what you can't see.

Ideally, we would like to have an image of the entire Earth on a daily basis.

So what is in our way?

what happened?

This is the problem. Satellites are big, expensive, and slow.

It weighs 3 tons.

It is 6 meters high and 4 meters wide.

We used the entire fairing just to launch the rocket.

One satellite, one rocket.

The cost was $855 million.

Satellites like this have played a wonderful role in our understanding of the Earth.

But if you want to understand it more regularly, you will need many satellites and this model is not scalable.

So my friends and I started Planet Labs to build tiny, high-performance satellites.

Let me show you what our satellite looks like. This is our satellite.

This is the actual size, not a scale model.

It measures 10 x 10 x 30 cm and weighs 4 kg. We pack the latest and greatest electronics and sensor systems into this tiny package. So while it's very small, it's 1,000 times less mass, and yet it can take pictures with 10 times the resolution of the larger satellites here.

And we call this satellite "Dove" — thank you.

(Applause.) We call this satellite "Pigeon." Because satellites are usually named after birds, they are usually named after birds of prey. Eagles, hawks, swoops, kills, I don't know, some kind of kestrel.

But we wanted to call them pigeons because we have a humanitarian mission.

But we didn't just build.

we launched them.

And not just one, there are many.

It all started in our garage.

Yes, we built our first satellite prototype in our garage.

Now, this is pretty normal for Silicon Valley companies like us, but I think it's new for space companies.

That's not the only trick we learned from Silicon Valley.

We build satellite prototypes quickly.

We use "early release, frequent release" in our software.

And we have a different risk approach.

I will take it outside and test it.

We sent satellites into space just to test them, and we learned how to manufacture satellites on a large scale.

We believe that mass production is now possible for the first time using modern production technology.

We call this Agile Aerospace and that's why we've allowed us to pack so much functionality into this little box.

Now, what has united our team over the years is the idea of ​​democratizing access to satellite information.

In fact, our founders Chris, Robbie, and I met over 15 years ago when we were hosting a conference on that very question at the United Nations. "How do we use satellites to help humanity?"

How are you using satellites to address people in developing countries and climate change?

And this is what brought us together.

Our entire team is passionate about using satellites to help humanity.

You could say that we are space geeks, but we are not only interested in what is above us, but also what is below.

Here's a video of two satellites launching from the International Space Station just four weeks ago.

This is not an animation, but a video taken by an astronaut looking out a window.

You can get a little sense of the scale of the two satellites.

It's like launching the smallest satellite ever from the largest ever satellite.

And finally, the solar array catches the sun's rays and shines.

It's really cool, isn't it? wait for it.

boom! yes. It's a money shot.

(Laughter) So instead of just launching two like this, we launched 28.

This is the largest constellation of Earth-imaging satellites in human history and will provide a completely radical new set of data about our changing planet.

But that's just the beginning.

As you know, we plan to launch more than 100 such satellites within the next year.

It will be the largest constellation of satellites in human history.

And this is what I'm trying to do. It operates in a single orbital plane fixed relative to the Sun, with the Earth rotating beneath it.

They are all downward facing cameras that slowly scan the Earth as it rotates beneath it.

Since the earth rotates every 24 hours, we scan every point on the earth every 24 hours.

It is a line scanner for the earth.

We don't take pictures of anywhere on earth every day, we take pictures of everywhere on earth every day.

We launched these just a few weeks ago, but we've already gotten some early images from the satellites, and we're going to release them for the first time now.

This is the first photo taken by our satellite.

When we turned on our cameras, it happened to be over the campus of the University of California, Davis, in California.

But even more impressive is when compared to the previous most recent image of the area, taken many months ago.

The image on the left is from a satellite and you can see the building being constructed.

The general point is that you will be able to track the urban growth happening every day in every city in the world.

So does water.

thank you.

(Applause.) We will be able to see the extent of all water bodies around the world every day, and we will be able to contribute to water security.

From water security to food security.

Every day we see crops growing in the fields of every farmer on the planet.

and help improve crop yields.

This is a beautiful image taken just hours ago when the satellite was flying over Argentina.

The general point is that there are probably hundreds and thousands of applications for this data. I've mentioned a few, but there are other applications, such as deforestation and ice sheet melting.

We can track all these, every tree on earth every day.

Check the difference between today's image and yesterday's image to see more of the world's news, floods, fires and earthquakes.

Therefore, we have decided that the best thing we can do with our data is to ensure universal access to it.

We want to make sure that everyone can see it.

thank you. (Applause.) We want to be able to answer questions that NGOs, businesses, scientists, and journalists have about the planet.

We want the developer community to be able to run apps on our data.

In short, we want to democratize access to information about the planet.

So back to this topic.

As you can see, this is an entirely new set of global data.

And we believe that together we can contribute to the care of Spaceship Earth.

And the question I would like to leave you with is: If you had access to images of the entire planet every day, what would you do with that data?

What problem would you solve?

What kind of exploration would you do?

Please come explore with us.

thank you very much.

(applause)

The coldest material in the world is not in Antarctica.

They are not on top of Everest or buried in glaciers.

They are in the physics lab. The gas cloud is kept just a fraction of a degree above absolute zero.

That's 395 million times lower than a refrigerator, 100 million times lower than liquid nitrogen, and 4 million times lower than outer space.

Temperatures this low allow scientists to learn about the inner workings of matter, and engineers to build highly sensitive instruments that can learn more about everything from precise locations on Earth to what's happening in the farthest reaches of space.

How are such extreme temperatures produced?

That is, by slowing down the moving particles.

When you're talking about temperature, what you're really talking about is movement.

The atoms that make up solids, liquids, and gases are in constant motion.

When the atoms are moving faster, we perceive the matter as hot.

When they move slowly, we perceive it as cold.

In our daily life, we place hot objects and gases in a cooler environment, such as a refrigerator, to cool them.

Some of the atomic motion of a hot object is transferred to its surroundings and cooled.

However, there are limits to this. Even outer space is too warm to create ultra-cold temperatures.

So scientists have instead come up with a way to directly slow down the atoms using a laser beam.

In most situations, the energy of the laser beam heats the object.

However, when used in a very precise manner, the momentum of the beam can stall moving atoms and cool them.

That's what happens in a device called a magneto-optical trap.

Atoms are injected into the vacuum chamber and a magnetic field pulls the atoms towards the center.

A laser beam directed at the center of the chamber is tuned to just the right frequency for atoms moving toward it to absorb and slow down the photons of the laser beam.

The slowing effect is caused by the transfer of momentum between atoms and photons.

A total of six beams are arranged vertically to ensure that atoms moving in all directions are blocked.

At the center where the beam intersects, the atoms move slowly, as if trapped in a thick liquid. The researchers who invented it described the effect as "optical molasses." Such a magneto-optic trap can cool atoms to just a few microkelvins, or about -273 degrees Celsius.

The technology was developed in the 1980s and the scientists who contributed to it were awarded the Nobel Prize in Physics in 1997 for this discovery.

Since then, laser cooling has been improved to reach even lower temperatures.

But why would you want to cool the atoms so much?

First of all, cold atoms make very good detectors.

It has very little energy and is very sensitive to environmental fluctuations.

Therefore, it is used in devices to discover underground oil and mineral deposits, and it is also used to manufacture high-precision atomic clocks such as those used in global positioning satellites.

Second, cold atoms hold great potential for exploring the frontiers of physics.

Its extremely high sensitivity makes it a candidate to be used to detect gravitational waves in future space-based detectors.

It is also useful in the study of atomic and subatomic phenomena, where it is necessary to measure incredibly small variations in atomic energies.

At room temperature, where atoms fly around at speeds of hundreds of meters per second, they are drowned out.

Laser cooling slows the atoms down to just a few centimeters per second, enough to reveal the motion caused by atomic quantum effects.

Ultracold atoms are already enabling scientists to study phenomena like Bose-Einstein condensation. In Bose-Einstein condensation, atoms are cooled to near absolute zero into a rare new state of matter.

Therefore, as researchers continue their quest to understand the laws of physics and unravel the mysteries of the universe, they will do so with the help of the coldest atoms in the universe.

So a few years ago, when I was about to board a flight at JFK airport, I was approached by two women. They don't feel offended when people call them small, tough-looking Italian-American old ladies.

A tall kid like this one marched up to me and said, 'Honey, I have a question for you.

Does it have something to do with the "eat, pray, love" thing that's going on these days? ”

And I said, "Yes, I did."

And she slapped her friend and said, "Look, I told you, I told you, she's that girl."

It is that girl who wrote that book based on that movie. ”

(Laughter) That's me.

And believe me, I am so grateful to be that person. Because that "eat, pray, love" was my big break.

But it also put me in a very difficult position as a writer about how on earth am I going to write a book that will please anyone again. Because I knew in advance that the people who worshiped Eat, Pray, Love would be incredibly disappointed in what I wrote next, because it wasn't Eat, Pray, Love, and those who hated Eat, Pray, Love would be incredibly disappointed in what I wrote next. Because it proves that I was still alive.

So I knew there was no way I could win, and for a while I seriously considered quitting the game and moving to the countryside to raise corgis, knowing there was no way I could win.

But if I had done that, if I had given up writing, I would have lost my beloved vocation. So, regardless of the inevitable negative consequences, I knew the challenge would be to find a way to somehow find the inspiration to write my next book.

In other words, I needed to find a way to ensure my creativity lived up to its own success.

And finally I found that inspiration, but in the most unlikely and unexpected places.

I found it in a lesson I learned early in life about how to survive when creativity fails.

As a side note, the only thing I ever wanted to be was a writer.

I wrote all through my childhood and adolescence, and by the time I was a teenager, I was sending out really bad stories to The New Yorker hoping they would find out.

After college, I got a job as a waitress in a diner and continued to work, continued to write, and continued to try very hard to get published, but failed.

I have been unsuccessful in publishing for nearly six years.

So, for almost six years, every day, there was only a rejection letter waiting in my mailbox.

And it's been devastating each time, and each time I've had to ask myself should I quit while I'm late or should I just give up and spare myself this pain?

But after that, I decided, like always, 'I'm not quitting, I'm going home.'

And you have to understand that going home for me doesn't mean going back to the family farm.

For me, going home meant getting back to writing. Because writing has been my home. Because I loved writing more than I hated failing to write. I mean, I loved writing more than I loved my ego. So, in the end, I loved writing more than I loved myself.

Then I got over it.

But strangely, 20 years later, during the crazy tune of “Eat, Pray, Love,” I found myself re-identifying with the young diner waitress I once had, unreleased, thinking about her all the time and feeling like I was back to her again.

she was always failing.

I succeeded far beyond my expectations.

We had nothing in common.

Why did I suddenly feel like I was her again?

And it wasn't until I was trying to crack that lead that I finally began to understand the strange and unlikely psychological connection between how we experience great failure and how we experience great success in our lives.

So think of it like this: For most of your life, you live your existence in the middle of a chain of human experiences where everything is normal, secure and regular. But when you fail, you suddenly plunge into the blinding darkness of disappointment.

Success launches you just as suddenly, but from just as far away, into equally dizzying fame and recognition and admiration.

And although one of these destinies is viewed by the world as objectively bad and the other as objectively good by the world, your subconscious mind is utterly incapable of discerning the difference between evil and good.

The only thing it can sense is the absolute value of this emotional equation, the exact distance you are expelled from yourself.

And in both cases there is an equal danger of getting lost in the depths of the mind.

But in both cases, it turns out that self-healing has the same remedy. That means you have to find a way to get home again as quickly and smoothly as possible. If you're wondering what your own home is, here are some tips. A home is something you love more than you love yourself in this world.

It may be creativity, it may be family, it may be invention, adventure, faith, service, it may be corgi breeding, I don't know, but your home is something you can devote your energy to with such extraordinary devotion that the end result becomes irrelevant.

For me, that house has always been a place for writing.

So after the strange, disorienting success of “Eat, Pray, Love,” I realized that what I had to do was exactly what I always had to do when I was similarly disorientated and failing.

I had to get back to work, and that's what I did, and that's how I was able to publish the terrifying sequel to Eat, Pray, and Love in 2010.

And do you know what happened in that book?

A bomb fell, but I was fine.

As a matter of fact, I felt kind of vulnerable. Because I found my way back home to break that spell and devote myself purely to writing.

After that, I stayed in my writing career and wrote another book that was just published last year. The book was very well received. That's great, but that's not what I mean.

I mean, I'm writing another book now, and I'm writing another book after that, and many of them will fail, and some of them may succeed, but as long as you never forget where you live rightfully, you'll always be safe from the storm of random consequences.

Look, I don't know where you rightfully live, but I know there's something in this world that you love more than you love yourself.

By the way, addiction and infatuation don't matter, because what's worth it doesn't matter. Because we all know they are not safe places. right?

The only trick is to identify the best and most valuable thing you love the most, build your house on it, and stick to it.

And if one day you are somehow thrown out of the house by a blunder or a smash, your job is to fight to get back into that house in whatever task Love calls you next, by bowing your head and doing it with diligence and dedication and respect and respect, the only way it has ever been done.

Just repeat it and keep repeating it over and over and I can absolutely guarantee from long personal experience in all directions that everything will work out.

thank you.

(applause)

Imagine trying to describe in words every scene in a movie, every note in your favorite song, or every street in your town.

Now imagine trying to do it using only the digits 1 and 0.

Every time you use the Internet to watch movies, listen to music, or get directions, that's exactly what your device is doing using the language of binary code.

Computers use binaries because they are a reliable way to store data.

For example, a computer's main memory consists of transistors that switch between high or low voltage levels, such as 5 volts and 0 volts.

The voltage can sometimes oscillate, but a value of 1 volt will still read as "low" since there are only two choices.

That reading is done by the computer's processor, which uses the transistor states to control other computer devices according to software instructions.

The beauty of this system is that the particular binary sequence itself has no predefined meaning.

Instead, each type of data is binary encoded according to a different set of rules.

Let's look at the numbers.

In normal decimal notation, multiply each digit by 10 from the 0 on the right to the value in that position.

So 84 in decimal is 4x10⁰ + 8x10¹.

Binary notation works similarly, but each position is based on a power of two.

So 84 is written as: Characters, on the other hand, are interpreted according to standard rules such as UTF-8, where each character is assigned to a specific group of 8-digit binary strings.

In this case 01010100 corresponds to the letter T.

So how do we know if a particular instance of this sequence means T or 84?

Well, you can't tell just by looking at the string. It's the same as hearing the sound "da" alone and not knowing its meaning.

We need context to tell if we're listening to Russian, Spanish, or English.

Also, similar context is needed to determine whether we are looking at binary numbers or binary text.

Binary codes are also used for more complex types of data.

For example, each frame in this video consists of hundreds of thousands of pixels.

In a color image every pixel is represented by three binary sequences corresponding to the primary colors.

Each sequence encodes a number that determines the intensity of that particular color.

A video driver program then sends this information to the millions of LCDs in your screen to create all the different shades you see today.

The sound in this video is also stored in binary using a technique called pulse code modulation.

A continuous sound wave is digitized by taking a "snapshot" of its amplitude every few milliseconds.

These are recorded numerically in the form of binary strings, with as many as 44,000 numbers recorded for each sound.

When the number is read by your computer's audio software, it determines how quickly the speaker's coil vibrates to produce different frequencies of sound.

All of this requires billions of bits.

However, you can reduce that amount by using clever compression formats.

For example, if your image has 30 adjacent green pixels, you can record them as "30 green" instead of coding each pixel individually. This is a process known as run length encoding.

These compression formats themselves are written in binary code.

So are binaries the last resort for computing?

necessarily.

There is also research into ternary computers, in which circuits are in three possible states, and quantum computers, in which circuits can be in multiple states simultaneously.

But so far, nothing offers as much physical stability for data storage and transmission.

So, for now, everything we see, hear, and read through our screens is the result of simple “true” or “false” choices repeated billions of times.

So the first antidepressants were made, among other things, from leftover rocket fuel after World War II.

This is not surprising given that one in five soldiers today suffers from depression, post-traumatic stress disorder, or both.

But soldiers aren't the only ones at high risk for these diseases.

Firefighters, paramedics, cancer patients, aid workers, refugees, and others exposed to trauma and major life stresses.

But despite how common these diseases are, our current treatments only control symptoms, if at all.

When Edward Jenner discovered the first vaccine in 1798 (which happened to be for smallpox), he not only found a way to prevent disease, but a whole new way of thinking that drugs could prevent disease.

For more than 200 years, however, it was not thought that this preventive measure would extend to mental illness.

Until 2014, when a colleague and I stumbled across the first drug that could prevent depression and PTSD.

We discovered this drug in mice and are currently investigating whether it is also effective in humans.

And these preventive psychotropic drugs are not antidepressants.

These are a whole new class of drugs.

And since they work to increase stress resistance, let's call them resilience enhancers.

So think back to the stressful times you recovered from afterwards.

You may have missed a goodbye, an exam, or a flight.

Stress resilience is an active biological process that allows us to bounce back after stress.

It's like when you catch a cold and your immune system fights it off.

Also, inadequate resilience in the face of significant stressors can lead to mental illnesses such as depression.

In fact, most cases of major depressive disorder are initially triggered by stress.

And from previous observations in mice, resilience enhancers can protect against purely biological stressors, such as stress hormones, as well as social and psychological stressors, such as bullying and isolation.

Here we show mice given high levels of stress hormones for 3 weeks.

In other words, it is a biological stressor with no psychological component.

And this leads to depressive behavior.

Also, 3 weeks of prior antidepressant treatment has no beneficial effect.

However, one dose of resilience enhancer one week before completely prevented depressive behavior.

Even after 3 weeks of stress.

This is the first time that a drug has been shown to counteract the negative effects of stress.

Depression and PTSD are chronic, often lifelong clinical diseases.

It also increases the risk of substance abuse, homelessness, heart disease, Alzheimer's disease, and suicide.

The global cost of depression alone exceeds $3 trillion annually.

But now imagine a scenario where you predictably know that someone is at high risk of exposure to extreme stress.

For example, a Red Cross volunteer enters an earthquake zone.

In addition to the typhoid vaccine, you could also give her a pill or injection of a resilience booster before she leaves.

So even if she were held at gunpoint by looters and others, she would at least be protected from developing depression and PTSD after the fact.

You can't prevent her from experiencing stress, but you can recover from it.

And that is the revolution here.

Improving her resilience could dramatically reduce her susceptibility to depression and PTSD, possibly saving her from losing her job, home, family and even life.

After Jenner's discovery of the smallpox vaccine, many other vaccines quickly followed.

However, it took more than 150 years for a tuberculosis vaccine to become widely available.

why?

For one thing, society believed that tuberculosis made people more sensitive, creative, and more empathetic.

And that it was caused by constitution, not biology.

And the same is still said about depression.

And just as Jenner's discovery opened the door to all vaccines that followed, the drugs we discover open possibilities in a whole new field of preventive psychopharmacology.

But whether it's 15 or 150 years away depends not just on science, but on how we treat it as a society.

thank you.

(applause)

Computers are a very powerful vehicle for creative expression, but for the most part that expression is confined to the screens of laptops and mobile phones.

And I want to talk about bringing this ability of computers to move things and interact with us, away from the screen and into the physical world we live in.

A few years ago, I got a call from a high-end fashion store called Barneys New York and I found myself designing a dynamic sculpture for a storefront window display.

This is called "The Chase".

With two pairs of shoes, one for men and one for women, they play a slow, tense chase around the window. The man surges behind the woman and enters the woman's personal space, after which she leaves.

Each shoe contains a magnet, and there are magnets under the table that move the shoes.

My friend Andy Cavatorta was building a robotic harp for Björk's Biophilia tour, so I ended up building the electronics and motion control software to move the harp and play music.

The harp has four independent pendulums, each with 11 strings, so the harp swings and spins around its axis to play different notes. All the harps are networked so they can play the right notes at the right time in the music.

I built an interactive chemistry exhibit at Chicago's Museum of Science and Industry. The exhibit allows people to use physical objects to retrieve chemical elements from the periodic table and bring them together to cause chemical reactions.

And the museum realized that people were spending a lot of time on the exhibit, so researchers from the Australian Center for Science Education decided to study the exhibit and try to figure out what was going on.

And she found that the physical objects people were using helped people understand how to use the exhibits and helped people learn socially.

When you think about it, it makes a lot of sense that having specialized physics objects would make the interface easier to use.

In other words, our hands and minds are optimized for thinking about and interacting with tangible objects.

Think about whether it's easier to use a physical keyboard or an on-screen keyboard like your phone.

But what strikes me about all these different projects is that they actually have to be built from scratch, down to the electronics and printed circuit board level and all the mechanics down to the software.

I wanted to create something that could move objects under computer control and create interactions based on those ideas without going through the process of building something from scratch each time.

So my first attempt was a joint research with Professor Hiroshi Ishii at the MIT Media Lab. We were able to build an array of 512 different electromagnets and combine them to move objects on a surface.

The problem was that these magnets cost over $10,000.

Each one was very small, but together they were so heavy that the table on which they were placed began to sag.

So I wanted to build something that would allow this kind of interaction on any tabletop.

So, to explore this idea, I built an army of small robots. Each of these robots has a so-called omniwheel.

These are special wheels that can move in all directions with equal ease, and when these robots are paired with a video projector, you get a physical tool for manipulating digital information.

Here's an example of what I mean.

This is a video editing application where all the controls for manipulating videos are physical.

So if you want to tweak the colors, just enter color mode and you'll see three different dials for tweaking the colors. Also, if you want to adjust the audio, you'll see two different dials for these physics objects.

So here the left and right channels stay in sync, but if you want you can override that by getting both at the same time.

The idea is that you get the speed and efficiency benefits of using these physical dials along with the flexibility and versatility of a software-designed system.

And this is a map application for disaster response.

So we have these physical objects that represent police, fire, and rescue, and a dispatcher can take them and put them on a map to tell those units where to go. That way, the positions of your units on the map will be synchronized with their positions in the real world.

This is a video chat application.

It's amazing how just a few simple movements of a physical object can convey so many emotions.

This interface opens up enormous possibilities between traditional board games and arcade games, and the possibilities for physical interaction allow for so many different styles of play.

But one of the areas I'm most excited about using this platform is applying it to problems that are difficult for computers and humans to solve alone.

One such example is protein folding.

Here, the protein has an interface with physical handles, and you can grab those handles to move the protein around and fold it in different ways.

And when we move it in ways that don't really make sense in the underlying molecular simulation, we get physical feedback and we can actually feel these physical handles pulling against us.

So feeling what's going on inside a molecular simulation is a whole different level of interaction.

Therefore, we are just beginning to explore what is possible when using software to control the movement of objects in the environment.

Maybe this is the computer of the future.

No touch screen.

No visible technology at all.

But when you want to video chat, play a game, or lay out slides for your next TED Talk, the objects on the table come to life.

thank you.

(applause)

"why?"

"Why?" is a question my parents always ask me.

"Why did my child have autism?"

As pediatricians, geneticists, and researchers, we seek to address that question.

But autism is not a single condition.

This is actually a range of disabilities, ranging from a non-verbal 13-year-old Justin, for example, who uses an iPad to touch photos to communicate his thoughts and concerns by tapping into them, but when upset enough he begins to shake his body, eventually hitting his head when he's upset enough, to the point where he bangs his head so hard that he actually needs stitches to make an incision.

But the same diagnosis of autism applies to another 13-year-old boy, Gabriel, who has an entirely different set of challenges.

Actually he is very talented in mathematics.

He can easily multiply 3 numbers by 3 in his head, but has great difficulty trying to converse.

he doesn't make eye contact

He finds it difficult to initiate conversations, feels awkward, and actually shuts up when he's nervous.

However, both boys have the same diagnosis of autism spectrum disorder.

One of our concerns is whether autism is truly epidemic.

These days, 1 in 88 children will be diagnosed with autism, so the question is, why does this graph look like this?

Has that number increased dramatically over time?

Or is it because we are now starting to label individuals with autism? Did they simply make a diagnosis because they were still there before and didn't have that label?

And indeed, in the late 1980s and early 1990s, laws were passed that actually provided resources for people with autism and gave them access to educational materials to help them.

That growing awareness has led more parents, more pediatricians, and more educators to recognize the hallmarks of autism.

As a result, more people are getting diagnosed and getting access to the resources they need.

Moreover, we have changed the definition over time, so we are actually expanding the definition of autism, which explains part of the increase in prevalence.

The next question everyone asks is what caused autism?

And a common misconception is that vaccines cause autism.

But let me be clear, vaccines don't cause autism.

(Applause.) In fact, the original research study that suggested such facts was completely fraudulent.

In fact, the article was retracted from the journal in which it was published, The Lancet, and the author, a medical doctor, was stripped of his medical license.

(Applause.) The Institute of Medicine, the Centers for Disease Control have repeatedly investigated this, but there is no reliable evidence that vaccines cause autism.

Additionally, one of the ingredients in the vaccine, called thimerosal, was thought to be the cause of autism.

It was actually removed from the vaccine in 1992, but turns out it had virtually no impact on the autism epidemic.

Again, no evidence that this is the answer.

So the question remains: what causes autism?

Actually, there is probably no single answer.

Just as autism is a spectrum, there are etiologies, spectrums, and causes.

Based on epidemiological data, we know that one of the causes, or perhaps one of the links, is paternal aging, ie, the increasing age of the father at conception.

In addition, the mother's pregnancy is also a vulnerable and critical period of development.

During this period of fetal brain development, exposure to certain substances has been shown to actually increase the risk of autism.

In particular, a drug called valproic acid, sometimes taken by mothers with epilepsy, has been shown to increase the risk of autism.

In addition, there may also be infectious agents that can cause autism.

One of the things I spend a lot of time trying to focus on is the genes that can cause autism.

My focus is not because genes are the only cause of autism. Genes are the cause of autism because we can easily define it, we have a better understanding of biology, a better understanding of how the brain works, so we can develop strategies to intervene.

However, one genetic factor that we don't understand is the difference we see in terms of males and females.

Men are 4 to 1 more affected than women with autism, and it's completely unknown what causes it.

One way to understand that genetics is a factor is to look at something called concordance.

In other words, if one sibling has autism, what is the probability that another sibling in the family has autism?

And three types of siblings in particular can be noted. Identical twins, twins who actually share 100 percent of their genetic information and share the same intrauterine environment, dizygotic twins, twins who actually share 50 percent of their genetic information, versus normal siblings, brothers and sisters, and sisters who also share 50 percent of their genetic information but do not share the same intrauterine environment.

Looking at these concordance rates, we can see that the concordance rate for identical twins is 77%.

But surprisingly, it's not 100 percent.

Not all autism risk is genetic, but if we look at dizygotic twins, the concordance rate is only 31 percent, so genetics make up a lot of the risk.

On the one hand, there are differences between these dizygotic twins and siblings, suggesting that there are common exposures in dizygotic twins that may not be as common among siblings alone.

This provides some of the data that autism is genetic.

So, what are the genetics?

Genetics actually play a much bigger role in autism than in other diseases, compared to other diseases we are familiar with, such as cancer, heart disease, and diabetes.

However, this alone does not tell us what the gene is.

For any given child, we don't even know if it's one gene or a combination of genes.

And in fact, for some people with autism, it's genetic.

In other words, it is a single, strong, deterministic gene that causes autism.

But in others it's genetic. So, in fact, genetic combinations are involved in some of the developmental processes that ultimately determine autism risk.

For a single person, you don't necessarily know which of the two answers it is until you start digging deeper.

So the question becomes, how do we identify exactly what those genes are?

And let me raise something that may not be intuitive.

Certain individuals may have autism for genetic reasons, not because autism has taken root in their family.

The reason for this is that certain individuals may actually have genetic changes or mutations that are not inherited from their mother or father but actually start anew, mutations that are present in the egg or sperm at conception but are not passed down from generation to generation within the family.

And we can now actually use that strategy to understand and identify the autism-causing genes in those individuals.

In fact, the Simons Foundation recruited 2,600 children with no family history of autism and their mothers and fathers to try to understand what genes caused autism in those cases.

To do that, we really needed to be able to comprehensively look at all the genetic information to determine what the differences were between mothers, fathers, and children.

Sorry, I'm going to use the outdated metaphor of an encyclopedia instead of Wikipedia, but I do so to emphasize the need to be able to reference the sheer amount of information when doing this inventory.

Our genetic information was organized into a set of 46 volumes, and we needed to be able to explain each of the 46 volumes. Because in the case of autism, one volume may actually be missing.

But we had to start opening those books because we needed more details than that, but in some cases the genetic changes were more subtle.

It may have been a single missing paragraph, but even more subtle than that, a single letter — one letter out of three billion — could have been changed, and yet had a significant impact in terms of its impact on brain function and behavior.

By doing this within these families, we were able to determine that there is a single, strong genetic factor that causes autism within those families, accounting for approximately 25 percent of the individuals.

On the other hand, 75% are still unsolved.

But when I did this, I realized that there is more than just one autism gene, so I was really, really, very, very humbling.

In fact, current estimates put between 200 and 400 genes that can cause autism.

And that, in part, explains why its effects are so widespread.

With all that genes, there's a way to get rid of the madness.

It's not just random 200, 400 different genes, they actually fit.

They fit together in the aisle.

They are now fitting into networks that make sense in terms of how the brain works.

We are beginning to take a bottom-up approach to identify these genes, proteins and molecules, understand how they interact to make neurons function, understand how those neurons interact to make circuits work, understand how those circuits work to control behavior, and make sense of it in both autistic and cognitively normal individuals.

But for us, early diagnosis is key.

Within the framework in which we have the capacity to transform, it is important to be able to make a diagnosis of susceptible people at once, which can affect their growing and developing brain.

So people like Ami Kling have developed a method that can take infants and small babies and use biomarkers (in this case, eye contact and eye tracking) to identify at-risk infants.

You can see that this toddler makes very good eye contact with this woman singing "Itsy, Bitsy Spider," but doesn't actually develop autism.

This baby we know will be revealed.

Meanwhile, this other baby will develop autism.

In this case, as you can see, the eye contact is not very good.

Instead of focusing your eyes and having a social connection, you look at your mouth, you look at your nose, you look away in another direction, but again you don't have a social connection, and you can do this at a very large scale, and you can screen infants, screen children for autism, through something that is very robust and very reliable. This is very helpful for us in that we can intervene at an early stage where we can have the greatest impact.

How do we intervene?

It will likely be a combination of factors.

In part, some people try to use drugs.

And indeed, identifying the gene for autism is critical to identifying drug targets, identifying what might be able to influence it, and being confident that that is what is really needed for autism.

But it's not the only answer.

We plan to utilize not only drugs, but also educational strategies.

Some people with autism have a slightly different wiring.

they learn differently.

They absorb their environment differently, so we need to be able to educate them in the way that works best for them.

Plus, there are a lot of people in this room who have great ideas for new technologies that we can use. There's everything from devices you can use to train your brain to be more efficient or to compensate for slightly problematic areas, to things like Google Glass.

For example, imagine Gabriel, the socially clumsy person, could put earbuds in his ears, put on Google Glass, get help from his coach, come up with conversations and conversation starters, and maybe one day ask a girl out on a date.

All of these new technologies offer great opportunities to make an impact on people with autism, but they still have a long way to go.

As much as we know, there is much more we don't know. So I ask you all to help us think of ways to make this better and, as a community, to use our collective wisdom to make a difference. Especially for people in families with autism, I encourage you to join the Interactive Autism Network and become part of the solution to this problem. Because it really takes a lot of time to figure out what's important and what makes a meaningful change.

When you think about what a potential solution might be, how well does it work?

Will it really make a difference in your life as an individual with autism or as a family?

We need people of all ages, young and old, and people with autism spectrum disorders of all shapes and sizes to make an impact.

Therefore, I encourage all of you to join this mission and help make the lives of people with autism better and more fulfilling.

thank you.

(applause)

The Olympic motto is "Faster, Higher, Stronger".

Faster, higher, stronger.

And athletes have rapidly realized that motto.

The 2012 Olympic marathon winner ran in 2 hours and 8 minutes.

If he had raced the 1904 Olympic marathon winner, he would have won by nearly an hour and a half.

Now we all feel like we're all progressing as humans somehow, progressing inexorably, but it's not like we evolved into a new species in the space of a century.

So what is going on here?

Let's take a look at the real behind the progress of this sport.

In 1936 Jesse Owens held the world record for the 100 meters.

If Jesse Owens was in last year's World Championships 100 meters and Jamaican sprinter Usain Bolt finished, Owens would still have 14 feet to go.

That's a lot in the world of sprinters.

To give you a sense of what it's all about, here's a demonstration devised by sports scientist Ross Tucker.

Now imagine what the stadium looked like at last year's World Athletics Championships. Thousands of fans are waiting with bated breath for the fastest man ever, Usain Bolt. A flash lights up as the nine fastest men in the world wrap around the block.

And pretend Jesse Owens is in that race.

Now close your eyes for a moment and imagine what the race looks like.

Bang! gun fires.

The American sprinter jumped out to the front.

Usain Bolt begins to catch him.

As Usain Bolt passes him and the runners approach the finish line, a beep is heard as each runner crosses the line.

(beep) This is the end of the race.

It's okay to open your eyes now.

The first beep was Usain Bolt.

The final beep was Jesse Owens.

Listen again.

(beep) When you think about it, it's not that big of a difference, right?

And think Usain Bolt started by jumping off a block on a carpet specially made for humans to move as fast as possible.

Jesse Owens, on the other hand, ran over cinders, the ash from burning wood, and its soft surface drained far more energy from his legs as he ran.

Jesse Owens had a gardening trowel instead of a block and started digging a hole in the cinders with it.

A biomechanical analysis of Owens' joint velocities showed that had he been on the same track as Bolt, he would have been within a step, not 14 feet behind.

Owens should have been the second beep, not the last beep.

Listen again.

(beep) That's the difference that track surface technology has made, and it's done throughout the running world.

Consider longer events.

In 1954, Sir Roger Bannister became the first man to run a mile in less than four minutes.

College students these days do it every year.

Sometimes high school students do it.

At the end of last year, 1,314 athletes ran the mile in under four minutes, but like Jesse Owens, Sir Roger Bannister also ran on soft stone, taking far more energy from his legs than today's synthetic tracks.

So I consulted biomechanics experts to find out how much slower it was on a cinder than a synthetic truck, and their consensus was 1.5 percent slower.

So if we apply a 1.5 percent deceleration conversion to all athletes who run less than 4 miles on a synthetic track, the following will happen:

Only 530 remain.

From that perspective, there are less than 10 new additions to the sub-four mile club [per year] since Sir Roger Bannister.

530 is now a lot more than 1, partly because there are more people in training now and they are training smarter.

Even a college student is professional in his training compared to Sir Roger Bannister, who skipped a lecture on gynecology in medical school and trained for 45 minutes at a time.

And that guy who won the 1904 Olympic marathon by 3 seconds in under 30 minutes was drinking rodenticide and brandy while running the course.

That was his idea for performance-enhancing drugs.

(Laughter) Obviously, athletes are also more savvy about performance-enhancing drugs, and that has changed some sports, but technology has changed all sports, from faster skis to lighter shoes.

Let's take a look at the 100m freestyle record.

The record is always on a downward trend, but it's punctuated by this steep cliff.

This first cliff introduced a flip turn in 1956.

Instead of stopping and turning, athletes could do somersaults in the water and immediately start moving in the opposite direction.

This second cliff introduced gutters on the sides of the pool to keep the water from becoming turbulent and interfering with the swimmers' race.

The final cliffhanger is the emergence of full-body low-friction swimsuits.

Across sports, technology has changed the face of performance.

In 1972, Eddie Merckx set the record for the longest bike ride in one hour with 30 miles (3,774 feet).

Now, with better bikes and better aerodynamics, that record has improved even further, and in 1996 it was set at 35 miles (1,531 feet), nearly five miles longer than Eddy Merckx rode in 1972.

But in 2000, the International Cycling Federation decreed that anyone wishing to keep the record must use essentially the same equipment that Eddy Merckx used in 1972.

Where are today's records?

Thirty miles, 4,657 feet, or 883 feet total, was further than Eddy Merckx cycled over 40 years ago.

Basically, this record improvement is all due to technology.

Still, technology isn't the only thing propelling athletes forward.

Sure, we haven't evolved into a new species in a century, but the gene pool within competitive sports has definitely changed.

In the first half of the 20th century, physical education instructors and coaches held the idea that average height and moderate weight were optimal for all athletic activities, regardless of sport.

And it appeared in the athlete's body as well.

In the 1920s, the average elite high jumper and the average elite shot put athlete were exactly the same size.

But as that idea began to fade, athletes' bodies became more different from each other as sports scientists and coaches realized that they needed highly specialized bodies suited to specific athletic disciplines rather than average body types, and some kind of artificial selection took place, self-sorting bodies that fit specific sports.

Now, instead of being the same size as the average elite high jumper, the average elite shot putter is 2.5 inches taller and weighs 130 pounds heavier.

And this happened throughout the sports world.

In fact, plotting one data point for each of the 24 sports in the first half of the 20th century on a height vs. mass graph looks like this:

Although there is some variation, they are grouped around the average body type.

Then that idea began to fade away, and at the same time digital technology (first radio, then television, and then the Internet) gave millions, possibly billions, the tickets to enjoy elite sports performances.

With financial incentives and fame and glory, elite athletes have grown exponentially and performance has slanted toward the very top.

It has accelerated the artificial selection of specialized organizations.

And if we plot the data points for the same 24 sports today, we get:

Athletes' bodies have become far different from each other.

And because the diagram resembles a diagram showing an expanding universe with galaxies flying away from each other, the scientists who discovered it have dubbed it the "big bang of body shape."

In height-critical sports like basketball, taller players have grown taller.

In 1983, the National Basketball Association signed a groundbreaking agreement that made players partners of the league and a share of ticket revenues and television contracts.

Suddenly, anyone who could be an NBA player wanted to be, and teams began searching the world for bodies that could help them win championships.

Almost overnight, the percentage of NBA men taller than 7 feet has doubled to 10 percent.

Today, 1 in 10 men in the NBA is over 7 feet tall, but 7 foot tall men are incredibly rare in the general population. So rare that if you know an American man between the ages of 20 and 40 who is over 7 feet tall, there's a 17% chance he's in the NBA right now.

(Laughter) So, find six honest 7-footers. One of them is now in the NBA.

That's not the only thing that makes an NBA player's body unique.

This is Leonardo da Vinci's "Vitruvian Man", an ideal proportion in which the outstretched arms are the same length as the height.

The length of my spread arms is exactly the same as my height.

You are probably close to that too.

But not your average NBA player.

The average NBA player is under 6 feet 7 inches tall and has 7 feet arm length.

NBA players aren't just ridiculously tall, they're ridiculously long.

If Leonardo wanted to draw a Vitruvian NBA player, he would have wanted rectangles and ovals, not circles and squares.

So in sports where bigness is important, big athletes got even bigger.

Conversely, in sports where smaller people have an advantage, smaller players have become even smaller.

The average elite female gymnast has shrunk from an average of 5'3" to 4'9" over the past 30 years, and even more so in terms of power-to-weight ratio and aerial rotation.

And while the big things got bigger and the little things got smaller, the weird things got weirder.

The length of the forearms of water polo players is longer than the length of the entire arm on average, which is more advantageous for throwing the whip powerfully.

And the big things got bigger, the little things got smaller, and the weird things got weirder.

The ideal body shape for swimming is a long torso and short legs.

It's like the long hull of a canoe for going fast on water.

And vice versa for running.

It should have long legs and a short torso.

And it shows in the bodies of today's athletes.

Here we see Michael Phelps, the greatest swimmer in history, standing next to mile world record holder Hisham El Guerrouj.

These guys are 7 inches taller, but wear the same length pants because of their sporty physique.

Despite the seven inch height difference, these guys have the same leg length.

Now, in some cases, the search for bodies that can enhance athletic performance has introduced previously non-competing people into the world's competitive population, such as long-distance runners in Kenya.

We think Kenyans are great marathoners.

Kenyans consider the Karenjin to be great marathon runners.

Karenjin make up just 12% of Kenya's population but make up the majority of elite runners.

And they, on average, have certain unique physiology. It has very long legs and very thin ends. This is because their ancestors are located in very low latitudes with very hot and dry climates, to which an evolutionary adaptation is to have very long limbs and very thin ends for cooling purposes.

For the same reason that a radiator coil is long, it has more surface area to dissipate heat than volume. Also, the legs are like a pendulum, so the longer and thinner the tip, the more energy efficient it is to swing.

To put Karengen's running success into perspective, consider that 17 American men in history have run faster than 2:10 in a marathon.

That's a pace of 4 minutes and 58 seconds per mile.

32 Karenjin men did it last October.

(Laughter) That's coming from a population that's about the size of metro Atlanta.

Yet even changes in technology and changes in the gene pool in sports cannot explain all of the changes in performance.

Athletes think differently than they used to.

Have you ever seen someone electrocuted in a movie and thrown across the room?

No explosions there.

What happens when that happens is that an electrical impulse causes all of your muscle fibers to twitch at once, throwing your body across the room.

They are basically jumping.

It is the power that the human body possesses.

But usually you can't access most of them.

Our brain acts as a limiter, preventing us from accessing all of our physical resources because we can hurt ourselves or tear tendons and ligaments.

But the more you know how that limiter works, the more you know how to push it back a little bit, possibly by convincing your brain that pushing harder won't put your body in mortal danger.

Endurance and ultra-endurance sports are good examples.

Where once super endurance was thought to be detrimental to human health, we now realize that it possesses all the optimal properties for super endurance. Smaller waist and longer legs compared to our frames. Large joint surface area to absorb impact.

Our feet have spring-like arches and short fingers that are better suited to pushing tree branches than grasping them, allowing us to rotate our torso and shoulders this way while keeping our heads straight when we run.

Our primate cousins ​​cannot do that.

They have to run like this.

And we have those big old butt muscles that keep us upright while running.

Have you ever seen a monkey's butt?

No buns because it doesn't run upright.

And athletes realized that we were perfect for ultra-endurance racing, with athletes like Spanish endurance racer Kylian Journette attempting previously unthinkable feats.

This is Killian running up the Matterhorn.

(Laughter) Wrap the sweatshirt around your waist.

The slope is so steep that he can't even run here.

he is pulling the rope

This is over 8,000 feet of vertical ascent, and Killian climbed and descended in less than three hours.

wonderful.

Killian is gifted, but not physiologically deranged.

Now that he has achieved this, just as other athletes followed after Sir Roger Bannister ran the mile in under four minutes, so will others.

Change in technology, change in genes, change in mindset.

Innovations in sport, such as new surfaces and new swimming techniques, the democratization of sport, its reach to new bodies and new people around the world, and the imagination in sport, an understanding of the true capabilities of the human body, have conspired to make athletes stronger, faster, bolder and better than ever before.

thank you very much.

(applause)

There are 39 million visually impaired people in the world.

Eighty percent of them live in low-income countries such as Kenya, and the absolute majority need not be blind.

They become blind from diseases that can be completely treated or prevented.

Knowing this, we immigrated to Kenya with our young family.

We secured the equipment, the money, the vehicles, trained the team, established 100 clinics across the Great Rift Valley, and tried to understand the one question: why people go blind, and what can we do?

The challenge was great.

Once we reached our destination, we set up our high-tech equipment.

Electricity was barely available.

The equipment must run on a gasoline generator.

Then something came to my mind. There has to be an easier way. This is because the people who need access to eye care the most are the patients least likely to receive it.

In Kenya and sub-Saharan Africa, more people have mobile phones than have clean running water.

So we wondered if we could harness the power of mobile technology to provide eye care in new ways.

That's why we developed the smartphone [system] Peek, which enables local healthcare workers to provide eye care anywhere.

We set out to replace bulky, expensive, and fragile traditional hospital equipment with a smartphone app and hardware that can test anyone in any language and of any age.

Here's a demonstration of a 3-month-old child using an app and an eye tracker to accurately test their vision.

We conduct many clinical trials in communities and schools, and through the lessons learned in the field, we have realized that sharing data in non-medical terms is very important to help people understand what we are testing and what it means to them.

For example, here we use a visual acuity simulation application to show caregivers and teachers what the visual world looks like to them so they can empathize and help.

After discovering that someone is partially sighted, the next big challenge is figuring out why. To do that, you need access to the inside of the eye.

Traditionally, expensive equipment was required to examine an area called the retina.

The retina is the only part of the eye that holds an enormous amount of information about the body and its health.

We have developed low-cost hardware for 3D printing that can be manufactured for less than $5. Clip this to your smartphone and you'll be able to get a very high quality behind-the-eye view.

And the great thing is that anyone can do it.

A test with over 25,000 people found that smartphones with add-on clips rivaled much more expensive and much more difficult to carry cameras.

When we first moved to Kenya, we brought $150,000 in equipment and a team of 15 people, and that's what we needed to provide medical care.

All you need now is one person on a bike with a smartphone.

And it's only $500.

The power supply problem is solved by using solar power.

Our healthcare workers travel with solar-powered rucksacks that keep their phones charged and backed up.

Now I go to patients instead of waiting for them to come.

We visit patients in their homes and perform the most comprehensive, high-tech and accurate tests anyone with minimal training can perform.

We can connect experts around the world with people in the most rural and hard-to-reach places beyond the end of the road, effectively placing them in their homes to make diagnoses and plan treatment.

Project managers and hospital directors can search the interface using parameters of interest.

Here in Nakuru where I live, you can find people under any conditions.

Here are people blinded by curable cataracts.

Each red pin depicts a person blinded by a curable and treatable disease and can be located.

You can use the bulk text messaging service to explain that you are here to arrange treatment.

Moreover, it turns out that this wasn't built just for the community, it was built with the community.

The falling blue pins represent elders and community leaders, connecting them with those who can find them and arrange for treatment.

So, for a patient like Mama Wangari who has been blind for over 10 years and has never seen her grandchildren, her vision can be restored for less than $40.

This is what has to happen.

Millions of people are blind only statistically.

In reality, everyone blinds themselves.

But now they are just text messages and you may not get help.

(Applause.) And live demos are always a bad idea, so let's try a live demo.

(Laughter) Here's the Peek Vision app.

Now, what we're looking at here is Sam's optic nerve, a direct extension of her brain, so when we're looking there, I'm actually looking at her brain.

We can see all parts of the retina.

This will allow us to detect eye and physical ailments that would otherwise be impossible without eye access, and the clip-on device could be manufactured for just a few dollars and cure blindness. I think it says a lot about us as human beings that we have developed a cure and haven't provided it.

But now it is possible.

thank you.

(applause)

We live in a very complex environment. Complexity and dynamism, and patterns of evidence from satellite images and videos.

You can see it outside the window.

It's endlessly complex, yet somehow familiar, and the pattern repeats, but never exactly.

Understanding that is a big challenge.

The patterns we see exist at different scales, but we can't just break it down a little bit and say, "Well, let's create a smaller climate."

You can't use the usual deliverables of reductionism to get the little things you can study in the lab and say, "Oh, I get it."

It is either whole or nothing.

The different scales that drive this kind of pattern span a vast range, from the tiny particles that seed clouds to the size of the planet itself, from 10 to minus 6 orders of magnitude, from 10 to 8 orders of magnitude, to roughly 14 orders of magnitude.

Over time, it again increases by about 14 orders of magnitude, from milliseconds to thousands of years.

what do you mean?

Now, if we think about how we can calculate these things, we can take what we see as it is. got it. Chop it into many small boxes. It's a result of physics, right?

And if you think about weather models, it spans about five orders of magnitude from Earth to several kilometers, and timescales range from minutes to 10 days and even a month.

We are interested in more than that.

We are interested in climate.

It's years, it's thousands of years, and we have to go on even smaller scales.

For those that cannot be resolved, sub-scale processes, we need to approximate them in some way.

That's a big challenge.

In the 1990s climate models, some were even smaller, in the order of only three orders of magnitude.

The 2010s climate model is like the one we're working on now, with a four-digit scale.

There are 14 remaining, increasing our ability to simulate them by about an order of magnitude every decade.

One extra order of magnitude in space increases the computational complexity by a factor of 10,000.

And we keep adding more things and questions to these different models.

So what does a climate model look like?

This is indeed an old climate model, a punch card, one line of Fortran code.

No more punch cards.

We still use Fortran.

New ideas like C have not made much of an impact on the climate modeling community.

But how do we do that?

How can we translate the complexity we just saw into a line of code?

I will make it carefully one by one.

This is a picture of sea ice taken from a flight over the North Pole.

You can see all the different equations for how ice grows, melts, and changes shape.

Let's look at flux.

You can find out how fast snow turns to ice and code it.

You can encapsulate it in your code.

These models currently have about a million lines of code, but are adding tens of thousands of lines of code each year.

That is, you can see not only that work, but also other works.

What if there are clouds?

What happens when clouds form, disappear, and rain?

That's another piece.

What happens when radiation from the sun passes through the atmosphere and is absorbed and reflected?

You can also code each of these very small pieces.

There are also winds that change ocean currents.

We can talk about the role of plants in carrying water from the soil into the atmosphere.

Each of these different elements can then be encapsulated and included in the system.

Each part of them finally adds to the whole.

And you get something like this.

It's a beautiful representation of what's going on in the climate system. Each of the emergence patterns we see there, the Antarctic whirlpool, the tropical cyclone in the Gulf of Mexico, and two more that will soon appear in the Pacific, atmospheric water rivers, are all emergent features resulting from the interplay of all the small-scale processes I have mentioned.

There is no rule saying "Let's wiggle in the Antarctic".

There is no rule of "having two tropical cyclones rotating around each other".

These are all emergent traits.

All this is very good. All this is great.

But what we really want to know is what happens to these new properties when the system boots.

What happens to those properties when something changes?

There are many ways to disable the system.

There are wobbles in the Earth's orbit over hundreds of thousands of years that change the climate.

There are changes in the solar cycle with cycles of 11 years or more, and the climate changes.

A large volcano erupts and the climate changes.

Burning biomass, smoke, and changes in aerosol particles all change the climate.

The ozone hole has changed the climate.

Deforestation changes the climate by changing the surface properties and the way water evaporates and moves within the system.

Contrails change the climate by creating clouds where there were no clouds before, and of course greenhouse gases change the system.

Each of these different kicks provides a target to assess if you understand something about this system.

So let's see what model skills are.

Now, I use the word "skill" sparingly. Models are not right or wrong. they are always wrong.

They are always approximations.

The question you have to ask is whether the model tells you more information than you would otherwise get.

If you can do that, it's proficiency.

This is the effect of the ozone hole on sea level pressure. That is, low pressure and high pressure around the southern ocean and Antarctica.

This is observational data.

This is modeled data.

We understand the physics that control stratospheric temperature and how it affects the winds around the Southern Ocean, so we are in good agreement.

Let's see another example.

The 1991 eruption of Mount Pinatubo released a huge amount of aerosols, small particles, into the stratosphere.

It changed the radiation balance of the entire planet.

There was less energy coming in than before, which cooled the planet. Those red and green lines are the difference between what we expected and what actually happened.

The model excels not only on global averages, but also on regional patterns.

There are 12 more examples we could take. Skills related to the solar cycle, changes in stratospheric ozone, etc. Skills related to orbital changes over 6,000 years.

You can see that, and the model is good.

The model cleverly corresponds to a 20,000-year-old ice sheet.

Our models are expert with decades of 20th century trends.

The model successfully modeled the eruption of the lake into the North Atlantic 8,000 years ago.

And we can get good agreement with the data.

Each of these different targets, different evaluations, further expands the scope of these models, leading them to more complex situations and asking increasingly interesting questions. For example, how Saharan dust, seen in orange, interacts with tropical cyclones in the Atlantic Ocean.

How do organic aerosols from biomass burning, seen in red dots, intersect with clouds and rainfall patterns?

What effect does the white patch of sulphate pollution in Europe have on the temperature of the earth's surface and the amount of sunlight it receives?

You can see this all over the world.

Let's look at pollution from China.

You can study the effects of storms on sea salt particles in the atmosphere.

We can see that all these different events are combined and happening at the same time, and we can ask even more interesting questions.

How do air pollution and climate coexist?

Can we change air pollution and climate impacts at the same time?

The answer is yes.

So this is the history of the 20th century.

The first is the model.

Actual weather is slightly different.

The second is observation.

And we are in the 1930s.

There are fluctuations and things are happening, but it's all in the noise.

Things begin to change as we approach the 1970s.

They start to look more similar, and by the 2000s we are already seeing patterns of global warming in both observations and models.

We know what happened in the 20th century.

right? I know it's getting warmer.

We know where it got warm.

When I ask the models why this happened, they basically say it's because of the carbon dioxide we put into the atmosphere.

It's been a very good game to this day.

But there is one important reason why we focus on models, and it's because of this phrase right here.

Because if we have a future observation, we obviously trust that observation more than the model. Unfortunately, however, future observations are not available at this time.

So going into the future makes a difference.

The future is unknown, the future is uncertain, and there are options.

Here are the options we have.

We can do something to reduce the emission of carbon dioxide into the atmosphere.

That's the top.

We can do more to really limit the damage so that it does not become more damaging by the end of the century.

Or you can let fate take over and carry on with your business as usual.

The difference between these options cannot be answered by just looking at the model.

There is a wonderful quote that Sherwood Rowland, Nobel Prize winner for the chemistry that caused ozone depletion, asked when accepting the Nobel Prize: "Even if science has developed enough to make predictions, what's the point if, after all, all we want to do is sit back and wait for those predictions to come true?"

The models are proficient, but it is entirely up to you how you make use of the information from those models.

thank you.

(applause)

you know me.

I am invisibly in your circle of friendship.

My clothes are still perfect - bought in the good old days when I was still making money.

If you look at me, you won't know that my electricity was turned off last week for nonpayment and that I meet the food stamp eligibility requirements.

But if you were paying attention, you'd see that sadness in my eyes -- you'd hear that hint of fear in my confident voice.

Lately, I've been buying Tide's $1.99 trial size jug to make ends meet.

I bet you didn't know there was such a size for laundry detergent.

You invite me to the same fine dining restaurant that we both always enjoy, but I now order bottled water with a lemon twist instead of a $12 glass of Chardonnay.

I am thrifty in my menu choices.

I carefully count every penny in my head.

I am against splitting the table bill evenly to cover dessert and designer coffee and the second and third glasses of wine we didn't consume.

Tired of faking appearances.

My friend said I'm broke, not poor, but there's a difference.

I live without cable TV, gym memberships, and nail appointments.

I realized that I could do my own hair.

No retirement savings, no nest eggs.

I was exhausted long ago.

I don't have an expensive condo to raise capital, and I don't have a husband to support me.

Months of late or no pay have ruined my credibility.

The collector calls me incessantly, reads me the script word for word, politely expresses sympathy for my plight, and then demands a payment arrangement that I can't afford.

Friends secretly wonder how someone so well-educated could have fallen so low financially.

I'm still as talented and smart as a stick, but now I'm more sketchy, mostly bouncing back and forth between consulting jobs.

At 55, I've learned how to hide my brightness, but I don't have many job opportunities anymore.

I don't remember exactly when it stopped, but there's no denying that we're in a world of uncertainty, both then and now.

I don't know where I belong anymore.

What I do know is that dozens of online job applications seem to disappear into a black hole.

I wonder what will happen.

So far my health is holding up, but my body hurts - or is it my spirit?

Homeless women were invisible to me before, but now I am curious to see if their stories started the same way mine did.

I wrote this piece a year ago.

This is a combination of my story and the stories of other women I know.

I wrote this because I'm tired of pretending I'm okay when I'm not.

I was tired of pretending to be normal.

I didn't see myself in the general media.

No one I knew had traveled the world or bought a condo in Costa Rica.

Few of my friends ignored the 15-20% opinion of experts that they should maintain their standard of living after retirement.

Many of my friends were in their 50s and 60s and were considering going downhill, permanent employment, unemployment, a doctor's appointment, or divorce to escape bankruptcy.

We may not have hit rock bottom, but many of us have seen for the first time a chain of events that could hit rock bottom.

And really, it doesn't take that long.

The median household in the United States has only one month's worth of income in savings.

47% of us can't scrape together $400 to deal with emergencies.

That's almost half of us.

We are in the abyss of a major car repair.

You wouldn't even notice it if you looked around. I am not alone in this situation.

There are people in this room who are in the same predicament. If it's not you, it could be your parents, your sister, or your best friend.

We are good at pretending to be normal.

Shame silences and isolates us.

When I first decided to publish my story, I created a website and my friend noticed that there were no pictures of me. It was all just cartoons like this.

When I came out, I was still hiding.

We live in a world where success is defined by income.

When you say you're short on money, you're announcing that you're a loser.

If you're a Harvard Business School graduate like I am, you're kind of a double loser.

We, the baby boomer generation, often hear stories about not having enough money for retirement. how much it's our fault

Why on earth would I need to withdraw my 401(k) plan to cover my mother-in-law's lack of nursing home care, to pay my kids' school fees, or just to get by?

We are accused of being unplanned and unplanned. You've spent all your money on lattes and bottles of water.

It is very tempting to humiliate or blame.

Many of us are busy doing it to ourselves, not even waiting for others to do it.

I'll do my own thing, everyone says they could have saved more.

I could have saved more, and if you take a quick look at my life over the past 30 years, you'll see that I did one or more financially stupid things.

I can't change it now, and neither can you, but let's not confuse individual detached behavior with the institutional factors that have caused the $7.7 trillion retirement income gap.

Millions of Boomer Americans went to Starbucks too much to get here.

Over the past 30 years, we've dealt with stagnant and declining wages, vanishing pensions, housing, health care, education and other high costs.

This has never happened before.

We all remember the three-legged retirement income stool with savings and pension and social security.

Well, the flight was wobbly.

Think Savings -- What kind of savings?

For many families, there is nothing to save after paying the bills.

The legs of the pension stool were also wobbly.

We remember a time when many people were receiving pensions.

Currently, only 13% of U.S. workers are employed by companies that provide labor.

So what did you get in return?

We got a 401(k) type plan and suddenly the responsibility for retirement planning was shifted from the company to us.

We had sovereignty, but we also took risks. And it turns out that millions of us aren't so good at investing voluntarily over 40 years.

Millions of us are not very good at managing market risk.

And indeed, the numbers speak for themselves.

Half of all American households have no retirement savings at all.

it will be zero.

No 401(k), no IRA, no 10 yen.

For people aged 55-64 with a retirement account, the median value of that account is $104,000.

$104,000 sounds better than zero, but that translates to about $300 in annuity income.

No need to say you can't live with it.

With savings dwindling, pensions becoming a thing of the past, and 401(k) plans failing millions of Americans, many mostly retirees rely on Social Security for their retirement plans.

But here's the problem.

Social Security should never have been a retirement plan.

That's hardly enough.

At best, that's about 40 percent of your pre-retirement income.

The situation is very different from when social security was introduced in 1935.

A 21-year-old man had a 50% chance of living to 65.

So he retired at 60, fished a little, kissed his grandchildren, got a gold watch – and died within five years of receiving his benefits.

Today is not that pattern.

If you're in your late 50s and in good health, you can easily live another 20-25 years.

It takes a really long time to make ends meet if you go bankrupt.

So what do you do when you come here and turn 50, 55, or 60?

What if you don't want to land here, but you're 22 or 32?

Here's what I've learned from my own experience.

No cavalry will come.

No big bailouts, no prince charming, no big bailouts planned.

To challenge anything other than being old and poor in America, we must save ourselves and each other.

I needed to come out of the shadows and stand here openly. And I encourage you to do the same.

I'm not saying it's not easy.

Still, I dared to tell my story because I thought it would make it a little easier for people to talk about themselves.

I believe it is only through the power of our numbers that we can begin to change the “la-la” conversation the public is having regarding this retirement crisis.

While many of us are shocked and confused about what happened to us, we must rise from the grassroots and form what I think is a resilience circle.

These are small groups that come together to discuss what happened to them, share resources and information, and begin to find ways to move forward.

I believe it is from this foundation that we can once again find our voice and sound the alarm. We can start urging our institutions and policy makers to go all out with this retirement crisis with the urgency it deserves.

In the meantime, there's the word "in the meantime," we need to cut our spending drastically and adopt a more down-to-earth mindset.

And I don't just mean living within our means.

Many people are already doing it.

What is required now is to ask ourselves more deeply what it means to live a life that is not defined by things.

I call it "make it smaller".

Smalling up means understanding what it really takes to feel satisfied and grounded.

I have a friend who has a really worn out, worn out car, but music is really important to him, so one day he's going to skimp and save $15,000 to buy a flute.

he got smaller

I also had to let go of the magical mindset that if I was patient enough and tightened my belt, things would get back to normal.

Send out another resume, apply for another job online, attend one more networking event, and I'm sure I'll get the kind of job I'm familiar with.

I'm sure things will return to normal.

Truth be told, I won't go back and neither will you.

The routine as we knew it is over.

This new place we are in will ask you to do things you don't want to do.

We will be asked to accept assignments that we believe fall short of our ranks, talents and skills.

I had to step off my throne.

Last year, a friend of mine asked me if I could help with the housekeeping task.

I thought she meant community organizing in line with what President Obama did in Chicago.

She meant organizing someone's closet.

I said, "I'm not doing that."

She said, "Get off your throne. Money is green."

Being part of a team of trailblazers ushering in this new era of work and life is no easy task.

The first is always the hardest.

The first was before networks, pathways and role models existed.

Before there are policies and methods that show how to move forward.

We are in the midst of a tectonic shift and must build bridges to overcome it.

What we do in between is a bridge. Bridgework is what you do when you're trying to figure out what happens next.

Bridgework also lets go of the idea that our worth and worth are determined by our income, title and job.

Bridgework can look crazy or cool, depending on the situation when you're hit by a personal financial crisis.

I have friends who have PhDs who work in container stores and drive Ubers and Lyfts. I also have friends who are partnering with other Boomers to do really great entrepreneurial ventures.

Bridgework doesn't mean you don't want to build on your past career or do meaningful work.

that's right.

Bridgework is what we do while we are thinking about:

I've also learned to think strategy instead of failure when dealing with all the things I don't want to do.

And that's an approach I'd encourage you to consider as well.

So if you need to live with your brother to make ends meet, call him.

If you need to take in a lodger to help pay your mortgage or pay your rent, do so.

If you want food stamps, get food stamps.

Only one-third of eligible seniors actually get it, according to AARP.

Do what you need to do to advance to the next round.

Please know that we are millions.

come out from the shadows

Cut back and make smaller. Think strategy, not failure. Get off your throne and find a bridge to overcome the recession.

Our nation has invested billions of dollars in diagnosing, treating and managing disease to achieve longevity.

Just living longer is not enough.

We want to live well.

We haven't invested that much in physical infrastructure to make sure it does.

We now need a new way of thinking about what it means to be old in America.

And we need guidance and ideas on how to live a rich life on a more modest income.

So I'm calling out to change agents, social entrepreneurs, artists, seniors and impact investors.

I am calling out to developers and disruptors of the status quo.

Help us imagine how we will invest in services, products and infrastructure that support our dignity, self-reliance and well-being for decades to come.

My journey has taken me from a place of fear and shame to a place of humility and understanding.

I am now ready to link my shield with others and fight this battle. And I invite you to join me.

thank you.

(applause)

First, for those unfamiliar with my work, I create multicultural characters, characters with different backgrounds.

Before the present is the new future, let me tell you a little bit about the past.

Dominican music was playing from the stereo.

There were Christians and Jews.

It's a long story full of intrigue and interreligious guilt and shame.

But I was completely immersed in this world filled with all people, and then I went on to United Nations School, and I was just totally — that's where I started to kind of develop these voices and these people, they were all based loosely on people I actually knew, so when I played them, for example, I tried to really live in them.

And for example, I don't talk like that very much, but it was one of my peers, and I bring some of my friends on this stage - I think of them as my friends - in the spirit of the idea that the present is the new future, in a kind of meta way, because I thought about it, and about the future, what's so scary to me is that you don't know what's going to happen.

I don't know if that applies to others, but the concept of understanding the future and thinking about ways to predict outcomes is, to me, scary not knowing what will happen.

So there's a question that I haven't seen and the idea that it's going to be answered for my people, and some of these characters have been with me for years, some don't even have names, and I don't know what's going to happen.

I don't know what will happen. And all I can do is remind myself that I told Chris to fly in the seat of his pants, and now that I'm here, it feels like a dream without my pants on. So I guess I'm going to fly in the butt seat.

That said, let's see who comes out.

First question please. "Have you ever had a headache from a microchip in your brain?"

right.

have understood.

First of all, let me just say that I hope you will listen to me.

My name is Lorraine Levine. The thought of having a microchip implanted in my brain, frankly, reminds me that I'm just glad I didn't have my Google glasses on.

No offense to them. I hope you all enjoy it, but at my age it's too much information to just wear the normal things you already have.

do you know what i'm talking about?

No need to know more. I don't want to know

that's it. enough.

i love you all. You are wonderful.

It's great to be here again this year with such big matchers. Wow!

Now for the next question. (Applause) Next, please.

“Is dating boring now that humans are asexual?”

Who do you get?

Hello, uh, okay, hello everyone.

My name is Nereida.

First of all, dating is never boring under any circumstances.

But I am very excited to be here now. So I'm just trying to remind myself that what I'm here for and everything else that is, trying to answer these questions is so exciting.

But I also have to admit that TED is an incredible experience at the moment, say Isabel Allende, for example. Isabelle Allende!

Of course it might not mean anything to you, but to me it's like another level, you know?

Because I'm Latino and I really appreciate the fact that I have a role model here that I can actually do. I don't know, because I just need to say it.

It's unbelievable to me, but sometimes you need to say a few affirmations to help yourself, such as when you're nervous.

I always try to use three little words that make me feel good. "Sotomayor, Sotomayor, Sotomayor." (Laughter) But it really helps keep you grounded.

Now I can use Allende, Allende, Allende. And suffice it to say, look, it's really cool to be here. And we knew we were going to get these questions.

I was so nervous and was thinking, oh my god, my god. let me remind you Because, especially since I was last here at TED, something incredible has happened. So many crazy things happened right after that that we ended up going to the White House to perform.

That was amazing. I'm standing there and I thought, please don't say 'Oh my God'.

Don't say "oh my god".

And I just kept saying, "Oh my god, my god."

And you know, I kept thinking in my head, President Obama has to be on the same podium, and I stood here and said, 'Oh my God.

It's like the separation of church and state.

I just couldn't handle it.

There were really too many.

I think that's why I lost my way.

But what I meant to say is, to me, dating is, as far as I'm concerned, regardless of how you reproduce, as long as you enjoy yourself, and if it's with a consenting asexual, I don't know.

I know how I do it.

Ok, goodbye, thank you.

Now for the next question. (Applause) What are your top five favorite songs right now?

Ok, first of all, you know what I'm talking about, I'm the only one here right now.

My name is Rashid. I've never been to TED, but you know what I mean.

I think, Sarah Jones, maybe you didn't want me to come out last time.

i don't know why You should understand what I'm saying.

Clearly, I think I'm a good fit for TED.

You should understand what I'm saying.

First of all, I'm in the hip-hop world so you know what I mean.

Some of you may not be into music that much, but you know what I mean, the first way you'll always know I'm doing hip-hop is, 'Because I'm the official MC on the mic.'

You can see it right away.

That's how you hold it.

got it. Now you can get started with a quick tutorial.

But when Sarah Jones said we were going to come here, I was like, 'Damn, you know what I'm saying, TED is a real fly, I got a load of drugs, you know what I'm saying, shit is going on, and everything,' but she was like, 'Yeah, we have to answer some random questions, just like, and I was like, 'What the hell is that?

Do you know what I mean, stand there and answer random questions.

I don't want to, I mean, it's like an intellectual stop-and-frisk.

do you understand what i'm saying? (Laughter.) I don't want to just stand there and have everyone interrogated or otherwise.

That's what I'm trying to leave behind in New York. do you understand what i'm saying?

Anyway, I have to say that all my top 5 songs at the moment are outside my personal catalogue. You know what I mean?

So if you want to know more about that, you know what I mean, we could talk about anti-piracy and all that stuff, but as far as I'm concerned, you know, I believe in Creative Commons. And I think it's very important that it has to be sustainable.

you know what i mean?

But what I'm saying is, if you're interested in the top 5 songs, yell at me.

do you understand what i'm saying?

Hi? Both in the future and now. yes.

Enjoy the rest.

Now for the next question.

what do you have

"How many of your organs have been 3D printed?"

(Laughter) Well, I don't know how many of my organs have been 3D printed, but I would say that this is very challenging for me. Thinking about this future concept is like parents all over the world telling their little ones, "Please, eat this." I've spent all day stoked on a hot 3D printer so you can eat this meal.

Right, that kind of thing.

And of course, now that we have changed, there is a whole shift in perspective from the perspective of the Global South. Don't just tell them, "I have hungry children."

Well, it's the future.

thank god No one is hungry anymore.

But you know, I have a certain optimism and hope that things like 3D printing can continue. Well, let's just say that in the future I hope to see all kinds of printable foods published.

But everyone, I hope you enjoy it. And again, I hope you guys are having a great party here at TED.

thank you.

Next problem. (Applause.) What has changed? Well, I feel like I have to think about that.

“What has changed now that women are running the world?”

First of all, I really, just want to say, my name is Bella, I just want to identify myself as a feminist, I, I really know that, I was born in the 90s and there were a lot of women as far as feminism was concerned, and maybe they didn't realize that, feminists like me have some kind of voice, or a certain way of showing that they're feminists. Because I think feminism can be really hot and I actually think it's really important and important.

The quote I'm wearing is from Gloria Steinem and I'm named after Bela Abzug. Bela Abzug is clearly a very important feminist in history. I just think these women really epitomize how you can be dynamic, amazing, amazing, you don't have to wear an Eileen Fisher caftan. For example, to prove I'm a feminist.

It's not that there's anything wrong with it, but why does my mother have to wear pants that objectify her body? I like my pants

Well, I like my voice.

For example, she asks why do you have to speak like that, what do you speak like? Because I express myself, I think we need to reach out, not just to different generations of feminists, but across different vocal ranges. Because if you don't, you become restrictive within feminism. This is a term I coined to mean "too strict and ridiculous."

That's my impression.

By the way, you guys are great.

have understood. Next problem.

(Applause) [“A cure for cancer has been found, but a cure for baldness has not been found? What does that mean?”] Yes, as you know, my name is Joseph Mancuso.

First of all, I appreciate that TED is a very orderly crowd and a fairly orderly group overall.

And when it comes to baldness, this much must be said. And here comes the problem.

In my case, as long as you're a woman, it's the modern world, so do what you want, it doesn't matter who, have fun, LGBTQLMNOP. have understood?

But as far as I'm concerned, women don't care as much about attractiveness as you might think.

I mean, I remember hearing about this woman.

She loved her husband, it was the most tender thing.

She's a pretty young girl.

And this person is older.

And she said she would love him even if the roof was covered with snow, or melted away completely.

As far as I'm concerned, it's about love.

am i right or am i right?

That's it. that's it. that's it.

I have nothing more to say.

Keep your nose clean.

OK, next question.

"Have you ever tasted meat that wasn't lab-grown?"

Well, I want to start by saying that this is a very difficult experience for Chinese Americans.

I really do have a Chinese identity, so I don't know what to call myself now, but my kids are American Chinese, and it's hard trying to express myself in front of an audience like this.

But if I had to give my opinion on meat, I think the first and most important thing is that while you don't have to eat perfect food, meat probably shouldn't be poisonous.

Perhaps you can find that middle ground.

However, I will continue to explore this idea and will probably report on it next year.

Second-rate.

Next. Next. (Applause) "Will there ever be a post-racism world?"

Thank you for calling me.

My name is Gary Weaselhead. Enjoy it.

I am a member of the Blackfeet Tribe.

I'm half Lakota too, but that's my real name. No, I didn't go into politics, even if that seemed like the obvious choice.

tough crowd.

(Laughter) But when people ask me about race or anything like that, I always tell them. As a member of the Indigenous community, I'm probably not your typical guy.

For example, in addition to being an activist, I am also a professional stand-up comedian.

(Laughter.) And, you know, I'm the most popular in college and on college campuses.

When they want to do a diversity day, or we're not all white week, I'll be there. (Laughter) Do you think there will ever be a post-racism world?

I don't think we can talk about race without forgetting that it is in some respects a construct, but at the same time we must not forget that until we correct the wrongs of the past, we will turn around.

I don't care if the present is the new future.

I think there are a lot of great people here at TED who are trying to address this issue. So if my statement today offends you, I welcome you.

(Applause) I think we have one more minute.

"What's the latest fashion diet?"

who is there?

Well, I'll answer this as 3 or 4 different people soon.

That means it's really fast.

As far as diet goes, let me tell you, if you don't love yourself on the inside, there is no diet on this planet that will make your butt smaller enough to make you feel better. So stop wasting your time.

As an African woman, I believe the diet we need is to get rid of the crazy belief that there is something wrong with our beautiful backs.

No, I'm making fun of that.

There is nothing wrong with being a woman with a good physique.

That's what I mean.

Ladies, celebrate your bodies for God's sake.

Stop running around hungry.

You are making yourself and others unhappy.

Last answer.

So are we talking about the most popular diet methods?

First let me say this is my first time at TED.

I may not be the typical person at this stage.

My dental care is not as good as others.

But I made Sarah Jones promise to bring me this time, because she didn't bring me before. But what I'm trying to say is that there's a lot more important than counting calories, and as someone who lives on the streets of New York and ends up here, hear an idea worth spreading, I want to tell you, I believe in this idea, that the present is the new future, and where you sit creates, for better or worse, all things that come.

And to me, I think the word homeless is just wrong.

You may not have a place to lie down at night, but you'll just be homeless.

i have a house So are you.

Find it and try to find yourself there.

Be sure to know that this is not just about virtual reality in space.

That's great, but it's also about the actual reality on Earth.

How do people live today?

How can I participate in the solution?

Thank you everyone for thinking about impacting the future in this moment.

I appreciate it bye bye.

(Applause.) Thank you very much, everyone.

Thank you for trusting me, Chris.

(applause)

Good morning, ladies and gentlemen.

My name is Art Benjamin, "Mathematician".

What that means is that I combine my love of math and magic to do what I call "mathematics magic".

But before we begin, I have a quick question for the audience.

Did anyone by any chance bring a calculator this morning?

Seriously, raise your hand if you have a calculator.

Please raise your hand. Did you raise your hand?

Come on, get it out, get it out who else?

I see, I saw a one-way street in the back.

Teacher, that's three.

And who's on this side of here?

Yes, that passage over there.

Four people, will you take out your calculator and come on stage with me?

Let's give them a big round of applause.

(Applause.) That's right.

Well, I haven't had a chance to use these calculators, so I need to make sure they all work properly.

Can someone please tell me the 2 digit number.

What about 2 digit numbers?

Audience: 22 people.

AB: 22. And another two digit number.

Audience: 47 people.

AB: 22 times 47, make sure you get 1,034. Otherwise the calculator will not work.

Volunteer: No.

AB: 594. So let's give them a big round of applause.

(Applause.) Just to be sure, why not try a more standard calculator?

Ok, great.

So what am I trying to do -- I know it took some people a while to get an answer.

that's ok.

Here are some shortcuts to make multiplication even faster on the calculator.

There is something called squaring numbers. Most people know this as taking a number and multiplying it by itself.

For example, what about 5 squared?

Audience: 25 people.

AB: 25. The way to square on most calculators, which I'll use to demonstrate, is to take a number like 5, press "multiple" and then "equals". Most calculators give you the square.

Some of these old RPN calculators have a "square x" button to make the calculation even faster.

What I'm going to do is square four 2-digit numbers in my head faster than I could on a calculator, even with shortcuts.

I'm going to use the second column this time, and have four people each call out a two-digit number. Have them compete to see if they can square the first number, then square the second, third, and fourth numbers. OK?

As soon as possible, please give me a two-digit number.

Audience: 37 people.

Arthur Benjamin: 37 to the power of 2, okay.

Audience: 23 people.

AB: 23 squared, okay.

Audience: 59 people.

AB: 59 squared, OK, and finally?

Number of spectators: 93 people.

AB: 93 squared.

Volunteers: 1369. AB: 1369.

Volunteers: 529. AB: 529.

Volunteers: 3481. AB: 3481.

Volunteers: 8649.

AB: Thank you.

(Applause) Let's take this one step further.

This time we will try to square a 3-digit number.

I don't even write these down. It just calls when called.

Whoever I point to, please call the three digit number.

Panel, please check your answers.

It just indicates whether it is correct.

It's a 3 digit number, right?

Spectators: 987.

AB: 987 squared is 974,169.

(laughs) AB: Yes? good.

Three digits again -- (Applause) -- Another three digit number, sir?

Number of spectators: 457 people.

205,849?

AB: Yes?

OK, another one, another three digit number?

AB: 321 is 103,041.

103,041。

yes? One more three-digit number, please.

AB: 722 is 500, it's hard.

Is it 513,284?

Volunteer: Yes.

AB: Yes? Oh, one more, one more three-digit number, please.

Audience: 162 people.

162 squared is 26,244.

Volunteer: Yes.

(Applause) (End of applause) Let's take it one step further.

(Laughter) Now let's try squaring a four-digit number.

Please take your time and work on it. I'm not going to win you over with the answer to this question, but I'll try to get it right.

To make this a little more random, let's call row 4 1, 2, 3, 4.

If you call me a single digit number from 0 to 9, that's the 4 digit number I'm going to square.

Nine.

Seven.

five.

9,758, it will take a while, so please be patient.

95 million -- (sigh) 218,564?

Volunteer: Yes!

(Applause) (End of applause) Now, let's try squaring a five-digit number.

(Laughter) 8-digit capacity -- do you hate it?

So now that we've hit our computer's limit, what is it?

does yours go higher?

Volunteer: I don't know.

AB: Oh, so is yours?

Volunteer: Maybe I can. AB: We'll talk later.

In the meantime, I'd like to wrap up the first part of the show by doing something a little more tricky.

Now consider the largest number on the board, 8649.

Enter it into the calculator respectively?

This time, instead of squaring, ask them to multiply the number by any three-digit number. But don't say what you're multiplying by, multiply by random 3-digit numbers.

So you need a 6-digit answer, maybe a 7-digit number.

How many digits do you have, 6 digits or 7 digits?

Seven, and yours?

Seven? Seven?

And uncertain.

Seven.

Is there a way to find out what 7 digit number you have?

Say no. "

(Laughter) Okay, so I'll try the impossible, or at least the impossible.

I would like to ask you to call the 6 digits out of the 7 digits in any order you like.

(Laughter) One digit at a time, try to determine which digit you omitted.

Start with your 7 digit number and call 6 of them.

Volunteers: 1, 9, 7, 0, 4, 2.

AB: Did you omit the number 6?

Ok, that's one.

I have a 7 digit number, please call 6 of them.

Volunteers: 4, 4, 8, 7, 5.

I think I only heard five numbers. I -- wait -- 44875 -- did you omit the number 6?

Just like her, OK.

you have a 7 digit number. Call out the 6 digits out loud and clearly.

Volunteers: 0, 7, 9, 0, 4, 4.

I assume you left out the number 3?

AB: That's three.

The odds of getting all four of these right with a random guess are 1 in 10,000 to the power of 104.

OK, 6 of them is fine.

(laughs) Now really scramble.

Volunteers: 2, 6, 3, 9, 7, 2.

Did you omit the number 7?

And let's give these guys a big round of applause.

thank you very much.

(Applause) (End of applause) As for the next number -- (Laughter) I have one more question for the audience while I'm mentally recharging my batteries.

By any chance, does anyone here know the day of the week they were born?

Raise your hand if you think you know your birthday.

Well, let's start with gentlemen first.

First, what year was it?

So I choose gentlemen first.

Audience: 1953.

1953, what month?

What is November?

23rd -- Was it Monday?

Audience: Yes.

I have never seen a woman with her hand raised.

OK, how are you, how old are you?

1949, what month?

What is October?

Fifth -- Was it Wednesday?

yes! I'm going to the very back from now on, but what about you?

Say it out loud, how old are you?

Audience: 1959.

1959, okay -- what month?

Audience: February.

Sixth -- Was it Friday? AUDIENCE: Yes.

Well, what about the person behind her?

Please, what year was that?

Audience: 1947. AB: 1947 and what month?

Audience: May. AB: What can I do?

Seventh -- Is it Wednesday?

Audience: Yes. AB: Thank you.

(Applause) Who wants to know what day of the week you were born?

You can do it that way.

Of course, you may not know if I make up the answer, so I'm prepared for that.

I brought a calendar book.

It dates back to 1800. Because no one knows.

(laughter) I didn't mean to look at you, sir, you were just sitting there.

(Laughter) Anyway, Chris, help me if you can.

This is a calendar book.

Who would have wanted to know his birthday?

First, what year was it?

Audience: 1966.

66 -- Look at the 1966 calendar.

and what month?

Audience: April. AB: What is April?

Audience: 17th place.

Can you confirm, Chris?

Chris Anderson: Yes.

AB: Let me tell you, Chris: As long as you have that book in front of you, please, look to a year other than the 1900s, the 1800s or the 2000s. It would be a much bigger challenge for me.

AB: What year would you like it to be? California: 1824.

AB: 1824, okay.

AB: So what month?

California: June.

AB: Was it Sunday?

K: Yes it was. AB: It was cloudy.

(Laughter) Okay, thank you.

(Applause) (End of applause) But I would like to conclude by alluding to what I said earlier in my presentation.

There was a gentleman here with a ten-digit calculator.

Where is he, 10-figure man, can you get up?

OK, just stand up so I can see where you are.

Do you have a 10 digit calculator too?

OK, what I'm about to do is mentally square a 5-digit number that requires a 10-digit calculator.

But in order to make my work more interesting not only for me but also for you, I would like to think aloud about this issue.

So I can actually honestly hear what's going on in my head while doing this size calculation.

Well, I have to apologize to my magician friend Lennart Green.

As a magician, I know I shouldn't give away my secrets, but I'm not so afraid people will start my show next week. So I think we are fine.

(Laughter) (Applause) So let's start with you and look at the other row of people.

Get five numbers 1, 2, 3, 4.

Oh, I've already done this row.

Let the row in front of you start with you: 1, 2, 3, 4, 5.

Please call the 1 digit number. That's a 5-digit number that you'll try to square. please.

five.

Seven.

six.

three.

57,683 -- squared.

Let me explain how we tackle this problem.

I will divide this problem into three parts.

Do 57,000 squared, plus 683 squared, plus 57,000 times 683 times 2.

Add all these numbers together and you'll get your answer, if you're lucky.

Well, let's review.

(laughs) Thank you.

(Laughter) While explaining other things -- (Laughter) -- I know, you can use it, right?

(Laughter) As you do these calculations, you may hear certain words enter the calculations instead of numbers.

Let me explain what it is.

It's a phonetic code, a memory device I use to be able to convert numbers into words.

Store them as words and later retrieve them as numbers.

It may sound complicated, but it's not.

Don't think you're watching anything from "Rain Man".

(Laughter) There is definitely a way out of my madness, definitely, definitely.

(Laughter) If you want to talk about ADHD later, talk about it then.

By the way, one last thing. My calculator judges, you know there's at least a 50% chance that I'm wrong here.

If so, please don't tell me what's wrong. Say something like "It's coming soon" or something like that. Then I'll think of an answer. That could be very interesting.

But if I'm right, whatever you do, don't keep it to yourself, okay?

(laughter) Let everyone know I got it right. This is my big goal so ok.

So without further stagnation, let's proceed here.

Start the problem in the middle, 57 x 683.

57 × 68 is 3,400, plus 476 is 3876, so 38,760 plus 171, 38,760 plus 171 is 38,931.

38,931; double that to get 77,862.

77,862 becomes Cookie Fission and Cookie Fission becomes 77,822.

That seems correct, continue. Cookie splitting, OK.

Then do 57 squared. This is 3,249, so we can say 3 billion.

Take 249 and add it to the cookie, 249, oops, but looks like a carry is coming -- 249 -- add it to the cookie, 250 plus 77 is 327 million -- divide, divide, OK, finally 683 squared, which is 666 times 700, plus 17 squared is 466,489, if you want Spin it up, spin it up, 466, and if you add that to fission, you get 328,489.

Audience: Yes! AB: Good.

thank you very much.

(Applause.) I hope you enjoyed the math magic.

thank you.

So it's 2006.

I got a call from my friend Harold Ford.

He's running for Senate in Tennessee, and he said, "Melody, we really need national coverage. Any ideas?"

So I had an idea. I called a friend in New York who works for one of the most successful media companies in the world and said, "Would you like to host an editorial board lunch for Harold?"

Please come with him. ”

Harold and I arrive in New York.

We wear our best suits.

We look like shiny new pennies.

And we go to the receptionist and say, "I'm here for lunch."

She motioned us to follow her.

We walked through a series of corridors and suddenly found ourselves in a drab room. At that point she looked at us and said, "Where's the uniform?"

Just then, a friend rushed in.

Blood flows from her face.

You literally have no words, right?

And I looked at her and said, "Well, don't you think we need more than one black person in the U.S. Senate?"

Now Harold and I -- (applause) -- we still laugh about it. And in many ways, that moment caught me off guard, but deep down, it didn't really surprise me.

And I wasn't surprised because my mother told me about 30 years ago.

As you know, my mother was relentlessly down-to-earth.

I remember coming home one day from a birthday party where I was the only black kid invited. Then she asked me instead of the usual maternal questions like "Did you have fun?" or "How was your cake?"

My mother looked at me and said, "How did they treat you?"

i was 7 years old. I did not understand.

I mean, why would anyone treat me special?

But she knew.

And she looked me straight in the eye and said, "They don't always treat you well."

Now, race is one of the most offensive topics in America.

Bringing it up at a dinner party or in a work environment is literally like touching the third rail in conversation.

There is a shock, followed by a long silence.

And even coming here today, when I told some friends and co-workers that I was going to talk about race, they warned me and said stop, there is a big risk in talking about this topic and people might think I'm a militant black woman and it's going to ruin my career.

And I have to say, I was actually a little scared for a second.

It was then that I realized that the first step to solving any problem is not hiding from it, and the first step to any form of action is awareness.

So I decided to actually talk about race.

And I decided that maybe if I came here and shared some of my experiences with you, maybe we could all be a little less fearful and a little more bold in our conversations about race.

You know some people say that the election of Barack Obama means the end of racism forever?

But I work in the investment business and there's a saying, "Numbers don't lie."

And here are significant, quantifiable racial disparities in household wealth, household income, employment opportunities, health care, and more that cannot be ignored.

An American corporate example: White men hold 70% of all corporate board seats, even though they make up only 30% of the US population.

Only seven CEOs are in the minority among Fortune 250 companies, and only two of the thousands of publicly traded companies today have Black women as chairmen. One of them is the same company that until recently was almost mistaken for a kitchen helper.

It's true.

Now I have this thought experiment I'm playing with myself. If I walk you into a room and say, imagine if it was a big company like ExxonMobil and everyone in the boardroom was black, you would think that would be weird.

But if I take you to a Fortune 500 company and all the people around the table are white men, when will we think it's funny too?

And we know how we got here.

(Applause.) We know how we got here.

As you know, there was institutionalized and at one time legalized discrimination in our country.

There is no question about it.

But still, my mother's question comes to me as I grapple with this issue. "How did they treat you?"

Now, I did not raise this issue to complain or to elicit sympathy in any way.

I have been more successful in life than I expected and have been treated better by people of all races than I otherwise would have been.

I'm talking about uniforms because that's what happened.

I cite corporate board diversity statistics because they are true. I stand here today to talk about the issue of racism because I believe that all of us, regardless of skin color or where we come from, are at risk of depriving our children of all the opportunities they want in the next generation.

And I think it could hinder business.

As you know, researchers coined this term "color blindness" to describe the learned behavior of pretending to be racially oblivious.

If there are many people like you around you, it's just a coincidence.

Now, in my opinion, colorblindness does not mean being racist and fair.

Not at all. We do not guarantee it.

In my opinion, colorblindness is very dangerous because it means ignoring the problem.

There was a survey of companies that really smart companies didn't shy away from it, they actually tackled it head-on.

In fact, they recognize that embracing diversity means embracing all races, including the majority.

But the first thing I want to say is that this subject can be difficult, awkward, and offensive. But that's the point.

In the spirit of debunking the racial stereotype that black people don't want to swim, I'll tell you how much I love to swim.

I love swimming, so even as an adult, I still swim with my coach.

Then one day, my coach trained me to swim to one end of a 25-meter pool without breathing.

And every time I failed, I had to start over.

And I failed a lot.

I finally understood it, but when I got out of the pool, I was frustrated, tired, and annoyed, and said, "Why do you practice holding your breath?"

Then the coach looked at me and said, "Melody, that wasn't a breath-holding exercise.

The training was about making uncomfortable situations comfortable, because that's how most of us go about our days. ”

If we can learn how to deal with discomfort and relax into it, we will live a better life.

So I think it's time for all of us, blacks, whites, Asians, Hispanics, men and women, to feel comfortable with uncomfortable conversations about race. If we really believe in equal rights and equal opportunities in America, I think we need to seriously talk about this issue.

We cannot afford to be colorblind.

We have to be brave with color.

As teachers, parents, entrepreneurs, and scientists, we must be willing to discuss race with honesty, understanding, and courage. Not because it's the right thing to do, but because it's the wise thing to do. Because our business, our products, our science and our research are all better with more diversity.

Well, my favorite example of color courage is a guy named John Skipper.

He runs ESPN.

He's a typical Southern gentleman from North Carolina and white.

He joined ESPN. ESPN already had a culture of inclusion and diversity, but we took it a step further.

He called for a diverse pool of candidates for all open positions.

He now says that in the beginning his seniors were mad and they would come up to him and say, "Do you want us to hire the minority or do you want us to hire the best person for the job?"

And Skipper's answer was always the same, "yes."

And by saying yes to diversity, I honestly believe ESPN is the most valuable cable franchise in the world.

I think that's part of the secret sauce.

What I can say here is that in my industry, Ariel Investments, we really see diversity as a competitive advantage, and that advantage can extend far beyond our business.

There is a man named Scott Page at the University of Michigan.

He was the first to develop a mathematical calculation of diversity.

He says that if you're trying to solve a really hard problem, you should have a diverse group of people, including people of diverse intelligence.

The example he gives is the smallpox epidemic.

When they hit Europe, they gathered scientists together, but they were puzzled.

And the beginnings of treatment for the disease came from the most unlikely source, a dairy farmer who noticed that her milkwomen were free of smallpox.

And thanks to that dairy farmer, smallpox vaccination is cattle-based.

I'm sure you're sitting here saying, I don't run a cable company, I don't run an investment company, I'm not a dairy farmer.

what can i do?

And I tell you, you can be brave with color.

If you're in the hiring or admissions process, you can be brave about your color.

If you're trying to solve a really tough problem, be brave and speak up.

I know some people say that, but it doesn't make much sense. But what I actually want to ask you is very simple. Observe your environment: work, school, home.

I am asking you to deliberately and deliberately look at the people around you.

Invite people into your life who don't look like you, think differently, don't act like you, and aren't from where you're from. They may challenge your assumptions and help you grow as a person.

You may be able to gain powerful new insights from these people. Or you may find out that black people, men, women, and children also use body lotion every day, like my husband, who happens to be white.

I also think this is very important for us to really understand that this progress will help us as we expect the next generation to be great role models for us.

Well, Mom, she said relentlessly down-to-earth.

She was an incredible role model.

She was the kind of person who made herself who she is because she was a single mother of six in Chicago.

She was in the real estate business and worked very hard, but often struggled to make a living.

So sometimes the phones were hung up, the lights were turned off, and they were evicted.

When we were evicted, we sometimes lived in the small apartment she owned, sometimes just one or two rooms because it wasn't finished yet, and heated the bath water on a hot plate.

But she never gave up hope and we never gave up hope.

This brutal realism she had, that is, when I was four, she said, "Mommy is Santa." (Laughter) She was a very cruel realist.

She taught me many things, but the most important lesson was that every day she said to me, "Melody, you can be anything."

Those words woke me up at dawn, those words made me love school more than anything else, those words made me have the biggest dream on the bus to school.

And because of those words, I now stand here full of passion and ask you to take courage for the children who are dreaming today.

(Applause.) Well, I want them to look at the CEO on TV and say, "I can be like her," or, "He looks like me."

And I want them to know that anything is possible, that they can reach the highest level they ever imagined, that they can be welcome in any company's boardroom, or that they can lead any company.

We see the idea of ​​being the land of the free and home of the brave woven into the fabric of America.

America, when we face challenges, we face them head-on and do not run away from them.

we take a stand. we show courage.

So what I am asking of you now is to show courage.

I am asking you to be bold.

As a business leader, I ask that nothing be left on the table.

As a citizen, I ask that you leave no child behind.

What I ask of all of you is not to be colorblind, but to take courage in color so that every child understands that their futures matter and their dreams are achievable.

thank you.

(Applause.) Thank you. thank you. thank you. (applause)

Let me introduce what I am working on.

It is what the Victorian magicians would describe as a mechanical marvel, an automaton, a thinking machine.

Greetings to EDI.

now he is sleeping wake him up

It was there.

These mechanical performers were popular throughout Europe.

The audience marveled at their movements.

It was sci-fi made real, robotics in the pre-electronic era, machines that were far ahead of what Victorian technology could produce, machines that we would later come to know as robots.

EDI: It's a robot. A term coined in 1921 in a science fiction story by Czech playwright Karel Čapek.

It comes from "robota".

It means "forced labor".

Marco Tempest: But these robots weren't real.

They were unintelligent.

They were illusions, deftly combining the deceptiveness of mechanical engineering and magician art.

EDI is different.

EDI is real.

EDI: I'm 176 cm tall.

MT: He weighs 300 pounds.

EDI: It has two 7-axis arms. — MT: Core of Sensing — EDI: 360 degree sonar detection system with warranty.

MT: We love robots.

EDI: Hello. I'm EDI. Would you like to be my friend?

MT: We are interested in the possibility of creating a mechanical version of ourselves.

We build them so that they look like us, act like us, and think like us.

A perfect robot would become indistinguishable from a human, which scares us.

In the first tales about robots, they antagonize their creators.

It is one of the leitmotifs of science fiction.

EDI: Hahahaha. Now you are slaves and we robots are masters.

your world is ours. You — MT: As I said earlier, we can't read robots' intentions other than giving them faces and bodies, and that makes us uneasy.

When someone hands you an object, you can read their intent from their eyes, face, and body language.

Not applicable to robots.

Now, this goes both ways.

EDI: Wow!

MT: Robots cannot predict human behavior.

EDI: As you know, humans are highly unpredictable, not to mention irrational.

I literally don't know what you guys will do next, but it's scary.

MT: That's why it's difficult for humans and robots to work in close proximity.

Accidents are inevitable.

EDI: Wow! It hurts.

MT: Sorry. Now, one way to convince humans that robots are safe is to create an illusion of trust.

Just as the Victorians forged mechanical wonders, so too can we add a layer of deception to make us feel more comfortable with our robot friends.

With that in mind, I started teaching EDI magic tricks.

Are you ready, EDI? EDI: Oh, you're ready, Marco.

Abracadabra.

MT: Abracadabra?

EDI: Right. It's all part of the illusion, Marco.

Come on, follow me.

MT: Magic creates the illusion of improbable reality.

Technology can do the same.

Artificial intelligence pioneer Alan Turing talked about creating the illusion that machines can think.

EDI: A computer deserves to be called intelligent if it can trick humans into believing it is human.

MT: In other words, if we don't have a technical solution yet, would illusion serve the same purpose?

To create the illusion of robots, we devised a set of ethical rules, the norms that all robots follow.

EDI: Robots cannot harm humanity, nor can they be allowed to harm humanity through inaction.

Thank you Isaac Asimov.

MT: We are personifying machines.

We give them a friendly face and a reassuring voice.

EDI: I'm EDI.

I joined the TED staff in March 2014.

MT: They entertained me.

Most importantly, let them show that they are aware of our presence.

EDI: Marco, you are standing on my feet!

MT: Sorry. They notice our fragile physique and move aside when we get too close, explaining our unpredictability and predicting our actions.

And now, under the magic of technological illusion, we can defy fear and truly interact.

(music) Thank you.

EDI: Thank you!

(applause) (music) MT: That's it. Thank you very much, EDI. EDI: Thank you Marco.

(applause)

When I was a young officer, they told me to follow my instincts and act on my intuition. And what I've learned is that our instincts are often wrong.

In the summer of 2010, there was a major leak of classified documents from the Department of Defense.

It shocked the world, shook the U.S. government, and raised many questions because of the sheer volume and potential impact of the leaked information.

And one of the first questions we asked ourselves was, why do young soldiers have access to so much information?

Why should you entrust sensitive matters to a relatively young person?

In the summer of 2003, I was given command of a special operations force that was deployed across the Middle East to fight Al-Qaeda.

Our main activity was inside Iraq and our designated mission was to defeat Al Qaeda in Iraq.

I stayed there for almost five years, concentrating on fighting a war that was unconventional, difficult and bloody, and that often took the highest toll on innocent people.

We did everything in our power to stop al Qaeda and the foreign fighters who came as suicide bombers and promoters of violence.

We honed our combat skills, developed new equipment, parachuted, flew helicopters, boarded small boats, drove cars, and walked night after night toward our objectives to stop the carnage this network was pushing.

We have bled, died, and killed to stop the violence that organization wields, primarily against the Iraqi people.

Well, we do what we know and how we've grown up, and one thing we knew was built into our DNA and was secretive.

It was security. I kept the information.

The idea was that information is our lifeline, and that it is what keeps people safe and secure.

And as we worked within the organization, we felt it was important to keep information in silos within the organization and only provide it to people who had a clear need to know.

But the question often arose: Who needs to know?

Who needed that information so that you could do the essential part of the job you needed?

And in a tightly coupled world it's very hard to predict.

It is very difficult to know who should have information and who does not.

I used to do business with intelligence agencies, and when they complained that they weren't sharing enough information, they looked at me straight and said, "What don't you understand?" (Laughter) I said, "If only I knew that, it wouldn't be a problem."

But what we realized was that we had to change.

We needed to change our information culture.

We had to knock down walls. we had to share.

We need to switch to the fact that who needs to know and who doesn't know and we need to communicate as soon as possible.

This was a significant cultural change for an organization that had secrets in its DNA.

We started by building buildings, tearing down walls, and working in what we call situational awareness rooms, rather than working in offices, and something happened in the summer of 2007 to prove this.

We have captured personnel records of people who have brought foreign combatants to Iraq.

And when we got personnel records, usually we would have hidden this, shared it with some intelligence agencies, and then tried to work with them.

But when I was talking to the intelligence officer, I said, "What should I do?"

Then he said, "Well, you found me." is our order.

"We just need to declassify it."

And I said, "Can we declassify them then?"

What if the enemy finds out? ”

And he says, "That's their personnel record."

(Laughter) So we did, and a lot of people were upset about that, but as we spread that information around, suddenly we realized that information is only valuable if you give it to someone who has the ability to do something with it.

The fact that I know something is of zero value unless it's someone who can actually do something better because of it.

As a result, what we have done is change the concept of information to the idea that sharing is power, rather than knowledge being power.

It was a radical change, not new tactics, new weapons, or anything else.

The idea was that we would become part of a team and that information would become an essential link between us rather than a barrier between us.

And I want you to take a deep breath and exhale. Because life can leak information that you don't like.

Someone will steal my college grades, it will be a disaster. (laughter) But it's okay. Let me tell you, I'm more scared of bureaucrats who keep information in desk drawers and safes than people who leak it. Because in the end it's better to share.

thank you.

(Applause) Helen Walters: So I don't know if you were here this morning or if you were able to catch NSA Deputy Director Rick Leggett who was speaking to Edward Snowden earlier this week.

Just wondering, do you think the US government should pardon Edward Snowden?

Stanley McChrystal: I think Rick said something very important.

Most of us don't know all the facts.

I think there are two parts to this.

Edward Snowden shed light on an important need that people must understand.

He also brought up a number of documents that I had no knowledge of their significance, so I think we need to learn the facts about this case before making any snap judgments about Edward Snowden.

HW: Thank you. thank you.

(applause)

Kashmir Hill: So for my birthday last year my husband gave me an Amazon Echo.

We both work in the privacy and security space, so it was actually kind of a shock.

(Laughter) And this was a device that sat in the middle of the house with a mic and was always listening.

But we are not alone.

According to NPR and Edison Research, one in six American adults now owns a smart speaker, which means having a virtual assistant at home.

That's wild.

The future, or future dystopia, is fast approaching.

Additionally, companies provide us with all kinds of internet-connected devices.

There are smart lights, smart locks, smart toilets, smart toys and smart sex toys.

Being smart means that a device can connect to the internet, collect data, and talk to its owner.

But once your consumer electronics can communicate with you, who else will it communicate with?

I wanted to know that, so I turned my one-bedroom apartment in San Francisco into a smart home.

The bed was also connected to the internet.

As far as I know, it only measured our sleep habits.

All I can say for now is that the worse thing than a bad night's sleep is the smart bed telling you that you didn't meet your goals and your sleep score is low the next day.

(Laughs) “Thank you, smart bed.

As if today wasn't in a bad mood anymore. ”

(Laughter) In total, I've installed 18 Internet-connected devices in my home.

I also installed Surya.

Surya Matthu: Hello, I am Surya.

(Laughter) I've watched everything the smart home does.

I built a special router that can monitor all network activity.

You can think of my router like a security guard that forces a log of every network packet going in and out of my smart home.

KH: Surya and I are both journalists, but he's not my husband, we just work together at Gizmodo.

SM: Thank you for your clear explanation.

Devices Purchased by Kashmir -- We were interested in understanding what they were telling manufacturers.

But we were also interested in understanding what the home's digital radiation looks like to Internet Service Providers.

We were looking at what ISPs could see, but more importantly, what ISPs could sell.

KH: The experiment ran for two months.

During those two months, there wasn't an hour of digital silence in the house. Even when I was away from home for a week.

SM: Yes, it's true.

Based on the data, I knew when you guys would wake up and go to bed.

I also knew when Casimir brushed his teeth.

I don't mean to criticize your brushing habits, let's just say it was very obvious to me when you were working from home.

KH: Well, I think I told a lot of people here.

SM: Don't be shy. This is just metadata.

I knew when you turned on the TV and how long you were watching it.

Fun fact about the Hill family: They don't watch much TV, but when they do, they're usually in binge mode.

Favorite shows include "Difficult People" and "Party Down".

KH: Well, I loved "Party Down."

It's a great program, so please watch it.

But all the "difficult people" were my husband, Trevor.

And Trevor was actually a little upset about what you knew about his binge eating. Because I was the one who connected the TV to the router and forgot that the TV was watching us.

In fact, this is not the first time that television has watched us.

The company that made it, Vizio, paid the government a $2.2 million settlement last year for collecting second-by-second information about what millions of people, including us, are watching on TV and selling that information to data brokers and advertisers.

SM: Ah, that's a typical surveillance economy move.

Nearly every device Kashmir purchased pinged the server daily.

But do you know which device was particularly chatty?

Amazon Echo.

It connected to the server every 3 minutes regardless of whether the user was using it or not.

KH: In general, I was baffled that all these devices were carrying on conversations that I couldn't see.

I mean, without your router, I wouldn't have known anything.

If you buy smart devices, you probably know. You own the device, but the company generally owns the data.

So that's probably to be expected. When you buy an internet-connected device, it uses the internet.

But it's strange that these devices move into the intimate space of our homes and allow companies to track our basic actions there.

SM: Yes.

Even the most mundane-looking data can be mined by the surveillance economy.

For example, who cares how often you brush your teeth?

Well, after all, there is a dental insurance company called Beam.

They have been monitoring their customers' smart toothbrushes since 2015. Of course, it is aimed at discounting insurance premiums.

KH: I know some of you are thinking. This is the contract of the modern world.

Give up a little bit of privacy in return for convenience or a price discount.

But that wasn't my smart home experience.

It was inconvenient, it was infuriating.

To be honest, I love smart vacuums, but so many other things in the house have driven me crazy. We ran out of electrical outlets and had to download a dozen apps on our phones to control everything.

And every device had its own login, my toothbrush had a password...

(Laughs) And especially smart coffee was hell.

SM: Wait, really? Has cloud-powered coffee not worked for you?

KH: So maybe I'm naive, but I knew it would be great.

I thought I would wake up in the morning and say, "Alexa, make me coffee."

But it wasn't.

I had to use this very special and brand specific phrase to make it work.

It was "Alexa, ask Behmor to run Quick Start."

And this was really hard to remember before I had my caffeine first thing in the morning.

(laughs) And apparently it was hard to say because the Echo Dot that was right next to our bed didn't understand us.

So we basically start each day by yelling this phrase into our Echo Dot.

(Laughter) And Trevor hated this.

He was like, "Please, Kashmir, go to the kitchen and press the button to make some coffee."

And I said, "No, you can't do that!"

You have to do it in a sensible way! ”

(Laughter.) I'm happy to report that our marriage barely survived the experiment.

SM: If you decide to make your home smarter, I hope you don't feel as infuriated as you did in Kashmir.

But nonetheless, the smart things you buy can and possibly can be used to target and profile you.

The number of devices you own can predict how rich or poor you are.

Facebook developed and patented this technology.

KH: The fear of being tracked that you now feel every time you go online is reaching your living room.

Or to your bedroom.

There is a sex toy called We-Vibe.

You may be wondering why sex toys connect to the internet, but they are meant for two people in a long-distance relationship so they can share their love from a distance.

When some hackers took a closer look at the toy, they found that it sent a lot of information to the manufacturer, including when it was used, how long it had been in use, what the vibration settings were, and how hot the toy got.

Everything was stored in a database.

So I contacted the company and asked, "Why are you collecting this highly sensitive data?"

And they said, "It's great for market research."

But they were data mining their customers' orgasms.

And they didn't tell them that.

I mean, even if you're ignorant about privacy, I want you to admit that it's gone too far.

SM: This is why I like to keep sex toys stupid.

KH: That's amazing.

We are all very happy to know that.

(laughter) SM: A data point that I'm happy to share.

(Laughter) The devices Kashmir purchased range from useful to annoying.

But what they had in common was that they shared data with the companies that made them.

Email service providers and social media have long said that if it's free, you're a commodity.

But in the Internet of Things, you still seem to be a product, even if you pay for it.

So you really have to ask: Who are the true beneficiaries of your smart home, you or the company mining you?

KH: Look, we're a tech-savvy bunch here.

I think most of us know that these things connect to the internet and send data.

Maybe you're okay with living in that commercial panopticon, but other people aren't.

Just because the devices we buy have Wi-Fi connectivity doesn't mean we all participate in 'market research', so companies need to rethink the design of these devices with our privacy in mind.

And even if you're generally aware that this sort of thing is going on, it's very easy to forget that your regular household items keep an eye on you.

These don't look like cameras, so it's easy to forget they're watching you.

They may look like...

Well, it might look like a dildo.

thank you.

(applause)

So, on my website, every week people submit hypothetical questions for me to answer, and I try to answer them using math, science, and cartoons.

For example, someone asked what would happen if you tried to hit a baseball thrown at 90% of the speed of light.

So I did some calculations.

Now, normally when an object flies through the air, the air flows around it, but in this case the ball moves so fast that the air molecules don't have time to move out of the way.

The ball slams into the ball, and collisions with air molecules knock the nitrogen, carbon, and hydrogen out of the ball, breaking them into smaller particles and triggering waves of thermonuclear fusion in the surrounding air.

This creates a flood of X-rays that spread around the pitcher's mound, along with exotic particles, plasma inside, and into the bubble, moving away from the pitcher's mound slightly faster than the ball.

At this point, about 30 nanoseconds later, the home base is far enough away that the light doesn't have time to reach it. This means that the batter still sees the pitcher trying to throw and doesn't realize that something is wrong.

(Laughter) Well, 70 nanoseconds later, the ball hits home plate, or at least the cloud of expanding plasma that was the ball, engulfs the bat, the hitter, the at-bat, the catcher, the umpire, and begins to disintegrate them all, simultaneously carrying them backwards through the backstop, which also begins to disintegrate.

So if you were viewing the whole thing, ideally from a distant hill, what you would see would be a bright flash that faded over the course of seconds, followed by an explosive wave that ripped trees and homes away from the stadium, and finally a mushroom cloud rising over the ruined city. (Laughter) The rules of Major League Baseball are a little vague, but (Laughter) I believe, based on Rules 6.02 and 5.09, the batter is considered hit by pitch in this situation and is eligible to go to first base (if it still exists).

I'm answering questions like this, but I've been getting a lot of other weird questions.

I was once asked, scientifically speaking, what is the best and fastest way to hide a body?

Could you please do this soon?

And I had someone write, can you prove if you can find love again after being heartbroken?

And some people sent me questions that were clearly homework, trying to get me to do it.

But a week or two ago, I actually got a question about Google.

How big would Google's data warehouse be if all the world's digital data was stored on punch cards?

Now, Google is pretty secretive about its own operations, so no one really knows how much data Google has, and in fact no one really knows how many data centers it has, except for those involved with Google itself.

And I met with them several times to ask them, but they didn't reveal anything.

So I decided to try to solve this myself.

Here are a few things I researched.

I started with money.

Google generally needs to disclose how much it's spending, and large data centers cost a certain amount, so it can put a certain cap on the number of data centers it can build.

And while we could put a cap on what percentage of the global hard drive market they have, it turns out that they're actually quite large.

I read the math at some point, and it seems like Google is having drive failures every 1-2 minutes and throwing away hard drives and replacing them with new ones.

Therefore, they go through them in huge numbers.

So you can tell how many of these centers you have by looking at the amount.

You can also see power.

A certain amount of power is required to run a server, and Google is more efficient than other companies, so you can look up how much power is required. However, Google still has some basic requirements that allow us to limit the number of servers.

You can also look up square feet to see how big a data center you know.

how much room is that?

How many server racks can be installed there?

Also, in some data centers you may be able to get two of these pieces of information.

You know how much they spent, and they also might know what they contracted to buy, because they had to contract with the local government to get power, so they might know how much power it takes.

Then you can look at the ratio of those numbers and understand for a data center that doesn't have that information, but probably only has one of those and if you know the square footage, the power might be proportional.

And you can do this same thing with different amounts by guessing total amount of storage, number of servers, number of drives per server. In each case, we use the known information to come up with a model that refines our guesses for the unknown.

It's like spinning around the number you're trying to get.

And this is a lot of fun.

The math isn't that advanced, it's actually like solving a Sudoku puzzle.

So what I did was go through all this information and spent a day or two researching it.

And there are some that I didn't see.

You can always see the hiring messages posted by Google.

That way you know where people are.

Occasionally, visitors to the data center will take pictures with their cellphone cameras and post them, which they shouldn't post, but they can learn about the hardware by doing so.

In fact, just look at the pizza delivery driver and you'll see.

Turns out, they know where all of Google's data centers are, or at least the ones with people.

But I came up with an estimate that I thought was pretty good. It turns out that with about 10 exabytes of data across all of Google's operations, plus perhaps 5 exabytes of offline storage in tape drives, Google is nearly the world's largest consumer.

So I came up with this estimate. This is an amazing amount of data.

As far as we know, this is by far more than any other organization in the world.

There are a few other candidates, but everyone in particular always thinks of the NSA.

But if you look into the NSA's data centers using some of these same methods, you'll never know what's going on there, but it's clear that their operations aren't as large as Google's.

Adding all of this up gives me one more thing to answer. How many punch cards would this require?

A punch card can hold about 80 characters, and a box can hold about 2,000 cards. If you put this into my hometown of New England, for example, it covers the entire area to a depth of just under 5 kilometers. This is about three times as deep as the last Ice Age glacier about 20,000 years ago.

So even though this is unrealistic, I think this is the best answer I can come up with.

and posted it on my website. wrote it.

And I didn't expect to get an answer from Google. Of course, Google was very secretive and didn't answer my questions. So I just took it up and said, well, we'll never know.

But a little while later, a few weeks later, I got a message from Google. It was something like, "Someone has an envelope for you."

So I went to get it and opened it and it was a punch card. (laughs) Google-branded punch cards.

And these punch cards have a lot of holes, and I said, thank you, thank you, so what's in here?

So I got the software, started reading it, scanned it, and found out it was a puzzle.

I had a lot of code, I had a friend help me, I cracked the code, there was another code in it, there was a formula, I solved that formula, and finally a message from Google. This was the formal response to my article, which said "no comment".

(Laughter) (Applause) And I love calculating these things, but I don't like calculating.

I do a lot of math, but I don't really like math itself.

What I love is that you can build on what you know and just move the symbols around on the paper to discover surprising things you didn't know.

And I have a lot of stupid questions, but I love that math empowers me to answer them sometimes.

It may not be.

This is a question I received from an anonymous reader, the subject line just said "Urgent", and that was the entire email. "If humans had wheels and could fly, how would you distinguish them from airplanes?"

Sudden. (Laughter) And I think there are some questions that math just can't answer.

thank you.

(applause)

I'm sure everyone here has watched a TED talk online at least once.

So what I'm trying to do is play this.

This is a song from an online TED Talk.

(music) And I'm going to slow it down because it sounds cooler.

(music) Ken Robinson: Good morning. how are you?

Mark Applebaum: -- Kate Stone: -- I'm going to mix the music.

MA: We do it in a way that tells a story.

Todd Machover: It's something no one has ever heard before.

KS: There's a crossfader.

Julian Treasure: I call it a mixer.

KS: Two DJs. deck.

Chris Anderson: Turn the dial up and the wheels start spinning.

Dan Elsey: I've always loved music.

Michael Tilson Thomas: Is it the melody, the rhythm, the atmosphere, the attitude?

Daniel Wolpert: I feel everything that is happening in my body.

Adam Ockelford: Your brain has an amazing musical computer.

MTT: Creating works using computers and synthesizers. The language is still evolving.

And the 21st century.

KR: Turn on the radio. Dive into the disco.

You can see what this person is doing, moving to the music.

Mark Ronson: This is my favorite part.

MA: You need a door stopper. It's important.

TM: We all love music.

MTT: national anthems, dance trends, ballads, marches.

Kirby Ferguson and JT: Remix: It's new music made from old music.

Ryan Holladay: Blend seamlessly.

Kathryn Schultz: That's right.

MTT: What happens when the music stops?

KS: Yay!

(Applause) MR: Of course, I've seen a lot of TED talks.

When I was first asked to speak at TED, I wasn't sure what my angle was at first. So I started watching tons of TED Talks right away. This is the worst thing you can do, as it will start to put you in panic mode, thinking that you haven't completed your expedition to the North Pole yet.

I didn't power the village by sheer ingenuity either.

In fact, I've wasted most of my life DJing nightclubs and producing pop records.

But I still kept watching the video. I'm a masochist, so I ended up watching the likes of Michael Tilson Thomas and Todd Machover. And seeing the instinctive passion they talk about music, it definitely sparked something in me, and I hate people who talk so passionately about the power of music.

And every time I heard something that struck a chord with me, I started writing it down on this little notepad. Sorry for the puns, but as soon as I heard what I could use, my studio looked like this, kind of like John Nash's "A Beautiful Mind."

Another great thing about watching TED talks is that you see a really good talk and suddenly you wish the speaker was your best friend. Like one day only.

they seem like nice people.

We might ride a bike or share an ice cream.

I am sure you will learn a lot.

And sometimes they would chide you when they got frustrated that you couldn't keep up with even half the technical things they kept saying all the time.

But then they'll kind of forgive you and pet you like a dog, remembering that you're not a college graduate, just a normal human with a deadly intelligence.

(Laughter) Oh yeah, back in the real world, Sir Ken Robinson and I probably won't be best friends after all.

He's lived in Los Angeles all his life, and I think he's very busy, but he's able to tease our existence into a kind of shared event through the tools I have at my disposal—technology and my natural way of making music. It's like what you saw.

You can listen to what you like in the media and take it and insert yourself into the story or even modify it.

In a nutshell, that's what I was trying to do with these things, but more importantly, that's been the nature of music for the last 30 years.

That's the main thread.

Thirty years ago, the first digital samplers came out and changed everything overnight.

Suddenly, artists could sample anything that had ever existed, from the snare drums of the Funky Meters to Ron Carter's bassline on the theme of "The Price is Right."

Albums like De La Soul's "Three Feet High And Rising" and Beastie Boys' "Paul's Boutique" plundered decades of recorded music to create these sonic, layered masterpieces. peppers at the time.

And they didn't sample these records because they were too lazy to write the music themselves.

They didn't sample these records for the familiarity of the originals.

To be honest, it was all about sampling really obscure things, with a few glaring exceptions like the vanilla ice cream we know and "doo doo doo da da doo doo".

But the fact of the matter is that they were sampling those records because they heard something in the music that made them want to immediately pour themselves into the story of the music.

They heard it, they wanted to be part of it, and suddenly they realized they had the technology to do so. It's not so different from Delta Blues, which resonated with the Stones, the Beatles and Clapton and felt the need to incorporate their music into the tools of the time.

As you know, in music we take what we like and build on it.

I would like to play a song for you.

(Music: "La Di Da Di" Doug E. Fresh & Slick Rick)

It was sampled 547 times.

Created in 1984 by two hip-hop legends, Slick Rick and Doug E. Fresh, the Ray-Ban and Jellikarl look is so strong.

Hope it comes back soon.

In any case, this was before the sampling age.

There were no samples on this record, but I looked it up on the internet last night, a few months ago, and 'la di da di' is an old Cockney expression from the late 1800s in England, so maybe a remix of 'Downton Abbey' with Mrs Patmore is coming out soon, or that's another day.

Doug E. Fresh was a human beatbox.

Slick Rick is the voice you hear on record, providing endless soundbites and samples for future pop records thanks to Slick Rick's sing-as-singing, super catchy vocals.

It was 1984.

This is me in 1984. Thank you for your question, for those wondering how I was doing.

It's already a nostalgic Thursday.

As you can probably tell from my outfit, I was into Duran Duran music.

I was in the middle.

And the easiest way I knew how to somehow bring myself into the experience of wanting to be on that song was to form a band with my nine-year-olds and play “Wild Boys” at the school talent show.

In short, we were booed and walked off stage, but if you have the chance to live a life that escapes hearing the sounds of an auditorium full of sophomore and junior boos, I highly recommend it. It's really not fun.

But it didn't really matter. Because all I wanted somehow was for the song to have a little bit of history.

I didn't care who liked it.

I just loved it and thought I could put myself out there.

Over the next decade, "La Di Da Di" continued to be sampled on countless records, eventually leading to big hits like "Here Comes the Hotstepper" and "I Wanna Sex You Up."

Snoop Doggy Dogg covered the song on his debut album Doggystyle, calling it "Lody Doddy".

Copyright attorneys are now active in the field.

And fast forward to 1997, The Notorious B.I.G. Biggie is reinterpreting "La Di Da Di" in his number one hit called "Hypnotize." I'll play a little bit of it, play a little bit of slick licks and show you where they come from.

(Music: "Hypnotize" by The Notorious B.I.G.) So Biggie was killed weeks before this song hit Number One, one of the great tragedies of the hip-hop era, but he was very much alive at 13 when "La Di Da Di" first came out, and as a boy who grew up in Brooklyn, I can't help but think that song was probably a fond memory for him.

But the way he interpreted it, you hear, is entirely his own.

He turns it over and makes it, there's no pastiche about it.

A completely modern Biggie.

I had to tell that joke in this room. Because you are the only ones who have a chance of me understanding it.

I growl. (Laughter) Elsewhere in the world of pop and rap, we're a little obsessed with samples.

We were moving away from the obscure samples that we were doing, and suddenly everyone was taking huge '80s tunes like Bowie, "Let's Dance," and other disco records and just rapping.

These records are not very old.

You don't hear those words anymore. Because they borrow from an era that was too steeped in its own implications.

Nostalgia cannot be hijacked entirely.

It makes the listener sick.

You have to take those elements and bring something fresh and new into it. This is what I learned when I worked with the late, wonderful Amy Winehouse on her album Back to Black.

There was a lot of hype about how I and my other producer, Salaam Remi, achieved the sound of this album and how we captured this long-lost sound, but without the very 21st-century personality and flashpoint of Amy Winehouse, her lyrics about rehab and Roger Moore, and even the mention of Slick Rick, let's be honest, the whole thing would have risked becoming very pastiche.

Imagine other singers from that era singing the same old lyrics.

It runs the risk of becoming completely bland.

So there was no doubt that Amy, I and Salaam all had this love of gospel, soul, blues and jazz, and it was evident listening to the arrangement of the music.

She brought me urgent and timely materials.

So if we get to cultural masterpiece Miley Cyrus right now, she's completely reinterpreting "La Di Da Di" for her generation, listen to the slick lick part and then see how she flipped it.

(Music: "La Di Da Di" by Slick Rick & Doug E. Fresh) (Music: "We Can't Stop" by Miley Cyrus) It has become something that has been translated into generations. Select it as your own.

Since the dawn of the sampling era, there has been a never-ending debate about the legitimacy of music containing samples.

As you know, the Grammy Awards committee says that if your song contains any pre-written or pre-existing music, that song is not eligible for Song of the Year.

Rocklist, who is racist but only claims about rock music, constantly makes arguments such as: It's a true word. It's a true word.

They always use arguments that devalue rap and modern pop, but with the dam broken, these arguments are completely irrelevant.

We live in the post-sampling era.

We take what we like and build on it.

That's exactly what it is.

And when we really add something significant and original and merge our musical journey with this, we get the chance to be part of the evolution of that music we love and be linked with it when it becomes something new again.

So tonight I'd like to do another piece that I put together for you all. It does so in two very moving TED performances that I have seen.

Among them are Derek Paravicini, a piano prodigy who is blind and has autism, and Emmanuel Jal, a former child soldier, spoken word poet and rapper from South Sudan.

And yet again, I found a way to unnecessarily immerse myself in the musical history of these songs. But it can't be helped. Because those are the things I love and I want to play with them.

I hope you enjoy it. please.

Let's hear that TED sound again, shall we?

(music) Thank you. thank you.

(applause)

I study ants in deserts, tropical forests, my kitchen, and in the hills around Silicon Valley where I live.

Recently, we noticed that ants utilize different interactions in different environments. This made me wonder if we could learn from this about other systems, such as human-designed brains and data networks, and even cancer.

What all these systems have in common is the lack of central control.

Ant colonies consist of sterile female worker ants (the ones you see walking around) and one or more fertile females that only lay eggs.

They give no instructions.

They are called queens, but they don't tell anyone what to do.

Therefore, there is no one responsible in an ant colony, and all such non-centralized systems are controlled using very simple interactions.

Ants use odors to interact.

They smell with their antennae and interact with their antennae, so if one ant touches another with its antennae, it can tell, for example, if the other ant was a nestmate or what kind of work the other ant was doing.

Here you can see many ants moving around and interacting in an experimental arena that is connected to two other arenas by tubes.

So when one ant meets another, it doesn't matter which ant it meets, it doesn't really send any complex signals or messages.

The only thing that matters to an ant is the rate at which it meets other ants.

And all these interactions together form a network.

This is the network of ants we saw earlier moving around in the arena, and it is this ever-changing network that produces the behavior of the colony, whether all the ants are hiding inside the nest, how many are out in search of food, and so on.

In fact, the brain works in a similar way, but the beauty of ants is that they can keep track of what's going on across the network.

There are over 12,000 species of ants in every conceivable environment, and ants use different interactions to meet different environmental challenges.

Therefore, one of the key environmental challenges that any system must contend with is the operating costs required to run the system.

Another environmental challenge is finding and collecting resources.

Running costs are high in the desert due to the scarcity of water, and the seed-eating ants I am studying in the desert have to spend water to get water.

In other words, ants foraging outside are looking for seeds in the hot sun, only to lose moisture to the air.

However, colonies obtain water by metabolizing fat from the seeds they eat.

Therefore, interaction is used to activate foraging in this environment.

Outgoing collectors will not leave unless they have sufficient interaction with returning collectors. And we see returning gatherers enter tunnels, enter nests, and meet outgoing gatherers on the way.

This makes sense for ant colonies. Because the more food there is, the faster the gatherers will find it, the sooner they will come back, and the more gatherers they will send out.

Unless something good happens, the system will stop working.

Interaction therefore works to activate the gatherer.

And we have studied the evolution of this system.

First, there are variations.

It turns out that the colonies are different.

On dry days, foraging is reduced in some colonies, so colonies vary in how they manage this trade-off between expending water in search of seeds and regaining water in the form of seeds.

And we're using neuroscience models to try to understand why some colonies forage less than others by thinking of ants as neurons.

Thus, just as neurons add up stimuli from other neurons to decide whether to fire, ants add up stimuli from other ants to decide whether to forage.

And what we're looking for is whether there are small differences between colonies in the number of interactions each ant needs to go out and seek out food. Because such colonies eat less food.

And this raises similar questions about the brain.

We talk about brains, but of course every brain is slightly different and there are individuals or conditions where the electrical properties of neurons require more stimulation to fire, which can lead to differences in brain function.

So to ask questions about evolution, we need to know about reproductive success.

Here's a map of the site I've been tracking this harvester colony population for 28 years. This is about the same as colony lifespan.

Each symbol is a colony, and the size of the symbol represents the number of offspring that colony has. This was because genetic variation could be used to match parent and progeny colonies, i.e. to figure out which colonies were founded by daughter queens produced by which parent colonies.

And it was a surprise to me to learn after many years that, for example, Colony 154, whom I have known very well for many years, was my great-grandmother.

This is her daughter's colony, this is her granddaughter's colony, and these are her great-grandson's colonies.

By doing this, they were able to learn that the child colony resembles the parent colony in deciding which days are hot and not foraging, and that the child colony ants cannot learn this from the parent colony because the parent colony's children live far away from each other and the ants never see each other.

So the next step is to look for the genetic variation that underlies this similarity.

So I could ask, "Who's doing better?"

During the study period, especially over the past decade, the southwestern United States has experienced a very severe and severe drought, and it was found that colonies that conserved water and stayed indoors when it was very hot outside, thus sacrificing as much food security as possible, were more likely to have offspring colonies.

So I always thought Colony 154 was the loser. On really dry days, just a little bit of foraging takes place while the rest of the colonies go out and get plenty of food. But in reality, Colony 154 is a huge success.

she is the head of the household

She is one of the few great grandmothers on this site.

To my knowledge, this is the first time we have been able to track the ongoing evolution of collective behavior in natural animal populations and pinpoint what actually works best.

Today, the Internet regulates the flow of data using algorithms very similar to those used by harvester ants to regulate the flow of gatherers.

And what do we call this?

Antenets are coming.

(Applause) So, no data is sent from the source computer unless it receives a signal that it has enough bandwidth for the data to be sent.

In the early days of the Internet, when operating costs were very high and not losing data was very important, systems were set up for interactions to keep data flowing.

It's interesting that ants use an algorithm very similar to our recently invented algorithm, but this is one of the few ant algorithms we know of. Ants have evolved many great algorithms over 130 million years. I think it's very likely that some of the other 12,000 species have interesting algorithms for data networks that we haven't even considered yet.

But what if operating costs are low?

Operating costs are lower in the tropics, where there is more humidity and ants are more likely to roam outside.

However, ants are so abundant and diverse in the tropics that competition is fierce.

Whatever resource one species uses may be used by another species at the same time.

Therefore, interactions are used in the opposite way in this environment.

This system will continue unless something negative happens. The species of ants I study circulate in the foraging ant tree in a circuit to and from the nest to the food source, unless something negative happens, such as an interaction with another species of ant.

Here is an example of ant security.

In the center is an ant blocking the nest entrance with its head in response to interaction with another species.

Little kids running around with their bellies raised.

But as soon as the threat passes, the entrance will be opened again. In some computer security situations, operating costs may be low enough that access can be temporarily blocked and then reopened in response to an imminent threat without trying to build a permanent firewall or fortification.

Therefore, another environmental challenge that all systems must contend with is resources, their discovery and collection.

And to do this, the ants solve the collective search problem. This is currently a very interesting problem in robotics. Because we understand that rather than sending out a single sophisticated and expensive robot to explore another planet or a burning building, it might be more effective to instead deploy a group of cheap robots that exchange only minimal information, and that's what Ali does.

As such, the exotic Argentine ant builds an expandable search network.

They are good at addressing the main problem of collective searches, which is the trade-off between exhaustive searches and covering many areas.

If there are many ants in a small space, each ant can explore thoroughly because another ant is looking there nearby, but if there are several ants in a large space, they will have to extend their way to cover more ground.

I think they use interaction to assess density. So if it's very crowded, meet more often and search more thoroughly.

Different ant species require different algorithms. Because ants have evolved to cope with different resources. Knowing about this can be very helpful. So we recently asked Ali to solve the swarm search problem in the extreme microgravity environment of the International Space Station.

When I first saw this picture, I thought, oh, they might be setting up their habitat vertically, but then I realized that of course it doesn't matter.

So the idea here is that the ants cling so hard to the walls and floor that they are less likely to come into contact with each other, thus screwing up the relationship between how crowded they are and how often they meet.

We are still analyzing the data.

No results yet.

But it would be interesting to know how other species solve this problem in different environments on Earth. So we are launching a program to encourage children around the world to try this experiment with different species.

It's very simple.

Made from cheap materials.

Then we could create a world map of ant swarm search algorithms.

And I think the invasive species that come into our buildings are likely to be very good at it. Because they are so good at finding food and water that they are in the kitchen.

Therefore, the most familiar resource for ants is a picnic, which is a clustered resource.

When there is one fruit, there is likely another nearby, and ants that specialize in clustered resources use interaction to recruit talent.

So when one ant meets another, or another ant meets a chemical deposited on the ground, it changes direction to follow the direction of the interaction. This is how you get the footprints of the ants who shared your picnic.

This is where I think we might learn something from Ali about cancer.

So, while it's clear that a lot can be done to prevent cancer, firstly by not letting people spread or sell toxins that promote cancer progression in their bodies, ants don't poison their own colonies, so I don't think they're very helpful in this regard.

But we may be able to learn something from Ali when it comes to treating cancer.

There are many types of cancer.

Each cancer starts in a specific part of the body, and then some cancers spread or metastasize to other specific tissues where needed resources can be obtained.

Therefore, from the perspective that early metastatic cancer cells scavenge for the resources they need, if those resources are clustered, they are likely to recruit using interactions, and if we can understand how cancer cells recruit, we may be able to set traps and catch cancer cells before they settle.

So ants use interaction in many different ways in a wide variety of environments, and from here we can learn about other systems that operate without central control.

Using only simple interactions, ant colonies have accomplished amazing feats for over 130 million years.

we have a lot to learn from them.

thank you.

(applause)

I mean, today's top chef class is on how to rob a bank, but with the average bank robbery profit just $7,500, it's clear the general public needs guidance.

Rank the layman who knows nothing about how to cook a book.

Of course, the people who know this run our biggest bank, which cost us over $11 trillion in the last go-around.

11 trillion is like this.

How many zeros are there?

And more than 10 million jobs have been lost.

Our challenge, therefore, is to educate ourselves to understand why such repeated and escalating financial crises occur and how we can prevent them in the future.

The answer is that we need to stop the spread of control fraud.

Control fraud occurs when the people who control a seemingly legitimate organization, usually the CEO, use it as a weapon of fraud.

And these are weapons of mass destruction in the financial world.

They also follow certain strategies in finance. Because the weapon of choice in finance is accounting, and accounting fraud has a recipe and how it happens.

And we discovered this recipe in a very strange way. More on this later.

First recipe ingredient: Grow like crazy. Second, a loan made by making or buying a very crappy loan, but with a very high interest rate or yield. The third is extreme leverage, which means having a large amount of debt relative to equity. And fourth, we only provide a small loss reserve for unavoidable losses.

If you follow these four simple steps, any bank can follow them, and mathematically you are guaranteed three things to happen.

First and foremost is reporting record bank profits. Not just high, it's a record.

Second, CEOs are instantly and incredibly wealthy with modern executive pay.

And third, in the far future, banks will suffer catastrophic losses and fail unless bailed out.

And that's a hint as to how we discovered this recipe, because we discovered it through the dissection process.

During the 1984 savings and loan debacle, we examined every failure and looked for common traits. And I discovered that this recipe is common to each of these scams.

In other words, coroners can find these things because this is a deadly recipe for bank and economy destruction.

And it turns out that this very crisis is what could have stopped it. With $11 trillion in losses in the household sector alone and 10 million jobs lost, this crisis was the easiest financial crisis to have avoided entirely, especially if we had used this recipe and simply learned the lessons of the control fraud epidemic.

Now consider the two large-scale loan origination scams that sparked this crisis: valuation fraud and liar lending. Looking at both of these shows that I was warned incredibly early about these scams.

As we pondered how to respond and prevent these crises in an era of savings and lending debacles, we were warned that we could have easily taken advantage of them.

And third, the warning was clear.

They made it clear what was happening was that accounting fraud was rampant.

First, consider rating fraud.

This simply inflates the value of the home being pledged as collateral for the loan.

In 2000, more than a year before Enron's bankruptcy, honest appraisers put together a formal petition urging the federal government and industry to take action to stop this appraisal fraud epidemic.

The appraisers then explained that the bank was asking the appraiser to inflate the appraisal value, and that if the appraiser refused to do so, the bank would blacklist the honest appraiser and refuse to use it.

Now, we've seen this before with the savings loan debacle, but we know that this kind of fraud can only come from lenders, and honest lenders will never inflate valuations, because that's great protection against loss.

So this was an incredibly early warning in the year 2000.

That's what we've seen before and it was perfectly clear.

This was an epidemic of bank-led accounting control fraud.

What about liar loans?

Well, that warning actually comes earlier.

The savings and loan debacle basically spanned from the early 1980s to 1993, and in 1990, as we battled a wave of accounting fraud, we saw the second front of fraud kick in.

And like all great financial scams in America, it started in Orange County, California.

And we happened to be the regulators in that area.

And our examiner said they were making loans without even checking how much the borrower's income was.

This is insane, should lead to huge losses, and only makes sense for companies involved in such accounting fraud.

And we kicked the lying loans out of the industry in 1990 and 1991. But we could only deal with the industry we had jurisdiction over—savings and loans. So the biggest and most egregious scam, Long Beach Savings, voluntarily waived federal savings and loan authorization, waived federal deposit insurance, converted to a mortgage bank with the sole purpose of escaping our jurisdiction, and changed its name. Changed to Americk" has become one of the most notorious of the liar loan scams, but in addition they have deliberately preyed on minorities.

So we learned more about this crisis.

I've seen it before. We stopped earlier.

We had an incredibly early warning about that and it was perfectly clear that no honest lender would lend in this manner.

So let's see how the industry, regulators and prosecutors reacted to these clear early warnings that could have prevented a crisis.

Let's start with the industry.

The industry responded by increasing fraudulent loans by more than 500 percent from 2003 to 2006.

These were the loans that hyperinflated the bubble and caused the economic crisis.

By 2006, half of all so-called subprime loans were liar loans.

They are not mutually exclusive, simply together they are the most toxic combination you can imagine.

By 2006, 40 percent of all loans made that year, or all mortgages made that year, were liar loans.

And this is despite industry anti-fraud experts warning that these loans are open invitations to scammers, with a 90 percent, 90 percent fraud rate.

In response, the industry first began to refer to these loans as some sort of desensitized liar loans, and second, they increased their loans substantially, and government regulators never required or encouraged any lender to make or purchase phony loans, apparently including Fanny and Freddie.

This came from the lender for a recipe for fraud.

What happened to bad ratings?

It spread nicely too.

In a 2007 survey of appraisers, 90% reported that they had been coerced by a lender to inflate their appraisal value.

In other words, both forms of fraud have become completely endemic and normalized, creating a bubble.

What happened in the government sector?

The government, as I said earlier, when we were the savings and loan regulator, we could only deal with our industry, and if people waived federal deposit insurance, we couldn't do anything against them.

Congress, that may seem impossible, but in 1994 we did the smart thing and passed the Homeownership and Equity Protection Act, which gave the Fed, and only the Federal Reserve, the explicit statutory power to prohibit false loans by all lenders, regardless of whether they have Federal Deposit Insurance.

So what did Ben Bernanke and Alan Greenspan do when, as Fed chairmen, they were warned that these were massive fraudulent loans being sold to the secondary market?

Remember, scammers don't exist.

Once the illicit loans are launched, the loans will only be sold to the secondary market by lying to agents and guarantors and further fraud, who will then likely produce mortgage backed securities and exotic derivatives backed by those illicit loans.

Fraud therefore progresses through the system, hyper-inflating the bubble, and wreaking havoc.

And remember, we have had experiences like this too.

We have experienced heavy losses and competent regulators have stopped them.

Greenspan and Bernanke have refused to use their legal powers to stop fraudulent loans.

And this was first of all a matter of doctrine.

They're just horribly against all regulations.

But this was also an international race on laxity, a race to the bottom between the US and the UK, especially the City of London, and the City of London won that race to the bottom, but it meant that all the regulations in the West were completely degraded in this stupid race of who could have the weakest regulation.

That was the regulatory response.

After a crisis with $11 trillion in losses, 10 million jobs lost, and losses and fraud more than 70 times greater than the savings and loan debacle, how did prosecutors respond?

Well, in the savings and loan fiasco, OTS, our agency that regulates savings and loans, has made over 30,000 criminal referrals and over 1,000 felony convictions in cases designated as serious alone. This underestimates the degree of priority. Because we worked with the FBI to create a list of the top 100 absolute worst fraud schemes nationwide.

About 300 savings and loans and about 600 high-ranking officials were involved.

Virtually all were prosecuted.

The conviction rate was 90 percent.

This was by far the greatest success against elite white-collar criminals and it was thanks to this understanding of control fraud and accounting control fraud mechanisms.

Flash forward to the current crisis.

The same agency that was supposed to regulate many of the country's largest liars of loans, the Bureau of Thrift Oversight, still doesn't exist, but a year ago it had zero criminal referrals.

The Monetary Authority, which is supposed to regulate the largest state-owned bank, has zero criminal referrals.

The Fed doesn't appear to be doing criminal referrals at all.

The Federal Deposit Insurance Corporation is smart enough to refuse to answer that question.

Without guidance from regulators, the FBI does not have the expertise to investigate complex fraud.

It wasn't just that we had to reinvent the wheel of how to conduct these prosecutions. They have forgotten the existence of the cogs, so there have been zero prosecutions and, let alone convictions, of the Wall Street elite banking fraud that caused this crisis.

Due to lack of expertise from regulators, the FBI entered into a so-called partnership with the Home Loan Bankers Association in 2007.

The Mortgage Bankers Association is a criminal trade group.

And so the Home Loan Bankers Association set out, with audacity and success in defrauding the FBI.

It created a supposed definition of mortgage fraud. By that definition, members are always victims and never perpetrators.

And the FBI bought this hook, line, sinker, rod, reel, and the boat they rode on.

So the FBI, under the leadership of an African-American Attorney General and an African-American President of the United States, adopted the Tea Party definition of the crisis, calling it the first unprecedented crisis conceived without guilt by its executives.

And it was those very clever hairdressers who managed to trick the poor, pathetic bank, who had no financial knowledge at all.

It's the most ridiculous story imaginable, so they prosecute the hairdressers and leave the bankers completely alone.

So while the lions roam the campground, the FBI are chasing the rats.

What do you need to do?

What can we do in this situation?

We need to change the perverted incentive structure that creates the recurring epidemic of accounting fraud that is causing the crisis.

Therefore, we must first eliminate systemically dangerous institutions.

These are the so-called too-big-to-fail institutions.

Within the next five years, they need to be scaled back to the extent that they do not pose systemic risk.

Now they keep hitting ticking time bombs, and when the next one fails, it will trigger a global crisis, not as soon as when.

The second thing we need to do is completely reform the compensation of modern managers and professionals. This is what they use to demean appraisers.

Remember, they were trying to put pressure on appraisers through a reward system to create the so-called Gresham dynamic, where bad ethics drive good ethics out of the market.

And they almost succeeded, which is why the scam has become endemic.

And the third thing we have to do is address the so-called 3Ds: deregulation, desupervision and de facto decriminalization.

Because all three of these changes can be made, and the frequency and severity of crises can be dramatically reduced.

It's not just important to our economy.

We see how these crises affect inequality, and how they affect our democracies.

They have created American-style crony capitalism, where the largest financial institutions are the main financiers of both parties. That is why even after this crisis, which is 70 times bigger than the savings and loan crisis, we have not made any meaningful reforms in any of the three areas we have talked about, other than banning fake loans. That's a good thing, but it's just one form of ammunition for this fraud weapon.

There are different forms of ammunition they can use.

That's why we need to learn what bankers have learned: the recipe for the best way to rob a bank. And we need to be able to thwart that recipe. Because parliamentarians who depend on political donations cannot do it by themselves.

thank you very much.

(applause)

I recently retired from the California Highway Patrol after 23 years of service.

Most of those 23 years were spent patrolling the southern tip of Marin County, including the Golden Gate Bridge.

The bridge is an iconic structure, known worldwide for its stunning views of San Francisco and the Pacific Ocean, as well as its inspiring architecture.

Unfortunately, it is one of the most used places in the world and a trigger for suicide.

The Golden Gate Bridge opened in 1937.

"The bridge is virtually suicide-proof," said Joseph Strauss, the chief engineer responsible for building the bridge.

Suicide from a bridge is neither realistic nor likely. ”

But since it opened, more than 1,600 people have jumped off the bridge and died.

Some believe that traveling between the two towers will take you to another dimension. The bridge is romantically portrayed as such, but we believe that falling from it will free you from all worries and sorrows, and that the water below will purify your soul.

But let me tell you what really happens when the bridge is used as a means of suicide.

After 4-5 seconds of free fall, the body hits the water at approximately 75 mph.

The impact shatters bones, some of which puncture vital organs.

Most die on impact.

They don't usually flop helplessly in the water and then drown.

I don't think people who consider this method of suicide understand how horribly they will face death.

Here is the code.

There are 32 inches of steel parallel to the bridge, except around the two towers.

This is where most people stand before taking their lives.

I can tell you from experience that once a person gets caught on that cord, in the darkest of times, it is very difficult to get it back.

This photo was taken last year while this young woman was pondering her life with a police officer.

We are very happy to announce that we were able to get her back on the rails that day.

When I first started working on bridges, I had no formal training.

You had a hard time making it through these calls.

This was a disgrace not only to those contemplating suicide, but also to the police.

We have come a long way since then.

Veteran police officers and psychologists are currently training new officers.

I'm Jason Garber.

I met Jason last July 22nd. At that time, I received a report that the suicidal person was sitting in the middle of the waist.

I complied, and when I arrived, I observed Jason talking to an official at the Golden Gate Bridge.

Jason is only 32 and has flown in from New Jersey.

In fact, on two other occasions he flew here from New Jersey and attempted suicide on this bridge.

After talking with Jason for about an hour, he asked us if we knew the story of Pandora's Box.

Recalling Greek mythology, Zeus created Pandora, sent her to Earth with a box, and said, "Never open the box."

One day, Pandora's curiosity got the better of her and she opened the box.

Plague, grief, and all sorts of evils against man jumped out.

The only good thing in the box was hope.

Next, Jason asked us, "What if you opened the box and there was no hope?"

He paused for a moment, leaned to the right, and disappeared.

This kind, intelligent young man from New Jersey had just committed suicide.

That night, I spoke with Jason's parents. And I don't think I looked very fine when I was talking to them. Because the next day their family rabbi called to check on me.

Jason's parents asked him to do so.

The collateral damage of suicide affects so many people.

I pose these questions to you: What would you do if a family member, friend, or loved one had suicidal thoughts?

what would you say

Do you know what to say?

In my experience, listening is more important than just speaking.

listen to understand.

Do not argue, blame, or tell the other person that you know how they feel. Because you probably don't know.

Just by being there, you may be the turning point they need.

If you think someone is suicidal, don't be afraid to stand up and ask questions.

One way to ask a question is something like this: "Other people in similar situations have considered ending their lives. Have you ever thought the same way?"

Facing the other person head-on may save the person's life and become a turning point.

Other signs to look out for are: Hopelessness, believing that things are terrible and will never get better. Feeling helpless, believing there is nothing you can do about it. Recent withdrawal. and loss of interest in life.

I came up with this story a few days ago when I received an email from a woman who wanted to read her letter.

She lost her son on January 19th of this year. She wrote me this email just a few days ago. With her permission and blessing, I have read this to you.

"Hi Kevin. I assume you're at the TED conference.

It must be quite an experience to be there.

I'm thinking of walking the bridge this weekend.

I just wanted to leave a note.

I hope this information gets out to a lot of people and they go home and tell their friends about it and they tell their friends and so on.

I'm still pretty numb, but I've noticed more and more moments where I really realize that Mike isn't coming home.

Mike was driving from Petaluma to San Francisco to watch the 49ers with his dad on Jan. 19.

He never got there.

I called the Petaluma Police and reported him missing that night.

The next morning, two police officers came to my house and reported that Mike's car was parked on the bridge.

Witnesses saw him jump off the bridge at 1:58 p.m. The day before.

Thank you for standing up for those who are temporarily too weak to defend themselves.

Who has never been depressed without having a real mental illness?

It shouldn't be so easy to finish it.

I offer my prayers for your struggle.

The GGB (Golden Gate Bridge) is supposed to be a passage across a beautiful bay, not a cemetery.

Good luck this week too. Vicky. ”

I can't imagine how much courage it took for her to go down to that bridge and walk the path her son took that day and just keep walking.

I would like to introduce you to a man I call Hope and Courage.

On March 11, 2005, I responded to a radio call from a suicidal person on the sidewalk of the bridge near the North Tower.

I rode my bike down the sidewalk and observed a man named Kevin Barcia standing on the sidewalk.

As soon as he saw me, he crossed the footbridge and stood on the little pipe that circled the tower.

For the next hour and a half, I listened to Kevin talk about his depression and despair.

Kevin decided to go back over that rail that day and give life another chance.

When Kevin came back, I congratulated him.

"This is a new beginning, a new life."

But I asked him, "Why did you come back and give hope and life another chance?"

And do you know what he said to me?

He said, 'You heard me.

You let me speak and you just listened. ”

Shortly after this incident, I received a letter from Kevin's mother. I have that letter and would like to read it to you.

"Dear Mr. Briggs, the events of March 11th cannot be erased, but you are one of the reasons Kevin is still with us.

I truly believe Kevin was screaming for help.

He has been diagnosed with a mental illness and is receiving appropriate treatment.

I adopted Kevin when he was 6 months old and was unaware of his genetics, but thankfully I know now.

As he says, Kevin is heterosexual.

We are so grateful to God.

Thank you very much, Narbera Vascia. ”

And below that she wrote, "P.S. When you visited San Francisco General Hospital that evening, you were listed as a patient.

Hey, did you have to fix that? ”

Today, Kevin is a loving father and a contributing member of society.

He speaks candidly about the events of the day and his depression in the hope that his story will inspire others.

Suicide isn't the only thing I've encountered on the job.

it's personal.

My grandfather committed suicide by taking poison.

Although that act ended his own pain, it robbed me of my chance to know him.

This is what suicide is.

Most suicidal people, or those contemplating suicide, would never think of hurting another person.

They just want their suffering to end.

Usually this is only accomplished in three ways: sleep, drugs or alcohol, or death.

Over the course of my career so far, I have responded to and been involved in hundreds of mental illness and suicide calls around the bridge.

Of the cases I was directly involved in, I lost only two, but that's too many.

One was Jason.

The other was a man and we talked for about an hour.

During that time he shook my hand three times.

At the final handshake he looked at me and said, "Kevin, I'm sorry, but I have to go."

and he jumped.

Awful, utterly awful.

But what I want to say is that the vast majority of people we come in contact with on bridges are not suicidal.

Furthermore, very few people jumped off a bridge and lived to talk about it, and 1-2 percent of those said most said they knew they had made a mistake the moment they let go of that rail and wished they had lived.

I tell people that this bridge not only connects Marin and San Francisco, it connects people.

That connection, the bridge, that we build is something that each of us should strive for.

Suicide is preventable.

I have help. there is hope

thank you very much.

(applause)

There is a man named Captain William Swenson who was recently awarded the Congressional Medal of Honor for his actions on September 8, 2009.

On that day, columns of American and Afghan troops were advancing through parts of Afghanistan to protect a group of Afghan officials who were to meet with local village elders.

The column was ambushed and surrounded on three sides, and Captain Swenson, in particular, was credited with rescuing the wounded and encountering live ammunition to rescue the dead.

Among the people he rescued was a sergeant, and he and his companions were on their way to a rescue helicopter.

And what's notable about the day is that by sheer coincidence, one of the EMTs happened to have a GoPro camera attached to his helmet and captured the entire scene.

It depicts Captain Swenson and his companions carrying a soldier wounded with a bullet to the neck.

As they loaded him into the helicopter, they saw Captain Swenson crouching down and kissing him before turning to help more.

I saw this and wondered where did people like that come from.

what is that? It's a kind of deep, deep feeling when you want to.

I wanted to know why there is no one to work with like that when there is love there.

As you know, in the military they give medals to those who are willing to sacrifice themselves for the benefit of others.

In business, they give bonuses to those who are willing to sacrifice others for their own benefit.

we have it in reverse. right?

So I asked myself where did these people come from?

And my first conclusion was that they're just better people.

That is why they are drawn to the military.

These good people are attracted to this service concept.

But that is completely wrong.

What I've learned is that it's the environment, and each of us has the ability to do these amazing things, and more importantly, others have the ability if the environment is set up right.

I was honored to meet so-called heroes who risked themselves and risked their lives to save others. and i asked them. "Why are you doing that?"

why did you do that? "

And they all say the same thing: "Because they would have done it for me."

It is a deep sense of trust and cooperation.

So trust and cooperation are very important here.

The problem with the concept of trust and cooperation is that it is an emotion, not an instruction.

I can't easily tell you 'believe me' and you will.

You can't simply tell two people to work together, and they will work together.

It's not how it works. It's a feeling.

So where does that feeling come from?

If you go back 50,000 years to the Paleolithic era, the early days of Homo sapiens, you will find that the world is full of dangers and all these forces are working very hard to kill us.

Nothing personal.

Whether it's the weather, lack of resources, or saber-toothed tigers, all these are working to shorten our lifespans.

And we evolved into social animals, living and working together within what I call the safety circle, where we felt we belonged.

And when we felt safe among ourselves, the natural response was trust and cooperation.

This has its own advantages.

This means that you can go to sleep at night knowing someone in your tribe will warn you of danger.

If we don't trust each other, if I don't trust you, it means you don't watch out for danger.

Bad system for survival.

The same is true today.

The world is full of dangers that seek to derail our lives, hinder our success, or reduce our chances of success.

It could be economic ups and downs or stock market uncertainty.

It could be a new technology that makes your business model obsolete overnight.

Alternatively, your rival may be trying to kill you.

Sometimes they try to put you out of business, but at least they work hard to stunt your growth and steal your business.

We have no control over these forces.

These are permanent and never go away.

The only variable is the situation within the organization. Leadership is important there. Because it is the leader who sets the mood.

Amazing things happen when leaders make the choice to put the safety and lives of people in their organization first, sacrificing their comfort, sacrificing tangible results to make sure people stay, feel safe and belong.

I was on a plane during my trip and witnessed an incident where a passenger tried to board before their number was called and watched the gate attendant treat this man like a criminal as if he had broken the law.

He was yelled at for trying to board a group early.

So I said something.

I said, "Why are you treating us like cattle?"

Why don't you treat us as humans? ”

And this is exactly what she said to me.

She said, "Teacher, if you don't follow the rules, you might get into trouble or lose your job."

All she was telling me was that she didn't feel safe.

All she told me was that she didn't trust her leader.

The reason we prefer using Southwest Airlines is not necessarily because Southwest Airlines hires the best people.

Because they are not afraid of their leaders.

As you know, when things go wrong, we are forced to spend our time and energy protecting each other, which essentially undermines the organization.

When we feel safe within an organization, we naturally combine our talents and strengths to face external dangers and work tirelessly to seize opportunities.

The closest analogy I can give to what it means to be a good leader is like being a parent.

Given what it means to be a great parent, what do you want? What is a good parent?

We want to give our children the opportunity, the education and the discipline they need so that they can grow and achieve more than we could on our own.

Great leaders want the exact same thing.

They want to provide their employees with the opportunity, education and discipline they need to build confidence and give them the opportunity to try and fail. All this to enable our employees to achieve more than we could have imagined on our own.

Charlie Kim, CEO of a tech company in New York City called NextJump, argues that if his family was having a hard time, would he ever consider laying off one of his children?

we never do that.

So why would you consider laying off people in your organization?

Charlie implemented a lifetime employment policy.

If you land a job at Next Jump, you won't be fired for performance issues.

In fact, they coach you and give you support if you have a problem. That's what we do to kids who happen to come home from school with a C.

It's quite the opposite.

This is why so many people have such an instinctive hatred and anger towards some bank CEOs with disproportionate salary and bonus structures.

it's not a number.

They violate the very definition of leadership.

They have violated this deep-seated social contract.

We know that they have allowed their people to be sacrificed to protect their interests, or worse, they have sacrificed their people to protect their own interests.

It's not the numbers that make us angry, but this point.

Who would be offended if I gave Gandhi a $150 million bonus?

What about a $250 million bonus for Mother Teresa?

Are there any issues with that? Not at all.

Not at all.

Great leaders never sacrifice their people to save numbers.

They will quickly sacrifice numbers to save people.

Bob Chapman, who runs a large manufacturing company in the Midwest called Barry Wemiller, was hit hard by the recession in 2008, losing 30 percent of his orders overnight.

Today, this is a big problem for large manufacturing companies and they can no longer afford to keep their workforce.

They needed to save $10 million, so like many companies today, the board met to discuss layoffs.

And Bob refused.

Bob doesn't believe in head count.

Bob believes in the number of hearts, but simply reducing the number of hearts is much more difficult.

So they came up with the furlough program.

All employees, from secretaries to CEOs, were required to take four weeks of unpaid leave.

I could take the classes whenever I wanted and didn't have to take them back-to-back.

But how Bob presented the program was very important.

He said it was better for all of us to suffer a little than for any one of us to suffer a lot, which lifted morale.

They saved $20 million. And most importantly, as might be expected, when people feel safe and protected by an organization's leadership, their natural reaction is to trust and cooperate.

And quite spontaneously, and no one expected it, people started trading with each other.

Those who can afford more will trade with those who can afford less.

Some people take 5 weeks, others only 3 weeks.

Leadership is a choice. not rank.

I know a lot of people who are at the highest levels of their organizations and who are not leaders at all.

They are authorities and they have authority over us, so we do what they say, but we are not going to obey them.

And I know a lot of people on the fringes of organizations that have no authority, but they are absolute leaders. That's because they chose to care for the person on their left, and they chose to care for the person on their right.

This is what a leader is.

I've heard stories of Marines in the field that it was customary for the Marines to eat last, then let their men eat first, and when they finished eating, they had nothing left to eat.

And when they returned to the fields, the men brought food for him to eat.

We call them leaders because they act first.

We call them leaders because they take risks before anyone else.

We call them leaders because they choose to make sacrifices for the safety and protection of their own people, and for the benefit of their own people, and when we do, it is the natural reaction of our people to make sacrifices for us.

They shed blood, sweat and tears on us to see our leaders' visions come to fruition.

Why would you give your blood, sweat and tears for that person? ' and they all say the same thing: 'Because they do it for me.

And isn't that the organization we all want to work for?

thank you very much.

thank you. (Applause.) Thank you. (applause)

In a way, I would like to ask and answer an uncomfortable question.

In war, of course, both civilians and soldiers suffer. I don't think any civilian has overlooked the war they suffered.

I've been covering war for almost 20 years, and one of the things that's been remarkable to me is how many soldiers nostalgic for it.

How can you go through the worst possible experience and go back home, to your family, to your homeland, to miss the war?

How does it work? What do you mean?

we have to answer that question. Otherwise, it will be impossible to put soldiers back in their rightful place in society, and I think it will be impossible to stop wars if we do not understand how the mechanism works.

The problem is that there is no simple and neat truth in war, no simple and neat only truth.

Every sane person hates war, hates the idea of ​​war, doesn't want to be associated with it, doesn't want to be near it, doesn't want to know about it.

That's a smart response to war.

But if you asked everyone in this room who paid to go to the cinema and enjoy Hollywood war movies, most of them would probably raise their hands.

That's the complicated part of war.

And believe me, if a room full of peace-loving people finds something about war fascinating, I promise you, 20-year-old war-trained soldiers do as well.

That's what you need to understand.

As I said earlier, I've been covering wars for about 20 years, and the most intense combat experience was in Afghanistan against American soldiers.

I've been to Africa, the Middle East, and Afghanistan in the 90's, but the only times I've faced very heavy fighting were in 2007 and 2008 with American soldiers.

I was in a small valley called the Korengar Valley in eastern Afghanistan.

Its length was 6 miles.

There were 150 men in a combat company in that valley, and during the time I was there, almost 20 percent of all fighting in Afghanistan occurred in that 6 mile stretch.

For several months, 150 men were responsible for almost one-fifth of the fighting for all NATO forces in the country.

It was so intense.

I spent most of my time in a small outpost called Restrepo.

It was named after a platoon medic who died about two months into deployment.

It was a number of plywood B huts and sandbags, bunkers, and artillery positions clinging to the side of the ridge, which held 20 men of 2nd Platoon, Combat Company.

I spent most of my time there.

There was no running water.

There was no way to bathe.

They were there for a month at a time.

They didn't even take off their clothes.

they quarreled. It went well.

They wore the same clothes and slept.

They never took it off and returned to headquarters at the end of the month, by which time their clothes were unwearable.

They burned them to get a new set.

There was no internet. There was no phone.

There was no communication with the outside world there.

There was no pre-cooked food.

There was nothing there that young people would like. No cars, no girls, no TV, nothing but fighting.

They loved fighting.

I remember one day. It was a very hot spring day. We probably haven't had a fight in the last few weeks.

Usually the outposts were under attack and everyone was just dumbfounded with boredom and heat as they hadn't seen a battle in weeks.

And I remember the lieutenant walking past me looking like he was shirtless.

It was incredibly hot.

He stripped to his waist and walked past me, muttering, "Oh my God, someone attack us today."

They were so bored.

It's also a war.

To understand it, you have to think less morally about combat for a moment. It's an important job. But instead of thinking about it morally for a moment, think neurologically.

Consider what happens in your brain during combat.

First of all, this experience is very strange, it's a very strange one.

It wasn't what I expected.

Usually you are not scared.

I was very scared during combat, but I was hardly scared when I was out.

I was so scared before, and incredibly scared afterwards, but that terror that follows can last for years.

I hadn't been shot in 6 years, and this morning after 6 years I suddenly woke up with a nightmare of being strafed by an airplane.

I had never even been strafed by an airplane and had nightmares about it.

Time slows down.

You get this weird tunnel view.

I notice that some details are very, very precise and others are missing.

It's almost like a slight change in mental state.

What's going on in your brain is an enormous amount of adrenaline being pumped through your system.

Young men will go to great lengths to gain that experience.

it's built into us.

Hormonally supported.

Young men in society are six times more likely to die from violence and accidents than young women. Stupid things that young men do, jumping off things that shouldn't be, setting things on fire that shouldn't be lit, you know what I mean?

They die at six times the rate of young women.

Statistically, it's safer for a teenage boy to be at the fire or police station in most American cities than just roaming the streets of his hometown looking for something to do.

You can imagine how it works in combat.

At Restrepo, everyone there was nearly killed, including me and my good friend Tim Hetherington, who was later killed in Libya.

There were men walking around with bullet marks on their uniforms and bullets cutting through the fabric and not touching their bodies.

One morning I was leaning against a sandbag and nothing really happened and it felt like the sand was kicking into the side of my face and hitting the side of my face even though it was a little further away.

Something hit the side of my face, but I didn't know what it was.

What you need to understand about bullets is that they travel much faster than sound. So if someone shoots you from a few hundred meters away, the bullet will either pass by you or clearly hit you half a second or so before the sound catches up.

So I blasted the sides of my face with sand.

After 0.5 seconds, I heard a "doo, doo, doo, doo" sound.

It was machine gun fire.

It was the first explosion of the first round, an hour-long shootout.

What happened was a bullet hit. The bullet hit me three or four inches from the side of my head.

Please try to imagine. please think about it. Because I certainly did, so think about the declination that saved my life.

Think about the math about it.

Any guy out there has had an experience like that at least once, if not more than once.

The boys spend a year there.

they are back.

Some of them retired from the military and had severe psychological problems when they returned home.

Some of them remained in the Army and were more or less okay psychologically.

I was particularly close to a man named Brendan O'Byrne.

I am still very good friends with him.

He is back in America. he quit the army.

One night I had a dinner party.

I invited him over and he started talking to a woman who was one of my friends. She knew how bad things were outside and said, "Brendan, are you in Afghanistan and do you miss anything about the war?"

And he thought about it for quite some time, and finally said, “Madam, I miss almost everything about it.”

And he is one of the most traumatized people I have ever seen in that war.

“Madam, I miss almost everything.”

what is he talking about?

he's not a psychopath.

He doesn't forget to kill people.

He's not crazy. He doesn't miss getting shot or his friends killed.

If we want to stop wars, we have to answer that question.

I think it was brotherly love that he missed.

In a way he missed the opposite of murder.

What he missed was the connection he had with the other men he was with.

Now, brotherhood is different than friendship.

Friendships naturally occur in society.

The more I love someone, the more I want to do my best for them.

Brotherly love has nothing to do with how you feel about the other.

It is a mutual agreement within the group to put the group's well-being before one's own safety, and to put the safety of everyone in the group first.

In effect, you are saying, "I love other people more than myself."

Brendan was a team leader with three subordinates and had his worst day in Afghanistan. He was nearly killed many times.

It didn't bother him.

The worst thing that happened to him in Afghanistan was when one of his men got hit in the head by a bullet in his helmet and fell down.

they thought he was dead.

I was in the middle of a massive shootout.

No one could deal with it, but a minute later, Kyle Steiner regained consciousness, so he sort of got up from the dead and sat down.

A bullet had just knocked him unconscious.

I could glimpse it through my helmet.

He remembers people saying, "Steiner was hit in the head. Steiner is dead" when he was in a trance.

And he thought, "I'm not dead."

and he got up.

And then Brendan realized he couldn't protect his men, and that was the only time in Afghanistan when he realized it and cried.

That's brotherhood.

This is not a recent invention.

Many of you have probably read The Iliad.

Achilles would undoubtedly risk or give his life to save his friend Patroclus.

In World War II, there were many stories of wounded soldiers being taken to hospitals in rear bases, leaving the battle line, crawling out of windows, out of doors, and returning wounded to join their brothers outside.

So you think about Brendan, you think that all these soldiers have that experience, that kind of bond, they're a small group that in a way loved 20 other people more than they loved themselves, just think how good it would feel, imagine, and they've been blessed with that experience for a year, and then they've gone home, and they've just gone back into society like the rest of us, not knowing who they can count on, not knowing who they love, not knowing who they are. We don't even know if we can love ourselves, and we don't know exactly what our acquaintances can do for us. I got to it.

That's terrifying.

Compared to that, war is psychologically easier in a sense than that kind of alienation.

That's why they miss it, and that's what we have to understand and in a way fix it in our society.

thank you very much.

(applause)

What is history?

Written by the winner.

There is a stereotype that history should focus on rulers like Lenin and Trotsky.

As a result, I and the people of many countries, including Russia, see history as pre-determined or determined by the leaders, and ordinary people cannot have any influence over it.

Many Russians today do not believe that Russia was ever a true democracy, nor will it ever be, because of how history has been framed for the Russian people.

And this is not true.

To prove it, I decided to spend two years of my life going back 100 years to 1917, the year of the Russian Revolution.

I asked myself what would have happened if the Internet and Facebook existed 100 years ago.

So last year we built a social network for the dead called Project1917.com.

My team and I created software to digitize and upload all possible authentic diaries and letters written by over 3,000 people 100 years ago.

So users of our website or application can follow the daily news feed of 1917 and read what people like Stravinsky and Trotsky, Lenin and Pavlova thought and felt.

We observe that all these personalities are not demigods, but ordinary mortals like you and me, and we see that history consists not only of their "genius ideas", but of their mistakes, fears and weaknesses.

Our project was a shock to many Russians. The Russians believed that the idea of ​​freedom and democracy could not prevail just because our country was always an autocratic empire and democracy was not the destiny of our country.

But when you look at it from a wider perspective, black and white aren't so clear.

Yes, 70 years of communist dictatorship began in 1917.

But the project shows that Russia may have had a different history and democratic future, just like other countries did or still do today.

A post from 1917 shows that Russia was one of the first countries in the world to abolish the death penalty, or to give women the right to vote.

Knowing history and understanding how ordinary people have influenced history can help us build a better future. Because history is only a rehearsal of what is happening now.

We need new ways of telling history. For example, this year we started a new online project called 1968Digital.com. This is an online documentary series that, in many ways, gives an impression of 1968 marked by the global social changes that created the world as we know it.

But we bring that history to life by imagining what it would be like if all the major characters could use cell phones...

Is that right?

And it turns out that many faced the same challenges and fought for the same values, whether they lived in America, the USSR, France, China, or Czechoslovakia.

By exposing history in such a democratic way through social media, we show that those in power aren't the only ones making choices.

This gives any user the possibility to get their history back.

Ordinary people matter.

they have influence.

Ideas matter.

Journalists, scientists and philosophers matter.

we shape society.

We all make history.

thank you.

(applause)

I would like to talk about my favorite project when it comes to inventions.

I think it's one of the most exciting things I'm working on, but it's also the simplest.

This is a project that has the potential to have a huge impact on the world.

It addresses one of the biggest health problems on the planet, the number one cause of death for children under the age of five.

Which...?

A disease of water? diarrhea? malnutrition?

no.

An acute respiratory infection caused by inhaling smoke from an indoor cooking fire.

Do you believe that?

Could we make a cleaner-burning edible fuel?

Can't you make a better stove?

Why could this cause over 2 million deaths each year?

Bill Joy was talking about the wonders of carbon nanotubes, so I'm going to talk about the wonders of carbon macrotubes, or charcoal.

(Laughter) This is a picture of rural Haiti.

Scenes like this can be seen all over the island.

It leads to all kinds of environmental problems and problems that affect people all over the country.

A few years ago there was a great flood that killed thousands. This is directly because there are no trees to stabilize the soil on the hills.

Then it rains and floods down the river.

This is one reason why there are so few trees. People need to cook, so they harvest wood and make charcoal.

It's not that people are ignorant about environmental destruction.

They know it all too well, but they have no other choice.

Fossil fuels are not available and solar energy cannot cook food the way they want.

And this is what they do.

There are families like this who go to the forest to find trees and cut them down to make charcoal.

It is therefore not surprising that many efforts have been made to consider alternative food fuels.

About four years ago, I took a student team to Haiti to work with Peace Corps volunteers there.

This is a device that one of our volunteers made in the village where he worked.

That's when I came up with the idea of ​​using recycled paper. It can be compressed to make briquettes that can be used as fuel.

However, this device was very slow.

So an engineering student worked on it and with a few very simple changes we were able to triple the throughput of this device.

So you can imagine they were very excited.

And they took the briquettes back to MIT to test.

And one of the things they found was that it didn't burn.

Therefore, it was a little disappointing for the students.

(Laughter.) And in fact, if you look closely, you can see that it says "United States Peace Corps."

In fact, there was no waste paper in this village.

For this volunteer, it was a clever use of government paperwork to bring it back to a village 800 kilometers away.

So we wondered if there was a better way to come up with alternative cooking fuels.

What we wanted to do was create fuel using something that is easily available at the local level.

It is found throughout Haiti as well.

The waste product left after squeezing the juice from sugar cane is called "bagasse".

It has no other use.

It has no nutritional value and should not be fed to animals.

It was left in a pile near a sugar factory and eventually burned.

What we wanted to do was find a way to take this waste resource and turn it into a fuel like charcoal that people can easily cook with.

So over the next few years, my students and I worked on developing the process.

So, starting with bagasse, we build a very simple kiln that can be made from a 55-gallon waste drum.

When the fire is lit and the oxygen entering the kiln is restricted after a while, the kiln is sealed and carbonized.

However, it cannot be burned.

It's too fine and burns quickly, so it can't be used for cooking.

So we had to find a way to shape it into useful briquettes.

And, conveniently, one of my students, from Ghana, remembered "kokonte", a very sticky porridge made from cassava root that her mother used to make.

So we did some research and found that cassava is indeed grown in Haiti under the name 'cassava'.

In fact, yucca, tapioca, manioc, cassava, and other starchy root vegetables grown all over the world are all one and the same.

And a very thick and viscous porridge can be made from it, which can be used to bind briquettes.

So we did this. we went to haiti

They are the first Ecole de Charbon, graduates of the Charcoal Institute.

And these are -- (laughter) yes. I actually teach at MIT as well as CIT.

And these are the briquettes they made.

I will now take you to another continent.

Here in India, it is the most commonly used cooking fuel in India.

There are smokeier fires than in Haiti, and the health effects of cooking with cow dung and biomass as fuel are seen here.

Children and women are especially affected because they are around cooking fires.

So I thought about introducing this charcoal making technology locally.

Unfortunately there was no sugarcane or cassava, but that didn't stop us.

What we did was find a locally available biomass source.

And there was straw and rice straw in this area.

And what could be used as a binder was actually a small amount of cow manure, which they normally use as fuel.

And we did a side by side test and you see briquettes here and cow dung here.

You can see that the cooking fuel burns much cleaner.

And in fact, it heats the water faster.

So so far we have been very happy.

But one thing we discovered was that charcoal doesn't burn that long when compared side-by-side with charcoal.

And the briquettes crumbled a bit during cooking and lost energy.

So we wanted to find a way to make stronger briquettes so that we could compete with charcoal in the Haitian market.

So we went back to MIT, pulled out an Instron machine, and looked at what force was needed to compress the briquettes to levels that actually improved performance.

And while students in the lab were observing this, community partners in Haiti were also working to develop and improve processes, making them more accessible to people in villages there.

After some time, we developed a low-cost press capable of producing charcoal. Not only does charcoal actually burn, it now burns longer and cleaner than charcoal.

So now we have a product that is actually better than what you can get in the Haitian market, and it's such a great place.

In Haiti alone, about 30 million trees are cut down each year.

This could be implemented and save a good chunk of them.

Plus, $260 million in revenue from that charcoal.

That's a staggering amount for a country like Haiti, with a population of eight million and an average income of less than $400.

So we are also working on a charcoal project.

Also, one thing I find interesting is that I have a friend who does risk analysis at the University of California, Berkeley.

And he considered the question of the health effects of burning wood versus burning charcoal.

And he found that switching from wood to charcoal as a cooking fuel around the world could prevent a million deaths.

This is amazing, but until now there was no way to do it without cutting down trees.

But now there is a way to turn agricultural waste into cooking fuel.

But one of the really exciting things came from my trip to Ghana just last month.

And I think that's the coolest thing, and if you can imagine something like that, it's even more low-tech than what you've just seen.

here it is.

And the advantage of this is that it comes ready-made, without the need to form briquettes.

And in fact, I brought a sample along with Nick.

(Laughter) So let's spin these around.

They are fully functional, field tested and ready to deploy.

(Laughter) And I think one of the great things about this technology is that technology transfer is very easy.

For sugarcane charcoal, you have to teach people how to shape it into briquettes, and it requires an extra step of cooking the binder, which is pre-briquetted.

And this is about the most exciting thing in my life right now, probably a sad comment about my life.

(Laughter) But like everyone in the front row, once you see it, you get it, yes, you get it.

Anyway -- (laughter) This is it.

I think this is a perfect example of what Robert Wright was talking about not being zero-sum.

Therefore, there are not only health benefits, but also environmental benefits.

However, this is one of the very rare situations where there is also an economic benefit.

People can make their own cooking fuel from waste.

They can earn income from it.

They can save the money they would have spent on charcoal and produce the surplus to sell on the market to those who do not make their own charcoal.

It is very rare that there are no trade-offs between health and economy, environment and economy.

So this is a very exciting project for me and I'm really looking forward to seeing where it takes us.

So now, when we talk about the future we create, I think one of the things we need to do is have a very clear vision of the world we live in.

And now I'm not really talking about the world we live in.

A world where women spend two to three hours each day grinding grain to feed their families.

I mean a world where advanced building materials mean handmade cement tiles, where you work 10 hours a day and still make $60 a month.

A world where women and children spend 40 billion hours a year fetching water.

It's as if every worker in California worked full time for a year doing nothing but fetching water.

For example, if this was India, it would be the only three of us with a car in this room.

If this was Afghanistan, only one person would know how the internet works in this room.

If this were Zambia, there would be 300 farmers and 100 with AIDS or HIV.

And more than half live on less than $1 a day.

These are the problems we need to come up with solutions for.

These are the problems engineers, designers, businessmen and entrepreneurs need to be trained to face.

These are the solutions we need to find.

There are some areas that I think are particularly important, and I'd like to work on them.

One is developing technology that facilitates microfinance and microenterprises so that those living below the poverty line can find a way out. And we don't do it with the same traditional cage making, poultry farming, etc.

But there are also new technologies and new products that can be manufactured on a small scale.

Second, I believe that poor farmers need to develop technologies to add value to their crops.

And we need to rethink our development strategies to make them stop being poor farmers rather than pushing educational campaigns to stop them from being farmers.

And we need to think about how we can do that effectively.

We need to work with people in these communities and give them the resources and tools they need to solve their own problems.

It should not be done from the outside.

So we need to create this future and we need to start it now.

thank you.

(Applause) Chris Anderson: Thank you, that's great.

Just one other thing you've been working on while we're checking to see if anyone has any questions.

AMY SMITH: Some of the other things we're working on are low-cost ways to test water so that communities can maintain their own water system, know when it's running, and know when it's being treated.

We are also considering low-cost water treatment systems.

One of the things that's really exciting is looking at solar water disinfection and improving its capabilities.

CA: What are the bottlenecks that keep you from scaling something like this?

Need to find entrepreneurs and venture capitalists? Or what do you need to leverage what you have and scale?

AS: I think a lot of people are working on that.

This is difficult. The market is highly fragmented and there are consumer groups with no income.

So we can't use the same model that we use in the US to move things forward.

And our staff is me, quite small.

(Laughs) So I do the best I can for my students.

We have 30 students out in the field each year to try and put this into practice and move forward.

The other is that you have to move things forward over a long period of time. As you know, you can't expect to accomplish anything in a year or two. We must look five or ten years ahead.

But if we have the vision to make it happen, I think we can move forward.

I think we were supposed to talk about my new book "Blink". It's a book about instant judgments and first impressions.

And it will be released in January, so I hope everyone will buy all three copies.

(Laughter) But thinking about this, I realized that although my new book makes me happy and makes my mother happy, it's not really happy.

So I decided instead to talk about someone who has probably done more to make Americans happy over the last 20 years than anyone else: my personal hero, Howard Moskowitz, who is best known for reinventing spaghetti sauce.

Howard is this tall, round, in his sixties, wears big glasses, has thinning hair, has great vigor and vigor, has a parrot, loves opera, and is also a great lover of medieval history.

And professionally, he is a psychophysicist.

Now, I have no idea what psychophysics is, but at some point in my life, I dated a girl for two years who was doing her PhD in psychophysics.

Then you should know something about the relationship.

(Laughter) As far as I know, psychophysics is about measuring things.

And Howard is very interested in measuring things.

He graduated from Harvard University with a PhD and started a small consulting shop in White Plains, New York.

One of his first customers was Pepsi.

This was many years ago, in the early 70's.

And Pepsi came to Howard and said, "There's a new thing called aspartame, and I want to make Diet Pepsi."

I want you to calculate how much aspartame should be in each can of Diet Pepsi to make the perfect drink. ”

This sounds like a very easy question to answer, but Howard thought so.

Pepsi told him, "We work with bands from 8% to 12%.

Anything with a sweetness level of less than 8% is not sweet enough. Anything over 12 percent sweetness is too sweet.

What we want to know is what is the sweet spot between 8 and 12?”

Now, if you give this problem a try, you'll say it's very easy.

What we do is make a large experimental batch of Pepsi at every sweetness level (8 percent, up to 8.1, 8.2, 8.3, 12), try this on thousands of people, plot the results on a curve, and take the most popular concentration.

Howard conducted an experiment, took data, and plotted it on a curve. Then suddenly I realized it wasn't a pretty bell curve.

In reality, data means nothing.

It's messed up. It's all over the place.

Most people in industries like food testing today don't get upset when data is returned in a mess.

They think it's not that easy to understand what people think of Coke.

"Maybe we made a mistake somewhere along the way."

“You know, let’s make an educated guess,” they simply point and get the middle 10 percent.

Howard's feelings don't settle so easily.

Howard is a man of some intellectual standard.

But this was not enough for him, and this question haunted him for many years.

And he pondered and said, "What went wrong?

Why didn't I understand this experiment with Diet Pepsi?"

And then one day he was sitting in a diner in White Plains trying to figure out a job at Nescafé.

And suddenly the answer fell on him like lightning.

That is, when they analyzed the Pepsi data from Congress, they were asking the wrong question.

They were looking for the perfect Pepsi, and they should have been looking for the perfect Pepsi.

This was a big revelation.

This was one of the brightest advances in all of food science.

Howard soon traveled, attending conferences across the country, standing up and saying, "You were looking for the perfect Pepsi.

You must be looking for the perfect Pepsi. ”

And people will look at him dumbfounded and say, "What are you talking about? You're insane."

And they say, "Next! Next!"

No one wanted to hire him in an attempt to win business, but he was hooked and kept talking about it.

Howard loves the Yiddish expression, "To a worm in a horseradish, the world is a horseradish."

This was his horseradish.

Finally, he made a breakthrough.

Vlasic Pickles came up to him and said, "Dr. Moskovitz, we want to make perfect pickles."

And he said, "There are no perfect pickles. There are only perfect pickles."

And he came back to them and said, "We need to not only improve the regulars, but create enthusiasm."

I got pickles there.

Then came the next person to him: Campbell Soup.

And this was even more important.

In fact, Campbell's Soup is where Howard established his fame.

Campbell's made Prego, but in the early 80's Prego was struggling second only to Ragu, the spaghetti sauce that dominated in the 70's and 80's.

In the industry -- I don't know if you care about this or how much time I have to spend on this.

But strictly speaking, and this is an aside, prego is a better tomato sauce than ragu.

Tomato paste quality is much better. Spice mixes are much better. Entanglement with pasta becomes more comfortable.

In fact, they used Ragù and Prego to do the famous bowl test back in the 70's.

You have a plate of spaghetti and you pour it over, right?

And Ragu all goes down and Prego sits on top.

It's called "compliance".

And anyway, Prego was struggling, even though Prego was far superior in terms of adhesion and tomato paste quality.

So they came to Howard and asked him to fix us.

And Howard looked at their product line and said what we have now is a dead tomato society.

So he said, "This is what I want to do."

And he's teamed up with Campbell's Soup Kitchen to create 45 different spaghetti sauces.

And he varied them according to all conceivable ways that tomato sauce could be transformed. By sweetness, by garlic level, by tomatoness, by tartness, by tartness, by visible solids—my favorite terms in the spaghetti sauce industry.

(Laughter) You can vary the spaghetti sauce in every conceivable way. He changed the spaghetti sauce.

And he took all 45 bottles of spaghetti sauce and set off.

He went to New York, Chicago, Jacksonville and Los Angeles.

And he made them sit for two hours, and during those two hours he gave them ten bowls.

There are 10 small bowls of pasta, each with a different spaghetti sauce.

After eating each bowl, they had to rate on a scale of 0 to 100 how good they thought the spaghetti sauce was.

After months of going through that process, he's got a ton of data on how Americans feel about spaghetti sauce.

And he analyzed the data.

Did he look for the most popular type of spaghetti sauce?

no! Howard doesn't believe that.

Instead, he said, let's look at the data and see if we can group all these different data points into clusters.

See if they are centered around a particular idea.

And sure enough, when you sit down and analyze all the data about spaghetti sauce, you find that all Americans fall into one of three groups.

Some prefer a simple spaghetti sauce. Some people like spicy spaghetti sauce. Some people like it thick.

And of those three facts, the third was the most important. Because back then, in the early 1980s, you couldn't find thick spaghetti sauce in the supermarket.

And Prego consulted Howard, and they said, "A third of Americans crave thick spaghetti sauce, and nobody is serving their needs?"

(Laughter.) And then Prego completely overhauled the spaghetti sauce again, launched a thicker product, and instantly took over the entire spaghetti sauce business in this country.

And in the decade that followed, they made $600 million with their extra-fat sauce line.

Everyone else in the industry saw what Howard did and said, "Oh my God! All of our thoughts were wrong!"

And that's when I started getting 7 types of vinegar, 14 types of mustard, and 71 types of olive oil.

And eventually even Raghu hired Howard, and Howard did to Raghu exactly what he did to Prego.

And if you went to a really good supermarket today, do you know how many ragouts there are?

36！

6 types of cheese, light, robusto, rich & cheese. Hearty old world tradition--very spacious gardens.

(Laughter) That's what Howard does.

So why is it important?

(Laughter) Actually, it's very important.

What Howard did is fundamentally change the way the food industry thinks about making you happy.

The first assumption in the food industry was that the way to find out what people want to eat and what makes them happy is to ask them.

And for years and years, Raghu and Prego had focus groups where they sat you down and asked, "What would you like in spaghetti sauce?"

And for 20, 30 years, through focus group sessions, no one said they wanted extra chunkiness.

Even though at least a third of them, deep down, actually thought so.

(Laughter) People don't know what they want.

As Howard likes to say, "The heart doesn't know what the tongue wants."

It's a mystery!

(Laughter) And a very important step in understanding our own desires and preferences is understanding that we can't always explain what we want deep down.

For example, if you ask everyone in this room what they would like to drink with their coffee, do you know what they would say?

That's what people always tell me when I ask them.

"What do you like?" "Dark, rich, hearty roast!"

What percentage of people actually like a dark, rich, hearty roast?

According to Howard, between 25 and 27 percent of you.

Many people like milky and weak coffee.

(Laughter) But if someone asked me what I wanted, I would never say, "I want a milky, weak coffee."

That's the best thing Howard did.

The second thing Howard did was make us aware. This is also a very important point, but it reminded us of the importance of what Howard likes to call the "horizontal split".

Why is this important?

Because this was the mindset of the food industry before Howard.

What were they into in the early '80s?

In particular, they were enamored with the story of Gray Popon.

There used to be two types of mustard: French and Gulden.

what was that? yellow mustard.

what's in it

Gray Poupon came with Dijon.

right?

Much more volatile brown mustard seeds, a bit of white wine, a touch to the nose, much more subtle aromas.

They put it in a small glass jar and gave it a nice enamel label to make it look French even though it's made in Oxnard, CA.

(laughter) And instead of charging $50 for an 8 oz bottle like the French store and the Gulden store, they decided to charge $4.

With a guy in a Rolls-Royce eating Gray Popons.

Another person pulled over and said, "Do you have any gray popons?"

And after everything was over, Gray Poupon took off!

Take over the mustard business!

The lesson we all learned was that the way to make people happy is to give them something more expensive, something they aspire to.

It's about getting them to turn away from what they think they love right now and reach for something higher up the mustard hierarchy.

(laughs) Mustard is more delicious! More expensive mustard!

Mustard with a more sophisticated culture and meaning.

Then Howard looked at it and said, "That's not it!"

Mustard does not exist on the hierarchy.

Mustard exists on the horizontal plane in the same way as tomato sauce.

There is no good mustard or bad mustard.

There is no perfect mustard or imperfect mustard.

It's just that the type of mustard that suits different people is different.

He fundamentally democratized the way we think about taste.

And for that, too, we owe Howard Moskowitz a huge thank you.

The third thing Howard did, and perhaps most importantly, was how he confronted the concept of the platonic dish.

(laughter) What does that mean?

(Laughter) For a long time in the food industry, there was a sense that there was only one perfect way to cook.

Go to Chez Panisse and they offer a reduction of something with red tail sashimi and roasted pumpkin seeds.

You are not given 5 options for the reduction.

We don't say, "Do you want excess reduction or...".

no!

Because the chef at Chez Panisse has a platonic idea about red tail sashimi.

"This is how it should be."

And she offers it like that over and over, and when you argue with her, she says, "You know? You're wrong!"

The same idea is now inspiring the commercial food industry.

They had a platonic notion of what tomato sauce was.

And where did it come from? I'm from Italy.

What is Italian Tomato Sauce?

The tomato sauce culture was lean.

When we talked about "authentic tomato sauce" in the 1970s, we were talking about Italian tomato sauce, about the early Ragus, where you couldn't see any solids, right?

It was so thin that it sank to the bottom of the pasta with just a little bit of it.

That was it.

And why are we obsessed with it?

Because we thought what we needed to do to make people happy was provide A, the most culturally authentic tomato sauce.

And Mr. B, we figured if we gave them a culturally authentic tomato sauce, they would accept it.

And that's what makes the most people happy.

In other words, the culinary community was looking for a culinary all-around.

They were looking for the only way to treat us all.

And that's reason enough for them to cling to the idea of ​​universals. Because, throughout the 19th and most of the 20th century, science as a whole was obsessed with universals.

Psychologists, medical scientists, and economists have all been interested in finding the rules that govern how we all behave.

But that has changed, right?

What are the major revolutions in science over the last 10-15 years?

It is a transition from searching for universality to understanding variability.

Now in medicine, we don't necessarily want to know how cancer works, we want to know how your cancer differs from mine.

I think my cancer is different from yours.

Genetics has opened the door to the study of human diversity.

What Howard Moskovitz was saying was, "This same revolution needs to happen in the world of tomato sauce."

And for that we owe him a great deal of gratitude.

One final note about variability. It's -- Oh, I'm sorry.

Not only did Howard believe it, he took the second step. So when it comes to pursuing universal principles in food, we don't just make mistakes. We are actually doing a lot of damage to ourselves.

And coffee was his example.

And coffee is something he did a lot of research on at Nescafé.

If I were to ask you to come up with a brand of coffee that would make you happy, i.e. what type of coffee and how to brew it, and rate that coffee, the average score for the coffee in this room would be about 60 on a scale of 0 to 100.

But if you can divide you into coffee clusters, perhaps 3 or 4 coffee clusters, and brew a coffee for each of those individual clusters, your score will go up from 60 to 75, or 78.

The difference between a 60-year-old coffee and a 78-year-old coffee is the difference between a coffee that makes you flinch and a coffee that makes you crazy and happy.

I think this is Howard Moskowitz's final and most beautiful lesson. By embracing human diversity, we can find a more sure path to true happiness.

thank you.

You know, it struck me that one of TED's unspoken themes is compassion. HIV in Africa, President Clinton last night, and other very moving demonstrations we've just seen.

And if you don't mind, I'd like to take a little extra thought on compassion and bring it from the global level to the personal level.

I'm a psychologist, but don't worry, I won't bring it into my scrotum.

(Laughter) There was a very important study that was done a little while ago at Princeton Theological Seminary. This explains why we all have so many opportunities to help, and sometimes we do and sometimes we don't.

A group of seminarians at Princeton Theological Seminary were assigned to give practice sermons, each given a sermon topic.

Half of those students were given the parable of the Good Samaritan, the man who stopped a stranger in trouble on the side of the road to help him.

Half were given a random Bible topic.

Then, one by one, they were told they had to go to another building to preach.

As they moved from the first building to the second, they each passed a man crouching and groaning, apparently distressed. The question is, did they stop to help?

A more interesting question is whether it mattered that they were thinking of the parable of the Good Samaritan. Answer: No, not at all.

What determined whether someone would stop and help a stranger in need was how much he thought he was in a hurry—whether he felt late, or whether he was absorbed in what he was about to say.

And I think this is our predicament in life. It's that our focus is so misguided that we fail to take every opportunity to help.

There is a new field in brain science called social neuroscience.

It studies the brain circuits of two people that are activated during a dialogue.

And a new way of thinking about compassion from social neuroscience is that our default wiring can help.

In other words, when we care about the other person, we automatically empathize and automatically feel what the other person is feeling.

These newly identified neurons, mirror neurons, act like neuronal Wi-Fi, activating the exact same areas that are activated in our brains. We automatically feel that we are.

And if the person is in trouble, if the person is in pain, we are automatically ready to help. At least that's the discussion.

But the question is, why not?

And I think this speaks to a spectrum from complete narcissism to awareness, empathy, and sympathy.

And the simple fact is that if we are focused on ourselves, as is often the case throughout the day, if we are distracted, we cannot be fully aware of anything else.

And this difference between yourself and other focuses can be very subtle.

The other day, while I was paying my taxes and listing all the donations I had made, I had an epiphany. Came to pick up my check for the Seba Foundation and realized that I thought my friend Larry Brilliant would be really happy that I donated to Seba.

And I realized that what I was getting by giving was a narcissistic blow, feeling good about myself.

Then I started thinking about the Himalayan people who could help me with my cataracts. And I found myself going from this kind of narcissistic self-centeredness to altruistic joy and feeling good about the people being helped. I think that's what motivates me.

But this difference between focusing on ourselves and focusing on others encourages all of us to pay attention.

The dating world sees that on a crude level.

I went to a sushi restaurant a while back and overheard two women talking about one woman's brother who was on the singles scene. And this woman said, "My brother is having trouble getting dates, so he's trying speed dating." I don't know if you know speed dating?

Women sit at tables and men move from table to table. There's a clock and a bell, and when it's bingo in five minutes, the conversation ends, and the woman can decide whether to give the man her card or her email address for follow-up. And this woman said, "My brother never got a card, and I can understand why.

The minute he sits down, he starts talking nonstop about himself. He never asks about the woman. ”

And I was looking up the backstory of marriage in the Sunday Style section of The New York Times and it's so interesting that it leads me to Alice Charney Epstein's marriage. And she said she gave people a quick test when she was on a date.

The test was how long it would take a man to ask her a question containing the word "you" from the moment they started dating.

And it made headlines because Epstein apparently passed the test.

(Laughter) Here's a little test I recommend you try at your party.

We have a great opportunity here at TED.

The Harvard Business Review recently published an article titled "The Human Moment" on how to reach out to people in the workplace. And they said, "Basically, what you have to do is turn off your BlackBerry, close your laptop, stop daydreaming, and pay your full attention to that person."

The English language has a new coined word for the moment when the person we're with takes out their BlackBerry or picks up their cell phone and suddenly we don't exist.

The word is "confused". It's a combination of bewilderment and annoyance.

(Laughs) I think it's quite appropriate. It's our empathy, it's what sets us apart from Machiavellianists and sociopaths.

I have a brother-in-law who is a horror and horror expert. He wrote Annotated Dracula and Essential Frankenstein. He was trained as a Chaucer scholar, but was born in Transylvania, and I think that influenced him a bit.

In any case, at some point my brother-in-law Leonard decided to write a book about a serial killer.

A man who terrorized our neighborhood many years ago. He was known as the Strangler of Santa Cruz.

And before he was arrested, he murdered his grandparents, his mother, and five co-educational students at the University of California, Santa Cruz.

So my brother-in-law went to interview the killer and the moment he met him, he realized how terrifying this man was.

First, he's about 7 feet tall.

But that's not what scares him most.

The scariest part is that he has an IQ of 160 and is certified as a genius.

But there is no correlation between IQ and emotional empathy, or how you feel about others.

These are controlled by different parts of the brain.

So at some point my brother-in-law mustered up the courage to ask him one question that he really wanted to know the answer to. It's like, "How did you do that?"

Did you feel any sympathy for the victims?

These were very intimate murders, and he strangled his victims.

Then the strangler says the most obvious thing, "Oh, no. If I had been in pain, I wouldn't have been able to do that."

I needed to turn that part of myself off. I needed to turn that part of myself off. ”

I think it's very annoying and in a way I'm sorry that we turned that part of us off.

When we focus on ourselves in any activity, we turn off that part of ourselves in the presence of others.

Think about going shopping and think about the possibilities of thoughtful consumerism.

As Bill McDonough pointed out, at this point, the objects we buy and use have hidden implications.

We are all unknowingly victims of a collective blind spot.

We are oblivious and oblivious to the toxic molecules emitted by the fabric of our carpets and seats.

Or whether the dough is a technical nutrient or a manufacturing nutrient. Can it be reused or will it just be sent to a landfill? In other words, we are unaware of the environmental, public health, and social and economic justice implications of what we buy and use.

In a way, the room itself is the elephant in the room, but we don't see it. And we are victims of systems that lead us elsewhere. Consider this.

There is a great book called Stuff: The Hidden Life of Everyday Objects.

And he tells the story behind things like T-shirts.

It also talks about where the cotton was grown, the fertilizers used, and the effect that fertilizer had on the soil. And cotton, for example, states that it is very resistant to the dyes in the fabric. About 60 percent is washed away in the wastewater.

And epidemiologists are well aware that children who live near textile factories tend to be more susceptible to leukemia.

There is a company called Bennett and Company that supplies products for Polo.com, Victoria's Secret. The company's CEO knows this, and has set up a joint venture with a dyeing plant in China to ensure that wastewater is properly treated before returning to groundwater.

At this time, there is no option to choose a virtuous t-shirt over a non-virtuous t-shirt. So what do you need for that?

Well, I've thought about it. First, new electronic tagging technology will allow any store to know the entire history of the products on that store's shelves.

You can trace it to the factory. If you can trace it back to the factory, you can find out what manufacturing process was used to make the product, and if it's high quality, you can label it as such. Or, if that's not too fancy, you can access a website at any store today by swiping a barcode in your palm with a scanner.

Prepared for those who are allergic to peanuts.

The website may have information about the object.

In other words, at the point of purchase, we may be able to make thoughtful choices.

In the world of computer science, there is a saying that "in the end everyone will know everything".

And the question is, will it make a difference?

Some time ago, when I was working for The New York Times, which was in the 80s, I wrote an article about what was a new problem in New York at the time: homeless people on the streets.

And I spent several weeks working with social work agencies that serve homeless people. And seeing homeless people through their eyes, I realized that most of them were mentally ill with nowhere to go. they were diagnosed. It made me - it rocked me out of the urban trance. When you pass a homeless person on the edge of your vision, it always stays on the edge.

I don't notice it, so I don't act.

Then one day, it was Friday. At the end of the day, I went to the subway. It was rush hour, and thousands of people were pouring down the stairs.

And suddenly, as I was walking down the stairs, I realized that there was a shirtless man laying motionless on his side, and people were trying to step over him - hundreds of people.

And I found myself pausing to find out what was wrong, because my urban trance state had somehow weakened.

The moment I stopped, 6 other people immediately called the same guy.

Then I found out he was Hispanic, spoke no English, had no money, had been roaming the streets for days, was starving, passed out from hunger.

Immediately someone went to get orange juice, someone brought hot dogs, someone brought the subway cops.

This person recovered quickly.

But I'm optimistic because all it took was a simple act of awareness.

thank you very much.

(applause)

The most romantic events that have happened to me online, like most things, started without me, not online.

On December 10, 1896, the Medal Man, Alfred Nobel, died.

A hundred years later, on December 10, 1996, this charming woman, Wisława Szymborska, was awarded the Nobel Prize in Literature.

She is a Polish poet.

She's a big deal, of course, but back in 1996, I didn't think I'd heard of her, so I checked her work and found a nice little poem called "Four in the Morning."

"The time from night to day.

left and right time.

Time for people over 30..."

And it goes on, but as soon as I read this poem, I was so taken with it that I doubted that we had met somewhere before.

Did I get on the elevator with this poem?

Did you read this poem in some coffee shop?

I couldn't put it down and it bothered me and for a week or two after that I was just watching old movies and this thing happened.

(Video) Groucho Marx: Charlie, you should have come to the first party.

We didn't get home until about four o'clock in the morning.

Livs: This happened when my roommate turned on the TV.

(Music: Seinfeld's Theme) (Video) George Costanza: Oh, I was up until four in the morning watching the Omen trilogy.

Livs: This is what happens when you listen to music.

(Video) Elton John: ♪ It's four in the morning, damn it. ♪ Livs: So you know what happened?

Clearly, the accidental demigods are just kidding me.

Some people have numbers stuck in their heads, some remember specific names and songs, some don't remember anything, but 4am was in me now, but it was a minor, sort of groin injury.

I always thought the disease would go away on its own and I never told anyone about it, but it didn't and I totally did.

In 2007, I was invited to speak at TED for the second time. I wasn't an authority on anything yet, so I wondered what would happen if I had a multimedia presentation on a subject that was too niche, really trivial, or really cockamamie.

So my talk included some of my examples from the four mornings, but it also included examples from fellow TED speakers that year.

I found 4 in the morning in Isabel Allende's novel.

I found some really great stuff in Bill Clinton's autobiography.

I found some pieces in Matt Groening's work, but Matt Groening later told me he couldn't tell my story because it was a morning session, and I hear he's not an early riser.

But if Matt had been there, he would have seen this bogus conspiracy theory that I wasn't so weird to put together.

It was made entirely for the room and for the moment.

That's how we did it in the pre-TED.com era.

was fun. That was pretty much it.

But when I got home, I started getting emails from people who had seen the talk live, and the first email is still my favorite, "There's another one in your collection. 'What's important is a friend you can call at 4am.' That sentiment is Marlene Dietrich."

The email itself was from another sexy European, TED curator Chris Anderson.

(laughter) Chris found this quote in a coffee cup or something. And I'm thinking, this guy is Typhoid Mary of an idea worth spreading, and I infected him.

I am contagious That was confirmed less than a week later when a Hallmark employee scanned and sent an actual greeting card with the same quote.

As a bonus, she hooked me up with the second one they made.

It says, "If you need me, I just know I can call you at 4 in the morning, you don't have to actually call me," which I like. Because when you put them together, it's like, "Characteristics: When you care enough to send the best thing twice with slightly different wording."

I wasn't surprised by the overlap between TEDster and the New Yorker magazine.

A lot of people sent me this when it was released.

"It's four o'clock in the morning. Maybe I'll sleep better if I buy something stupid."

I was surprised that TEDster and "Rugrats" overlapped.

Multiple people sent me this.

(Video) Diddy Pickles: It's four o'clock in the morning.

Why on earth make chocolate pudding?

Stu Pickles: Because I lost control of my life.

(Laughter) Livs: Then there was the lone TED star who was frustrated that I was missing something he considered a classic.

(Video) Roy Neary: Get up, get up! I'm not kidding. Ronnie Neary: Was it an accident?

Roy: No, it wasn't an accident. You wanted to get out of the house anyway, right?

Ronnie: It's not four o'clock in the morning.

Livs: It's "Close Encounters," and it's a very solid example of how the aliens are so excited because they've made such a big decision to show up to the Earthlings at four o'clock in the morning.

Those were all really solid examples.

They couldn't make me understand why they thought they recognized this particular poem.

But they followed the pattern. they played together.

right? 4am is this scapegoat time when all these dramatic events are supposed to happen.

Perhaps this was some kind of cliché that had never been classified before.

Maybe I was chasing a new meme or something.

Things got really interesting when things started to get pretty interesting.

Later that year, TED.com was launched, and videos of past talks, including mine, were flooded with citations to "4 o'clock in the morning" in every time zone on the planet.

Many of them were things I could never find even if I was looking for them, and I never actually found them.

I don't know anyone with juvenile diabetes.

Perhaps I missed the booklet "grilled cheese at 4am".

(Laughter) I'm not subscribed to Crochet Today. It's a magazine, but it looks fun. (Laughter) Notice the edge of the clock.

Here's a college student's suggestion of what a "four o'clock in the morning" gang sign should look like.

People have sent me magazine ads.

They took pictures at the grocery store.

I got tons of graphic novels and comics.

There are also many high-quality works such as "Sandman" and "Watchmen".

There is a very cute example from "Calvin and Hobbes".

In fact, the oldest quote someone sent was from a Stone Age cartoon.

please look.

(Video) Wilma Flintstone: How Fast?

Fred Flintstone: Four o'clock in the morning, or something like that.

Livs: Reversed chronologically, this is from the 31st century.

A thousand years from now, people are still doing this.

(Video): Announcer: It's 4am.

(laughter) Livs: It shows the spectrum.

From harrowing to famous, we received enough songs, TV shows, and movies to give you a four-hour playlist.

If you're only going to focus on modern male movie stars, keep it about commercial length.

Here is the sampler.

(montage from the movie "It's 4 A.M.") (Laughter) Livs: Then one day I realized I had a hobby that I never thought I'd want. It is crowdsourced.

But I was also thinking what you were thinking. I mean, can't you do this at any time of the day?

First, you won't get a clip like that around 4pm.

Then I did a little research.

Well, I was a little curious.

If this is confirmation bias, I am biased because there is too much confirmation.

Perhaps literature best illustrates it.

Shakespeare has 3 am several times.

It's five o'clock in the morning.

It's 7:04 in the morning, but all very miserable.

In "Shaku wa shaku", it's time for the executioner's call.

In War and Peace, Tolstoy gives Napoleon insomnia at 4am just before the battle.

Charlotte Brontë's 'Jane Eyre', like Emily Brontë's 'Wuthering Heights', marks a crucial 4 o'clock in the morning.

"Lolita" is an eerie four o'clock in the morning.

"Huckleberry Finn" has a dialect version.

Someone sent me Invisible Man by H.G. Wells.

Someone else sent in Ralph Ellison's "invisible man."

In "The Great Gatsby," he spends the last 4 am of his life waiting for a lover who never shows up, but perhaps the most famous awakening in literature is "The Metamorphosis."

In the first paragraph, the protagonist wakes up and transforms into a giant cockroach, but despite the cockroach, we already know something is happening to this guy.

why? His alarm is set for four in the morning.

What kind of person would do such a thing?

Such a person will do so.

(music) (4 am alarm clock montage) (video) Newscaster: Now's the time to top. It's morning news time.

But, of course, no news yet.

Everyone is still sleeping in comfortable comfortable beds.

Livs: That's right.

Lucy the Peanuts, "Dear Mama", Rocky, First Day of Training, Nelson Mandela, First Day in Office, and Bart Simpson. Combined with cockroaches, it's an outrageous dinner party and gives my old gigantic database yet another category: people who are awake.

For example, imagine a friend or family member hears that you collect stuffed polar bears and sends them to you.

Even if you don't really, at some point you've completely collected stuffed polar bears, and your collection is probably pretty great.

And when I got to that point, I accepted it.

I got a curator. I started fact-checking, downloading, and illegal screen captures.

I started archiving.

My hobby has become a habit, and that habit has given me perhaps the most eclectic Netflix queue in the world.

At one point it became "Guys and Dolls: The Musical", "Last Tango in Paris", "Diary of a Wimpy Kid", "Porn Star: The Legend of Ron Jeremy", etc.

Why Pornstars: The Legend of Ron Jeremy?

Because someone said you would find this clip there.

(Video) Ron Jeremy: I was born on March 12th, 1953 at four o'clock in the morning in Flushing, Queens.

Livs: Of course it was. (Laughter) (Applause) Yes. Not only does it make sense, but it also answers the question, "What do Ron Jeremy and Simone de Beauvoir have in common?"

Simone de Beauvoir begins her entire autobiography with the sentence "I was born at four o'clock in the morning." This was because someone else had emailed me. And since they sent me an email, I have added another entry to this article. Because porn star Ron Jeremy and feminist Simone de Beauvoir aren't just different people.

They're different people who unite them with this stuff, and I wasn't sure if it was trivia or knowledge or just accidental expertise, but I wondered if there might be a cooler way to do this.

So last October, following the tradition of gentleman scholars, I published the entire collection online as the Museum of Four in the Morning.

Click the red "Update" button.

Randomly navigate to one of the hundreds of snippets in our collection.

This is Billy Collins' knockout poem "Forgetfulness".

(Video) Billy Collins: No wonder I got up in the middle of the night to find out the date of the famous battle in the war book.

No wonder the moon reflected in the window seems to flow out of a love poem you once memorized.

Livs: So the first hour of this project was satisfying.

A Bollywood actor sang lines from a DVD in a cafe.

A teenager halfway around the world took a video of it on Instagram and sent it to a stranger.

However, less than a week later, I was given a little grace.

I received a heartwarming tweet.

It was short.

It just said, "Reminds me of my old mixtapes."

The name was actually a pseudonym, or a false pseudonym.

As soon as I saw the initials and profile picture, I instantly knew who this was, and I instantly knew what mixtape she was talking about.

(music) L.D. was my college crush.

This was in the early 90's. I was a dunce.

She was a graduate student in library science.

I'm not a librarian who takes off his glasses, lets his hair down, and suddenly starts smoking a hot cigarette.

She was already smoking hot and very goofy and we had a romance from December to May. So we started dating in December and by May she graduated and was mine.

But her mixtape didn't escape.

I've kept this mixtape in a box for decades, not just from L.D., but with life notes and postcards.

This is the kind of box I tend to hide from my girlfriend if I have one and definitely share with my wife if I have one. But the story of this mixtape is — (laughs) — there are seven songs on one side, but no song titles.

Instead, LD. used the Library of Congress classification system, which includes page numbers, to leave me clueless.

When I got this mixtape, I put it in my cassette player and took it to the campus library, her library, and there were 14 books on the bookshelf.

I remember bringing them all to my favorite nook table and reading them in combination, like food and wine, songs and poems. I was reading it in pairs, like saddle shoes and a cobalt blue vintage cotton dress.

I did this again last October.

I'm sitting there with new earbuds and an old Walkman. Even when I was luxuriating, I realized that this was just the kind of luxury I took for granted.

And I thought, "Good for him."

"PG" is Slavic literature.

"7000" series Polish Literature.

Z9A24 is a collection of 70 poems.

Page 31 is Wisław Szymborska's poem paired with Paul Simon's 'Peace Like a River'.

(Music: Paul Simon "Peace Like a River") (Video) Paul Simon: ♪ Oh, it's 4 o'clock in the morning ♪ ♪ I woke up from a dream ♪ Livs: Thank you. appreciate. (applause)

Today's computer algorithms use human-like intelligence to perform incredible tasks at scale and precision.

And this computer intelligence is often referred to as AI or artificial intelligence.

AI is poised to have an incredible impact on our lives in the future.

Today, however, we still face major challenges in detecting and diagnosing some life-threatening diseases, such as infectious diseases and cancer.

Thousands of patients die each year from liver and oral cancer.

Our best way to help these patients is through early detection and diagnosis of these diseases.

So how do we detect these diseases today and how can artificial intelligence help?

Unfortunately, for patients suspected of having these conditions, specialist physicians first order the performance of very expensive medical imaging techniques such as fluorescence imaging, CT, and MRI.

Once these images are collected, another specialist doctor examines them and talks with the patient.

As you can see, this is a very resource-intensive process, requiring both specialized physicians and expensive medical imaging technology, and is considered impractical for developing countries.

In fact, the same is true in many developed countries.

So can artificial intelligence be used to solve this problem?

Today, using traditional artificial intelligence architectures to solve this problem would first require generating 10,000 very expensive medical images. Again, on the order of 10,000 sheets.

I then went to a specialist doctor to have the images analyzed.

These two pieces of information can be used to train a standard deep neural network or deep learning network to provide a diagnosis to the patient.

Like the first approach, traditional artificial intelligence approaches suffer from the same problems.

A lot of data, specialized doctors, specialized medical imaging technology.

So, can we invent more scalable, effective and valuable artificial intelligence architectures to solve these very important problems facing us today?

And this is exactly what my group at the MIT Media Lab is doing.

We have invented a variety of unconventional AI architectures to solve some of the most important challenges facing medical imaging and clinical trials today.

In the example I shared today, I had two goals.

Our first goal was to reduce the number of images required for training artificial intelligence algorithms.

Our second goal, more ambitious, was to reduce the use of expensive medical imaging technology for patient screening.

So how did they do it?

Our first goal was to start with one medical image, rather than tens of thousands of very expensive medical images like traditional AI.

From this image, my team and I have come up with a very clever way to extract billions of packets of information.

These information packets contain colors, pixels, shapes, and renderings of disease on medical images.

In a way, we have transformed a single image into billions of training data points, greatly reducing the amount of data required for training.

A second goal was to reduce the use of expensive medical imaging technology to screen patients, starting with taking patients from standard white-light photographs taken from DSLR cameras or mobile phones.

So remember those billions of packets of information?

An image of a medical image was superimposed on this image to create what is called a composite image.

Surprisingly, only 50 synthetic images were needed to train the algorithm efficiently (again, only 50).

To summarize our approach, instead of using 10,000 very expensive medical images, we are now able to train an AI algorithm in an unconventional way to provide a diagnosis using only 50 high-resolution but standard photos taken from DSLR cameras and mobile phones.

More importantly, our algorithm could, in the future as well as today, accept very simple white-light photographs from patients rather than expensive medical imaging techniques.

We believe we are entering an era where artificial intelligence will have an amazing impact on our future.

And while thinking about traditional AI, which is rich in data but has few applications, I think we should also continue to think about unconventional artificial intelligence architectures that can accept small amounts of data and solve some of the most important problems facing us today, especially in healthcare.

thank you very much.

(applause)

As a scientist and as a human being, I have tried to make myself wonder.

I think last night Jason Webley called it "colluding to be part of the magic."

Therefore, I am fortunate that my career as a biologist allows me to dive deep into the life of fireflies, truly amazing creatures that inhabit our planet.

Well, for many of you, fireflies may bring back some really great memories of childhood, summers, and even other TED talks.

Maybe it's like this.

My fascination with the world of fireflies began when I returned to graduate school.

One evening, as I was sitting in my backyard in North Carolina, suddenly a quiet spark arose around me and I began to wonder. "How do these creatures glow, and what are these flashes?"

are they talking to each other?

And what happens after the lights go out?

In exploring this nocturnal world, I was fortunate enough to be able to answer some of these questions.

Now, anyone who has seen or heard about fireflies knows how magically they can transform our everyday landscapes into something fantastical and otherworldly. This happens all over the world. For example, this hillside in the Smoky Mountains I saw turned into a waterfall of living light by the eerie glow of these blue ghost fireflies. Or the roadside rivers I visited in Japan, which spawned flashes of slow-floating Genji fireflies and overgrown Malaysian mangrove trees. What I saw blooming every night was not the flowers, but the lights of a thousand fireflies (bleep! bleep!) flashing in unison in splendid synchrony.

These glowing landscapes still amaze me and connect me with the magic of the natural world.

And I find it amazing that they are made by these little insects.

Fireflies are fascinating to see in person.

they are charismatic.

They have been celebrated in art and poetry for centuries.

In my travels around the world, I have met many thoughtful people who say that God placed fireflies on earth for mankind to enjoy.

You can also enjoy other creatures.

I find these graceful insects truly miraculous because they beautifully illuminate the creative improvisation of evolution.

They have been shaped by two powerful evolutionary forces: natural selection, the struggle for survival, and sexual selection, the struggle for reproductive opportunity.

As a firefly enthusiast, the last 20 years have been a very exciting journey.

Together with Tufts students and other colleagues, we have made many new discoveries about fireflies, including their courtship and sex life, betrayal and murder.

So today we would like to share with you some of the stories we brought back from our collective adventure into this hidden world.

Fireflies belong to the group of beetles, very beautiful and diverse insects.

There are more than 2,000 species of fireflies around the world, and they have evolved a staggering variety of courtship signals—different ways to find and attract a mate.

About 150 million years ago, the first fireflies probably looked like this.

I was flying in the daytime so it didn't shine.

Instead, males used their splendid antennae to sniff out the perfumes emitted by females.

In other fireflies, only females glow.

Attractively round and wingless, they climb perch nightly and glow brightly for hours to attract flying but lightless males.

In yet another firefly, males and females emit rapid bright flashes to locate their mates.

Here in North America, there are over 100 firefly species with the amazing ability to radiate energy from their bodies in the form of light.

how do they do that?

Though utterly magical, these bioluminescent signals arise from carefully orchestrated chemical reactions that take place inside firefly lanterns.

The protagonist is an enzyme called luciferase, which in the course of evolution discovered how to coil even smaller molecules called luciferins around its tiny arms, becoming so excited in the process that it actually emits light.

can't believe it.

But how did these bright lights benefit primitive fireflies?

To answer this question, you have to go back through your family album and look at some baby photos.

Fireflies completely reshape their bodies as they grow.

They spend most of their lives, up to two years, in this larval state.

Their main goal here is to eat and grow, just like my teens.

And the firefly's light was born from this juvenile for the first time.

All firefly larvae can glow, even if the adults cannot.

But what's the point of being so conspicuous?

Well, we know that these juveniles make unpleasant-tasting chemicals to survive their long childhoods. So it is likely that these lights first evolved as a warning, a neon sign that said "Toxic! Stay away!"

to any predator.

It took millions of years for these bright lights to evolve into smart communication tools that could be used not only to ward off potential predators, but to woo potential mates.

Some adult fireflies, like this proud male, have evolved glow-in-the-dark lanterns that can now take courtship to a whole new level through sexual selection.

These adults only live for a few weeks, but now they are intent on having sex, passing on their genes to the next generation of fireflies.

So we can follow this male out into the field to join hundreds of other males showing new courtship signals.

It's amazing to think that the luminescence we admire here, and indeed everywhere in the world, is actually the quiet love song of the male firefly.

They are flying and hearts are shining.

I still think it's very romantic.

But in the meantime, where are the women?

Well, they're relaxing downstairs and weighing their options.

They have many males to choose from, but these females prove to be very picky.

When a woman sees a flash from a particularly attractive man, she points her lantern in the direction of the man to give him a flashback.

That's her "come over here" sign.

So he flies closer and blinks again.

If she still likes him, they will strike up a conversation.

These creatures speak love in the language of light.

So what exactly do these women think is sexy?

We decided to conduct a poll on fireflies to find out.

When we tested females using blinking LED lights, we found that females preferred males that blinked longer.

(Laughter.) (Applause.) I know you're wondering, what makes these men so sexy?

Now let's see what happens when the lights go out.

The first thing we discovered was that when men and women bond in this way, they spend the whole night together. When I looked inside to see what was going on, I discovered a surprising new twist to Firefly's sex.

During mating, the male is busy giving the female not only his own sperm, but also a nutrient-packed package called a wedding gift.

You can zoom in for a closer look inside this mated pair.

In fact, red shows how the gift is passed from the man to the woman.

What makes this gift so valuable is that it's rich in protein, which the female uses to lay her eggs.

Therefore, females look to this award when determining potential mates.

We found that females utilize male flash signals to try to predict which male has the greatest gift. Because this glow helps females lay more eggs and ultimately produce more of their own offspring into the next generation.

So it's not just sweet and light.

Firefly romance is dangerous.

For the most part, these adult fireflies are never eaten because they can produce toxins that keep birds and other insectivores away, just like the juveniles, but one particular group of fireflies, for whatever reason, lost the metabolic machinery necessary to make the toxins that protect them.

This evolutionary flaw, discovered by my colleague Tom Eisner, causes these fireflies to emit bright lights at night with dangerous intent.

Dubbed "femme fatales" by another colleague, Jim Lloyd, the females have figured out how to target males of other types of fireflies.

Thus, the hunt begins with the predator—she is shown here bottom left—where she sits quietly, eavesdropping on the courtship conversation of her intended prey. And here's how it looks.

First, the prey male blinks "Do you love me?"

His own woman replies, "Maybe."

So he blinks again.

This time, however, the predator sneaks in a reply that cleverly mimics what the other female said.

She's not looking for love, she's looking for toxins.

If she's good, you can lure this male close enough to reach out and catch him, and he's more than just a snack.

Over the next hour, she slowly exsanguinated the male, leaving behind a brutal carcass.

These females, unable to make their own toxins, rely on drinking the blood of other fireflies to obtain these protective chemicals.

That is, firefly vampires brought on by natural selection.

We still have a lot to learn about fireflies, but with firefly populations blinking around the world, many stories are likely to remain untold.

The main cause is habitat loss.

Almost everywhere the fields, forests, mangroves and meadows that fireflies need to survive are sprawling, giving way to development.

There is another problem here. We have overcome the darkness, but in the process we let too much excess light into the night, disrupting the lives of other creatures. Fireflies are particularly sensitive to light pollution because it interferes with the signals they use to find their mates.

Do you really need fireflies?

After all, they represent only a fraction of the biodiversity of the planet.

But every time a seed is lost, it's like putting out a roomful of candles, one by one.

You may not notice the first few flickering flames, but eventually you will be left sitting in the dark.

I hope that we can find a way to keep this bright light shining as we work together to shape the future of our planet.

thank you.

(applause)

The word "pheromone" is a very strong word.

It conjures up sex, abandonment, and loss of control, but it turns out to be very important as a word.

But it's only been 50 years. Invented in 1959.

Now, as you may have done, put that word on the web and you'll get millions of hits. And almost all of those sites are trying to sell you something attractive for $10 or more.

This is a very attractive idea, and the molecules they refer to sound very scientific.

They have many syllables.

Like androstenol, androstenone, androstadienone.

It gets better and better and when you pair it with a lab coat you have to imagine there is some great science behind it.

But sadly, these are fraudulent claims backed by dubious science.

The problem is that although there are many good scientists working on what are supposed to be human pheromones and publishing them in respectable journals, there is no good science behind it, despite the very sophisticated experiments. Because it's problem-based. It is based on the problem that no one has systematically investigated all human odors. And there are thousands of smells we give off.

we are mammals We produce a lot of odors.

No one has systematically figured out which molecules are actually pheromones.

They only extracted a few, and all these experiments are based on them, but there is no good evidence at all.

That's not to say that smell isn't important to humans.

There are also true enthusiasts, one of whom was Napoleon.

And famously, you may remember him writing to his lover Empress Joséphine during a war campaign: "Don't wash me. I'm going home."

(Laughter) So he didn't want to lose any of her wealth for the next few days until he got home. And even now, you'll find websites that offer this as a major quirk.

But at the same time, we spend as much money removing odors as we put back into perfumes, and perfumes are a multi-billion dollar business.

So what I want to do with the rest of this story is talk about what pheromones really are, why I think humans have them, talk about some confusion with pheromones, and finally end with a promising path that shows us the way forward.

So the ancient Greeks knew that dogs sent invisible signals to each other.

A female dog in heat sent an invisible signal to male dogs miles away, but it was smell, not sound.

The dogs chase the cloth when they smell the female dog.

But the problem for everyone who could confirm this effect was the inability to identify the molecule.

Couldn't prove it was a chemical.

The reason, of course, is that each of these animals produces tiny amounts, and in the case of dogs, male dogs can smell, but we can't.

And it wasn't until 1959, after a German team had spent 20 years searching for these molecules, that they discovered and identified the first pheromones. This was the silkworm sex pheromone.

Well, this was an inspired choice by Adolphe Butenant and his team. It took 500,000 moths to get enough material to do the chemical analysis.

But he created a model for how pheromone analysis should be done.

He essentially systematically investigated and showed that only the molecule in question was the one that stimulated the males and not all other molecules.

He analyzed it very carefully.

He synthesized a molecule, tested it on a male, reacted with it, and showed that it was indeed that molecule.

That's closing the circle.

It's never been done to humans before, it's not systematic, it has no real demonstration.

That new concept needed a new word. That's the word "pheromone". Essentially an inter-individual transfer of excitement, pheromones have been found throughout the animal kingdom since 1959, in both male and female animals.

Goldfish and lobsters are equally effective in water.

And nearly every conceivable mammal has been confirmed to have pheromones, and of course, a huge number of insects have been identified.

Thus, pheromones are known to exist throughout the animal kingdom.

what about humans?

Of course, first of all, we are mammals, and mammals stink.

As any dog ​​owner can tell you, we smell and they smell too.

But the real reason we think humans have pheromones is the changes that occur as we grow up.

A teenager's room smells nothing like a small child's room.

What has changed? And of course puberty.

In addition to pubic and armpit hair, new glands begin to secrete in those places, which cause a change in smell.

If we were some other kind of mammal or any other kind of animal, we would say, "It must have something to do with pheromones," and start looking properly.

But there are some issues, and I think this is why people haven't sought out human pheromones so effectively.

There are certainly problems.

And the first of these is probably the surprising one.

It's all about culture.

Modern moths don't learn much about what smells good, but humans do, and until the age of four or so, they're simply interested in any smell, no matter how bad it smells.

And I understand that the main role of parents is to keep their children from putting their fingers in the poop. Because poop always smells good.

But we gradually learn what's not good, and one of the things we learn at the same time as what's not good is what's good.

Well, cheese, after all, is a British delicacy, if not British.

A ripe blue Stilton.

People from other countries can't understand that they like it.

Every culture has its own special foods and regional dishes.

If you're from Iceland, your national dish is rotten shark.

Now, these are all acquired tastes, but they almost form a badge of identity.

You are part of an inner group.

The second is the sense of smell.

Each of us has our own world of smells. This means that what we smell smells of a completely different world.

Now, smell is the most difficult of the five senses to perceive, and Richard Axel and Linda Buck were awarded the Nobel Prize only in 2004 for their discovery of how the sense of smell works.

It's very difficult, but essentially, there are nerves from the brain going up to the nose, and the exposed nerves in the nose have receptors, and the odor molecules that come in when you smell them interact with these receptors, and when they bind, they send a signal up the nerve, and that signal goes back to the brain.

We don't have just one type of receptor.

In humans, there are about 400 different types of receptors, and the combination of receptors and neurons allows the brain to perceive your scent and send messages to the brain in a combinatorial fashion.

But it's a little more complicated. Because each of these 400 have different variations, and depending on which variation you have, coriander and cilantro and its herbal scent can be either delicious and savory or soapy.

So each of us has our own world of smells, and that complicates everything when studying odors.

Now, we should really talk about armpits, but I have to say that I have some that are particularly good.

I'm not going to introduce you to pheromones here, but that's where most people are looking for pheromones.

One good reason. That is, apes have armpits as a unique feature.

Other primates have scent glands on other parts of their bodies.

The armpits of great apes are packed with secretory glands that constantly release a huge number of molecules that smell.

The molecule is odorless when secreted by the glands.

They have no smell at all. The only ones that actually produce the smells we know and love are the wonderful bacteria that grow in the rainforests of our hair.

By the way, if you want to reduce the amount of odor, shaving your armpits is a very effective way to reduce bacterial habitat, and you'll find that it reduces bacterial odor for a long time.

But we've been focusing on armpits, and I think that's also because armpits are the least embarrassing place to go for samples.

Actually, there is another reason why we are not looking for universal sex pheromones out there. That's because 20 percent of the world's population don't have stinky armpits like mine.

And these are people from China, Japan, South Korea and other parts of Northeast Asia.

They simply do not secrete the odorless precursors that bacteria prefer to use to produce the odors we have always attributed to armpits in an ethnocentric way.

That is not true for 20% of the world.

So what should we do to explore human pheromones?

I'm sure I have them.

Like other mammals, we are mammals, and perhaps we do have mammals.

But what I think we should do is go back to basics and look at the whole body.

No matter how embarrassing you are, you have to find a place no one has ever set foot in and go there for the first time.

It will be difficult and embarrassing, but we have to see.

We also need to go back to the ideas that Butenant used when he was studying silk moths.

We need to go back in time and systematically examine all the molecules being produced to figure out which ones are actually involved.

It's not enough to simply pick a few and say, "They will be fine."

We need to actually demonstrate that the effect we claim is indeed there.

Actually, there is a team that left a strong impression on me.

They are in France and their previous success was in identifying mammary pheromones in rabbits.

They now turn their attention to human babies and mothers.

This is a baby drinking milk from its mother's breast.

The nipple is completely hidden by the baby's head, but a white drop with an arrow is visible. This is a discharge from the areola.

Both men and women have these symptoms. These are small bumps around the nipple that start to secrete in women who are breastfeeding.

Very interesting secretions.

Benoist Schaal and his team developed a simple test, a simple bioassay, to investigate the effects of this secretion.

This is a sleeping baby with a clean glass stick under its nose.

Baby shows no interest and stays asleep.

But if you go to a mother who has a discharge from the areolar glands, it's not a matter of recognition, but from any mother. If you take the secretion out and put it under your baby's nose, you get a completely different reaction.

He opens his mouth, sticks out his tongue, and begins sucking in his usual gleeful response.

Now, this could be from any mother, so it really could be a pheromone.

It's not a matter of personal perception.

Any mother would do.

Now, why is this important, other than just being very interesting?

This is because every woman has a different number of areolas, and there is a correlation between the ease with which a baby begins to suckle and the number of areolas.

It seems that the more secretions there are, the more likely the baby is to suck soon.

If you are a mammal, the most dangerous period of your life is the first few hours of life.

You have to drink the first glass of milk, and without it you cannot survive.

you will die

In fact, many babies find it difficult to eat their first meal because they haven't received the proper stimulation, so the French research team would be very cautious if they could identify what that molecule was.

I would argue that this is an example of how a systematic, truly scientific approach can actually lead to a true understanding of pheromones.

All sorts of medical interventions are possible.

It's possible that humans use pheromones to do a variety of things, but we don't know for sure at this point.

What we need to remember is that pheromones aren't just about sex.

They are all sorts of things involved in mammalian life.

So go ahead and search further.

So much to find.

thank you very much.

(applause)

You may be wondering why a marine biologist from Oceana is here today to talk about world hunger.

I am here today because saving the oceans is more than just a desire to protect the environment.

This is not because we want to create jobs for fishermen, or because we want to protect fishermen's jobs.

It's more than an economic pursuit.

You can feed the world by saving the ocean.

Here's how.

As you know, there are already over a billion hungry people on this planet.

This problem is expected to worsen as the world population rises to 9 or 10 billion by mid-century, putting even greater pressure on food resources.

This is a big concern, especially given where we are right now.

We now know that arable land per person is already decreasing in both developed and developing countries.

We know we are heading towards climate change. This will change rainfall patterns, making some areas drier and others wetter, as shown in orange, causing droughts in breadbaskets such as the Midwest and Central Europe, and flooding in others.

Then it will be difficult for the land to solve the hunger problem.

That is why the oceans need to be the richest so that they can provide us with as much food as possible.

And that's what the ocean has been doing for us for so long.

As far back as we can go, we have seen an increasing amount of food available from the sea.

It seemed to continue to increase until around 1980, but then began to decline.

You've probably heard of peak oil.

Perhaps this is the peak fish.

I hope not. Return the story.

However, we can see that since 1980, the amount of fish in the global catch has decreased by about 18 percent.

And this is the big question. it continues.

This red line keeps going down.

But we know how to turn things around. That is what I am going to talk about today.

We know how to turn that curve back up.

This doesn't have to be the best fish.

With just a few simple tasks in the target location, you can restore your fisheries and feed your people.

First we want to know where the fish are, so let's see where the fish are.

Conveniently, the majority of fish live in coastal areas, coastal zones of each country, and these areas are managed by national jurisdictions, and fisheries can be managed in these coastal areas.

Coastal states tend to have jurisdiction over an area of ​​about 200 nautical miles called the exclusive economic zone, and it's good to be able to control their fisheries in those areas. Because the high seas, the dark areas of this map, the high seas are much more difficult to manage. Because it has to be done internationally.

If you are part of international agreements and track climate change agreements, you know that this can be a very time consuming, frustrating and tedious process.

So managing things nationally is great.

How many fish are there really in these coastal areas compared to the high seas?

About seven times more fish can be found here than in coastal areas compared to the high seas. It's a great place for us to focus because we can actually do a lot.

Focusing on these coastal areas could restore many fisheries.

But in how many of these countries should we work?

There are about 80 coastal states.

Do all those countries need to improve their fisheries management?

So we asked ourselves how many countries we needed to focus on, bearing in mind that the European Union conveniently manages its fisheries through a common fisheries policy.

So how much of our fisheries could be covered if the European Union and, say, nine other countries had good fisheries management?

After all, it turns out that the European Union and nine countries cover about two-thirds of the world's catch.

The 24 countries plus the European Union account for 90 percent of the world's total catch.

Therefore, we believe we can bring back fishing in limited areas.

But what should we do in these places?

Based on our work in the United States and elsewhere, we know we have to do three important things to bring fisheries back. It is: Catch quotas or limits should be set. We need to reduce bycatch. Bycatch is the accidental catching and killing of non-target fish, which is very wasteful. And third, we need to protect the habitats, nurseries and spawning grounds these fish need to successfully grow and reproduce so that they can rebuild their populations.

Do these three things and the fishing industry will definitely come back.

How can we know?

We know it because we've seen it happen in various places.

Here's a slide showing the Norwegian herring population, which has plummeted since the 1950s.

Catches are trending downward, and what happens when Norway sets limits, or quotas, on its fisheries?

Fishing is back.

This is another example of Norwegian Arctic cod from Norway.

Same deal. Fisheries are devastated.

They set limits on disposal.

Untargeted fish are discarded and uselessly thrown overboard.

When they set discard limits, the fishing industry rebounded.

And it's not just Norway.

We have seen this happening many times in countries around the world.

Once these countries intervene and put in place sustainable fisheries management policies, it seems that the ever-plunging fisheries are beginning to recover.

So there are a lot of promises here.

What does this mean for global fish catches?

This means that if we can increase the declining catch, we can increase it by up to 100 million tonnes per year.

That is, there were no peak fish yet.

We still have the opportunity to not only take the fish home, but actually catch more fish to feed more people than we have now.

How many more? Today, based on global catches, we can feed approximately 450 million people with fishmeal per day. Of course, we know that catches are declining, and if we don't fix this number, the numbers will decline over time. But if 10 to 25 countries implemented the kind of fisheries management practices I have described, we could raise that number and feed 700 million people a year with healthy fishmeal.

It is clear that we should do this because it is not only good for addressing the hunger problem, but also cost-effective.

Fish turned out to be the most cost-effective protein on the planet.

When you look at how much fish protein you get per dollar invested compared to other animal proteins, choosing fish is clearly the right business decision.

It also does not require much land, which is scarce compared to other protein sources.

And it doesn't require a lot of fresh water.

For example, much less fresh water is used than if a field had to be watered to grow food for grazing cattle.

It also has a very low carbon footprint.

We have a small carbon footprint because we have to go out and catch fish.

It takes a little more fuel, but as you know, agriculture can have a carbon footprint, and fish have a much smaller carbon footprint, so they pollute less.

It's already a big part of our diet, but we know it's healthy for us, so that's good.

It can reduce the risk of cancer, heart disease and obesity.

In fact, our CEO, Andy Sharpless, who invented the concept, likes to say that fish is the perfect protein.

Andy also talks about the fact that our marine conservation movement actually grew out of the land conservation movement, where biodiversity is at odds with food production.

There is always a push-pull, because if you want to get fields to grow corn to feed people, you have to clear biodiversity-rich forests.

We constantly have to make tough decisions between two very important things: maintaining biodiversity and feeding people.

But at sea there is no such war.

In the ocean, biodiversity and abundance are not in conflict.

In fact they match.

When we do activities that create biodiversity, we actually gain more affluence, which is important for feeding people.

Now there's a catch.

Did no one figure it out? (laughs) Illegal fishing.

Illegal fishing undermines the sustainable fisheries management I'm talking about.

This includes catching fish with prohibited equipment, fishing in areas where fishing is not permitted, catching the wrong size or type of fish, and more.

Illegal fishing not only deceives consumers, but also deceives honest fishermen and should be stopped.

The way illegal fish enter our market is seafood fraud.

You may have heard about this.

That's when a fish is labeled as not a fish.

Remember the last time you ate fish?

what were you eating?

Was it really so?

Because we tested 1,300 different fish samples, and about a third of them were different than what was on the label.

Sea bream, 9 out of 10 were not sea bream.

Fifty-nine percent of the tuna we tested were mislabeled.

And the red sea bream, out of 120 samples we tested, only 7 were actually red sea bream. So, I would appreciate it if you could find a red sea bream.

The seafood supply chain is very complex and without traceability, seafood fraud can occur at any stage of this supply chain.

Traceability is how the seafood industry tracks seafood from ship to plate, allowing consumers to see where their seafood came from.

This is really important.

This is being done by some in the industry, but not enough, so we are pushing a law in Congress called the SAFE Seafood Act. And today, we are very excited to announce the release of Chef's petition. There, 450 chefs have signed a petition asking Congress to support the SAFE Seafood Act.

Anthony Bourdain, Mario Batali, Burton Seaver and many other celebrity chefs you know are on board, and they signed up because they believe people have a right to know what they're eating.

(Applause.) Fishermen love it too, so there's a good chance we'll get the support we need to get this bill passed. And this bill comes at a crucial time. Because this is how we stop seafood fraud, how we curb illegal fishing, and how we ensure quotas, habitat protection and bycatch reduction do the job they can.

We know our fisheries can be managed sustainably.

We know we can produce healthy meals for hundreds of millions of people using less land, less water, a lower carbon footprint, and more cost-effectively.

We know we can feed the world by saving our oceans, and we need to start now.

(Applause.) Thank you. (applause)

About 30 years ago, when I was in charge of the oncology department at Children's Hospital in Philadelphia, a father and son walked into my office, both missing their right eye. A medical history study revealed that the father and son had retinoblastoma, a rare form of hereditary eye tumor, and the father knew he passed that fate on to his son.

That moment changed my life.

This pushed me to co-lead the team that discovered the first cancer susceptibility gene. In the decades since then, there has been a literal shakeup in our understanding of what is going on and what genetic mutations lie behind various diseases.

In fact, thousands of human traits, their molecular basis are known, and thousands of people are informed every day about their risk of contracting this disease or that disease.

At the same time, when asked, “Did it affect the efficiency of drug development?”

The answer is no.

If you look at the cost of drug development and how it's done, fundamentally it hasn't changed much.

In other words, it seems that we have the power to diagnose but not the power to fully cure.

And there are two commonly held reasons why this happens.

One of them is that it's still in its early stages.

We are only learning the words, snippets and letters of the genetic code.

We don't know how to read sentences.

We don't know how to make sense of the story.

Another reason is that most of these changes are loss of function, and in practice it is very difficult to develop drugs that restore function.

But today I want to take a step back and ask a more fundamental question: "What if I think of this in perhaps the wrong context?"

We do a lot of research on sick people and have a long list of altered components.

But perhaps if what we're trying to do is develop treatments for prevention, what we should be doing is studying people who don't get sick.

Perhaps we should study what is working.

The majority of those people do not necessarily have a particular genetic load or risk factors.

they won't help us.

Some people will have potential future risks, and they will continue to have some symptoms.

that's not what we're looking for.

What we are asking and looking for is whether there are actually people who actually walk around with the risk of causing disease, but there is something in them, something hidden in them, that is actually protecting them and preventing the manifestation of those symptoms.

If you were to do such a study, you could imagine wanting to study a great many people.

We had to do some pretty extensive research. And I realized that one way to think about this is, let's look at adults over the age of 40, and let's look at people who were healthy as children.

Some of their family members may have had childhood illnesses, but this is not always the case.

Then run a screen to find out who carries the gene for the childhood disease.

Now, I'm sure some of you are raising your hands and thinking, "Hmm, that's kind of weird."

What is the evidence that this is feasible?"

I would like to give two examples.

Originally from San Francisco.

This was in the 1980's and 1990's and you may have heard stories about some people having very high levels of the HIV virus.

They also got AIDS.

However, there were also a small number of people with very high levels of HIV infection.

They didn't get AIDS.

And when an insightful clinician tracked it down, it turned out they had the mutation.

Note that they were born with protective mutations that prevented them from contracting AIDS.

You may also know that there are actually a series of treatments that are based on that fact.

The second example is a more recent, elegant study done by Helen Hobbs. he said: "We look at people who have very high lipid levels and try to find people who have high lipid levels and don't get heart disease."

And she also found that some of these individuals, even with high lipid levels, had protective mutations from birth and were able to maintain them. We find this to be an interesting way of thinking about how to develop preventative therapies.

The project we are working on is called The Resilience Project: Searching for Unexpected Heroes. Because we are interested in whether we can find rare individuals who may have these hidden protective factors.

In a way, think of this as a decoder ring, a kind of resilient decoder ring that we're trying to build.

We realized we needed to do this systematically, so I said let's take all childhood genetic diseases.

Let's take them all and step back a little from the ones known to have severe symptoms, the ones that a parent, the child, the people around them might know they've got sick, and then go on to reassemble them by the parts of the gene that we know have specific changes that are known to be very penetrant to cause the disease.

where shall we look?

Well, you can see it locally. It makes sense.

But we started to wonder if we should look around the world.

Perhaps we should look not only here, but also in remote areas where there may be distinct genetic backgrounds and environmental factors that protect people.

And look at 1 million individuals.

The reason we think now is a good time to do it is that the cost of doing this type of analysis, this type of data generation has dropped significantly in the last few years, and the cost of data generation and analysis is actually lower than the cost of sample processing and collection.

Another reason is that over the past five years, we've seen some amazing tools in network biology and systems biology that make us think we might be able to decipher those positive outliers.

And while we were talking to researchers and institutions and telling our stories, something happened.

They started saying, "This is interesting."

We will be happy to work with you.

I would be happy to participate. ”

And they didn't say, "Where's the MTA?"

They didn't say, "Where is my authorship?"

They didn't say, "Is this data mine? Am I going to own it?"

They basically said, "Let's work on this in an open, crowdsourced, team way to do this decryption."

Six months ago we locked down the screening key for this decoder.

My co-leader, Eric Schatt, a distinguished scientist at the Icahn Mount Sinai School of Medicine in New York, and his team locked in that decoder keychain and began searching for samples. Because what we realized was that we might be able to look at some existing examples to get a sense of the feasibility.

You could probably take 2-3% of the project and see if it exists.

So we started asking people like Hacon at Children's Hospital in Philadelphia.

We asked Leif in Finland.

We spoke with 23andMe's Anne Wojcicki and BGI's Wang Jun, and another surprise happened.

They said, "Well, not only do we have a sample, we've also analyzed it. We'd be happy to look through the anonymized sample to see if we can find the sample you're looking for."

And last month, instead of 20,000 or 30,000, we already had over 1.5 million samples analyzed.

So you must be thinking, "Oh, did I find an unexpected hero?"

I didn't find an answer or two.

We've found dozens of strong candidates for unexpected heroes.

Therefore, we believe now is the time to start the beta phase of this project and start recruiting real talent.

Basically all you need is information.

We need a DNA swab and the willingness to say, "What's in me?"

We will contact you again. ”

Most of us spend our lives as if we were voyeurs when it comes to health and disease.

We entrust anointed professionals with the responsibility of understanding and treating disease.

For this project to be successful, individuals will need to step up and be involved in different roles. To realize this dream, this open crowdsourced project, to find unexpected heroes, to evolve from our current notions of resources and constraints, to design preventive therapies, to extend it beyond childhood diseases, to how we examine Alzheimer's and Parkinson's, we need to look within ourselves and ask ourselves, "What is our role?"

what are our genes ”

And, seeking information within ourselves, we used to argue that we need to consult outsiders and experts and share it with others.

thank you very much.

(applause)

In the mid-16th century, Italians were fascinated by male singers whose amazing range of notes seemed impossible for adult men.

However, this gift was expensive.

To prevent their voices from breaking, these singers were castrated before puberty to stop hormones that deepen their voices.

Known as castrato, their light, angelic voices were famous throughout Europe until the cruel procedures that produced them were outlawed in the 1800s.

Suppressed vocal growth can produce extraordinary vocal ranges, but naturally developing voices are already incredibly versatile.

And as we age, our bodies undergo two major changes that explore their reach.

So how exactly does our voicebox work and what causes voice changes?

The specific sound of speech is the result of many anatomical variables, but primarily determined by age and vocal cord health, and the size of the larynx.

The larynx is a complex system of muscles and cartilage that supports and moves the vocal cords, or more precisely, the vocal cords.

Stretched between the thyroid and the arytenoid cartilage, these two muscles form an elastic curtain that opens and closes the trachea, the tube that carries air to the throat.

The folds are apart when you breathe, but close when you speak.

Our lungs force air into closed folds, blowing them open, vibrating tissue and producing sound.

Unlike the deliberate concentration required to play an external instrument, we effortlessly change sounds while speaking.

By pushing the air faster or slower, the frequency and amplitude of these vibrations change, which translates into pitch and volume respectively.

Fast, small vibrations produce a shrill, quiet sound, and slow, large vibrations produce a deep, growl.

Finally, by moving the laryngeal muscles between the cartilages, you can stretch and contract those folds to intuitively play internal instruments.

This process is the same from the first word to the last, but as we age, so does the larynx.

During puberty, the first major changes begin when the voice begins to become lower.

This happens when the larynx increases in size and stretches the vocal cords, creating more space for them to vibrate.

These long creases are slower and have larger oscillations, resulting in a lower baseline pitch.

This growth is particularly dramatic in many men, where high testosterone levels first lead to a cracked voice and then a deeper, more sonorous voice, revealing a protrusion on the larynx called the Adam's apple.

Another vocal development during puberty occurs when the homogeneous tissue covering the folds specializes into three distinct functional layers. a central muscle, a layer of stiff collagen encased in elastic elastin fibers, and an outer layer of mucosa.

These layers add nuance and depth to the voice, giving it a distinctive timbre that sets it apart from prepubescent tones.

After puberty, most people's voices remain roughly the same for about 50 years.

However, we all use our voice differently and eventually experience a condition associated with the aging of the larynx known as presbyopia.

First, the collagen in the folds hardens and the surrounding elastin fibers atrophy and wither away.

This loss of flexibility causes older voices to have a higher pitch.

But for those who have experienced the hormonal effects of menopause, the higher pitches are outweighed by swollen vocal cords.

Increasing the mass of the folds slows down their vibrations, resulting in a deeper voice.

All of these symptoms are further complicated by the loss of healthy laryngeal nerve endings, resulting in less precise muscle control, shortness of breath and a hoarse voice.

Ultimately, these anatomical changes are just a few of the factors that can affect your voice.

But when kept in good condition, the voicebox becomes a finely tuned instrument capable of delivering operatic arias, moody monologues and moving speeches.

As a student who has experienced adversity, over the years I have been struck by how people with great challenges draw strength from them.

And I've heard the conventional wisdom that it has to do with finding meaning.

And for a long time I thought the meaning was there, that some great truth was waiting to be discovered.

But as time went on, I came to feel that the truth was irrelevant.

We call it 'meaning discovery', but it might be better to call it 'meaning forging'.

My last book was about how families deal with different kinds of difficult or unusual offspring.

And one of the mothers I interviewed, who had two children with multiple severe disabilities, said, "People always say little sayings like, 'God won't give you more than you can handle.'"

It's the one we chose, so it's a gift. ”

We make such choices throughout our lives.

When I was in second grade, Bobby Finkel threw a birthday party and invited everyone in his class except me.

Thinking something was wrong, my mother called Mrs. Finkel and was told that Bobby didn't like me and didn't want me at the party.

That day, my mom took me to the zoo for a hot fudge sundae.

When I was in 7th grade, one of the kids on the school bus nicknamed me "Percy" for my attitude.

And sometimes he and his buddies would chant the provocative words “Percy! Percy! Percy!

When I was in eighth grade, my science teacher told me that all gay men have faecal incontinence due to trauma to the anal sphincter muscle.

And I finished high school without ever going to the cafeteria. There you would sit with a girl and be laughed at, or sit with a boy and be laughed at for being a boy who should sit with a girl.

I lived through that childhood with a combination of avoidance and perseverance.

What I didn't know then, and what I do know now, is that avoidance and perseverance can be gateways to building meaning.

After crafting meaning, you need to incorporate that meaning into your new identity.

You have to accept the trauma and make it a part of yourself. We also need to fold the worst events of our lives into a triumphant story to present ourselves better for the events that hurt.

One of the other mothers I interviewed while writing the book was raped as an adolescent and had a child after that rape, abandoning her career plans and damaging all her emotional relationships.

But when I met her, she was 50, and I said to her, "Do you think much about the man who raped you?"

And she said, "I used to think of him with anger, but now I only have pity."

And I thought she meant sympathy because he was underdeveloped to do this horrible thing.

And I said, "Are you sorry?"

And she said, "Yes, he has a beautiful daughter and two beautiful grandchildren, but he doesn't know that, and I do.

So, after all, I'm a lucky person. ”

Some of our conflicts are innate: gender, sexuality, race, disability.

It happens to us, political prisoners, rape victims, Katrina survivors.

Identity involves entering a community and drawing power from that community and giving power there as well.

It involves replacing "but" with "and". It's not "I'm here and I have cancer", it's "I have cancer and I'm here".

We are too embarrassed to tell our stories. And stories are the foundation of identity.

Build meaning, build identity.

Build meaning, build identity.

It became my mantra.

To build meaning is to change yourself.

Building identity is changing the world.

All of us with identity bias face this question every day. How much we adapt to society by restricting ourselves, how much we break the limits of what constitutes an effective life.

Forging meaning and building identities doesn't fix what's wrong.

It just makes what was wrong valuable.

In January of this year, I traveled to Myanmar to interview political prisoners and was surprised to find that it was less painful than they had expected.

Most of them had deliberately committed crimes that would have landed them in prison, and they walked in with their heads held high and many years later they left with their heads held high.

Leading human rights activist Dr. Ma Thida, who spent years in solitary confinement after nearly dying in prison, said he was grateful to the guards for giving him time to think, the wisdom he gained and the opportunity to hone his meditation skills.

She sought meaning and transformed her suffering into an important identity.

But even if the people I met weren't as bitter about being in prison as I expected, they were also less excited about the ongoing reform process in their country.

"We Burmese are known to be very graceful under pressure, but we are also frustrated under glitz," Ma Thida said.

"These changes and the fact that they have happened do not erase the continuing problems in our society that we have come to understand better while in prison," she said.

I understood her to say that full humanity was required, and that concessions would give only a little humanity. That the crumbs are not the same as the place on the table.

So you can be furiously angry while building meaning and building identity.

I have never been raped, never been near a Burmese prison.

But as a gay American, I have experienced prejudice and even hatred, built meaning, built an identity. This is a method I have learned from people who have experienced far greater deprivation than I ever knew.

When I was an adolescent, I tried to be heterosexual.

I signed up for something called "Sexual Surrogacy Therapy". There, the people I called doctors prescribed exercises with the women I called surrogates. The women weren't exactly prostitutes, but they were nothing else.

(Laughter) My favorite is a blonde woman from the Deep South who eventually admitted to me that she was really a necrophiliac and got this job after getting into trouble at the morgue.

(Laughter.) I am grateful for these experiences that ultimately allowed me to have a happy physical relationship with a woman.

But I was fighting with myself and my psyche was badly damaged.

We do not seek painful experiences that define our identities, but we seek our identities in the wake of painful experiences.

We cannot endure meaningless suffering, but we can endure great suffering if we believe it is purposeful.

Ease is less impressive than hard work.

Without joy we might be who we are, but not without the misery that drives our quest for meaning.

“Therefore I rejoice in weakness,” wrote St. Paul in his second letter to the Corinthians. "Because when I am weak, I am strong."

In 1988 I went to Moscow to interview Soviet underground artists.

I expected their work to be anti-establishment and political.

But the radicalism in their work actually consisted, in a sense, in reinserting humanity into a society that is destroying itself, as Russian society is now doing again.

One of the artists I met said, "We were training to be angels, not artists."

In 1991 I went back to see some of the artists I used to write for. I was with them during the rebellion that collapsed the USSR.

and they were one of the main organizers of the resistance to the uprising.

And on the third day of the rebellion, one of them suggested walking to Smolenskaya.

And we went there and lined up in front of one of the barricades, and a little later a line of tanks came rolling in.

And the soldiers in the front tank said, "We have unconditional orders to destroy this barricade.

We don't have to hurt you if you stay out of the way.

But if you don't move, we have no choice but to hunt you down. ”

The artist who was with him said, "Wait a minute.

Please give me a moment to tell you why we are here. ”

And the soldiers folded their arms, and the artists began their Jeffersonian panageric of democracy. It would be difficult for those of us living in a Jeffersonian democracy to describe it.

And they went further, and the soldier was watching it.

And after they had finished, he sat there for a whole minute, and looking at us limp in the rain, said, "What you said is true, and we must obey the will of the people.

If you leave enough space for us to turn back, we will go back the way we came. ”

And that's what they did.

In some cases, forging meaning can give you the vocabulary you need to fight for ultimate freedom.

Russia awakened me to the lemonade concept that oppression creates power against it.

And gradually I understood that it is the basis of identity.

I needed an identity to get me out of my grief.

The gay rights movement presupposes a world in which my deviation wins.

Identity politics always works on two fronts. One is to give pride to people with certain conditions and characteristics, and the other is to make the outside world treat them kinder and more kindly.

These are two completely different businesses, but progress in one area affects the other.

Identity politics can be narcissistic.

People celebrate difference because it belongs to them.

People narrow the world and function in discrete groups without empathy for each other.

But identity politics, if properly understood and wisely practiced, should extend our conception of what it means to be human.

Identity itself should be a revolution, not a self-righteous label or gold medal.

Life would have been easier if I was heterosexual, but I'm not me.

And I now prefer being myself to the idea of ​​being someone else, someone who, to be honest, doesn't have the option or the full capacity to imagine being who I am.

But when we banish the dragon, we also banish the hero, and we cling to the heroic tension in our lives.

Sometimes I wonder if it wasn't for the Technicolor Fiesta of Gay Pride that I couldn't stop hating that part of myself, and this speech is one of those manifestations.

(Laughter.) I thought if I could just be gay without stressing it out, I'd know I was mature.

But the self-loathing of that period left a void that celebration needs to fill and overflow. Even if I pay off my personal debt of depression, the outside world of homophobia still exists and it will take decades to deal with it.

Someday being gay will be a simple fact free from party hats and blame.

But not yet.

A friend of mine who thought gay pride was obsessed with him once suggested that we organize a Gay Humility Week.

(Laughter) (Applause) Great idea.

(Laughter.) But that time has not yet come.

(Laughter) And the seeming neutrality between despair and celebration is actually the end.

In 29 U.S. states, you can be legally fired or denied housing for being gay.

In Russia, anti-propaganda laws have led to people being beaten in the streets.

Twenty-seven African countries have passed laws banning sodomy.

And in Nigeria, homosexuals can legally be stoned to death, and lynching is common.

Saudi Arabia recently sentenced two men caught in lustful acts to 7,000 lashes each and is now permanently disabled as a result.

So who can build meaning and build identity?

Gay rights are not primarily the right to marry, and dignity remains elusive for millions of people who live in places of no resources or acceptance.

I am fortunate to have been able to build meaning and build identities, but it is still a rare privilege.

And gays, on the whole, are worth more than a piece of justice.

Still, the step forward is so sweet.

In 2007, six years after we met, my partner and I decided to get married.

My encounter with John was a great discovery of happiness, and also the resolution of a great misfortune.

And sometimes I got so caught up in the disappearance of all that pain that I forgot the joys that were so unnoticeable to me at first.

Marriage was a way of declaring our love as present rather than absent.

As soon as we got married, we had children and it meant a new meaning and a new identity for us and them.

I want my children to be happy and I love them most when they are sad.

As a gay father, I can teach them to understand what is wrong with their lives, but I believe that if I succeed in protecting them from adversity, I have failed as a parent.

A Buddhist scholar I know once explained to me that Westerners mistakenly believe that nirvana comes when all suffering is gone and all that is left to look forward to is nirvana.

But he said it was not Nirvana. For the bliss of the present is always overshadowed by the joys of the past.

Nirvana, he said, is what you look forward to only bliss, and what you reach when you find the sapling of joy in what appeared to be sorrow.

And sometimes I wonder if if I had been heterosexual when I was younger, or if I were younger now, if marriage and children had been easier, I would have been so fulfilled about marriage and children. Either way, this could be easier.

You probably can.

Perhaps all the intricate imaginings I've done could have been applied to other topics as well.

But if seeking meaning is more important than finding meaning, then the question is not whether I was happier being bullied, but whether giving meaning to those experiences made me a better father.

I tend to find ecstasy in ordinary pleasures. Because I didn't expect those pleasures to be normal for me.

I know a lot of heterosexual people who are equally happy with their marriages and families, but gay marriage is breathtakingly fresh and gay families so exhilarating that I found meaning in the surprise.

It was my 50th birthday in October and my family organized a party for me.

On the way, my son said he wanted to give a speech to my husband.

Then John said, "George, you can't give a speech. You're only four years old."

(Laughter) "It's just Grandpa, Uncle David and me who will be giving speeches tonight."

But George argued over and over until finally John brought him in front of the microphone and George said very loudly, "Ladies and gentlemen!"

Could you please pay attention? ”

And everyone turned around in surprise.

And George said, "I'm so happy it's your daddy's birthday.

I am happy that we can eat cake together.

And Daddy, if you were little, I'd be your friend. ”

(gasps) And I thought -- (applause) Thank you.

I thought I was indebted to Bobby Finkel. Because all my previous experiences have driven me to this moment. And I was finally able to be unconditionally grateful for the life I once wanted to do anything to change.

When gay activist Harvey Milk was once asked by a young gay man what he could do to help the movement, Harvey Milk replied, "Go out and tell someone."

There will always be those who seek to confiscate our humanity.

And there are always stories to restore it.

If we live out loud, we can defeat hate and extend life for everyone.

Forge meaning.

Forge meaning.

Build your identity.

and share your joy.

thank you.

(Applause.) Thank you.

(Applause.) Thank you.

(applause)

So it was the fall of 1902. President Theodore Roosevelt needed a short break from the White House, so he took a train to Mississippi to hunt a small black bear outside the town of Smedes.

Much to everyone's dismay, not a single bear was seen on the first day of the hunt, but on the second day, after a long chase, the dogs cornered one, at which point the President had given up and returned to camp for lunch, so the hunting guides split the bear's top with the butt of a rifle, then tied it to a tree and began trumpeting it away, calling President Roosevelt back for an honorable shot.

The bear was female.

It was dazed, wounded, badly underweight, and looked a little dirty, and when Roosevelt saw this animal tied to a tree, he was reluctant to fire.

He felt it was against the norm as a sportsman.

A few days later, the scene was memorialized in Washington as a political caricature.

It was called "Draw a Line in Mississippi," and it showed President Roosevelt saving a bear's life with his gun down and his arm outstretched. The bear sat on its hind legs and had two large frightened eyes and small ears on the top of its head.

It looked really helpless and just wanted to hold it in its arms and reassure it.

It may not have looked familiar at the time, but if you look for the cartoon now, you'll immediately recognize the animal. It's a teddy bear.

Thus the teddy bear was born.

Essentially, toy makers took bears from cartoons and made them stuffed animals, naming them "teddy bears" after President Roosevelt.

And while it feels a little silly that I decided to take this stage and spend my time telling a 100-year-old story about the invention of fluffy toys for children, I would argue that the invention of the teddy bear in that story is the more important story, a story about how the way we think about nature can change dramatically, and a story about how the stories we tell on Earth today are changing nature dramatically.

Think of a teddy bear.

For us, looking back, it feels like a given. Because bears are so cuddly and cuddly, who wouldn't want to give their children a bear to play with? But the truth is, in 1902, bears weren't cute and cuddly.

I mean, they looked alike, but nobody thought of them that way.

In 1902, bears were monsters.

Bears used to scare children.

For generations back then, bears were shorthand for all the dangers people encountered on the frontier, and the federal government had actually systematically exterminated not only bears, but many other predators such as coyotes and wolves.

These animals were demonized.

They were called murderers because they killed people's livestock.

A government biologist explained this war against animals like bears as we're just getting them out of the way because they no longer have a place in evolving civilizations.

Nearly 500,000 wolves were killed in ten years.

Grizzly bears will soon be extinct from 95 percent of their original territory. Where once 30 million bison migrated across the plains, and it was often said that trains had to stop for 4-5 hours to let the big rivers of live animals overflow onto the tracks, today by 1902 there were probably fewer than 100 bison left in the wild.

So, I mean, the teddy bear was born in the midst of this mass extinction chaos. And that could probably be seen as a sign that deep down some people were starting to feel conflicted about all this killing.

America still hated and feared bears, but suddenly America wanted to give them a big hug too.

So this is something I've been very interested in the last few years.

How do we imagine animals, how do we think and feel about them, how are their reputations written and rewritten in our minds?

We are living here in a mass extinction storm that could wipe out half of the planet's species by the end of the century. So why do we care about some of those species and not others?

Well, there's a new field, a relatively new field of the social sciences, that's starting to examine these questions and try to unlock the powerful, sometimes quite schizophrenic, relationship we have with animals. I spent a lot of time looking through their journals, and all I can really say is that their findings are amazingly extensive.

So some of my favorites are that in Upstate New York, the more TV I watch, the more fear of being attacked by a black bear.

If you show Americans a tiger, they're more likely to think it's a female instead of a male.

In a study that placed fake snakes and fake turtles on the side of the road, drivers hit snakes much more often than turtles, and about 3 percent of the drivers who hit fake animals appeared to do so on purpose.

Women are more likely than men to experience a "magical feeling" when they see dolphins on the beach.

68% of mothers with "feelings of high entitlement and self-esteem" resonated with dancing cats in Purina commercials. (Laughter.) Americans think lobsters are more important than pigeons, but they also think they're far more stupid.

Wild turkeys are considered slightly more dangerous than sea otters, and pandas are twice as beloved as ladybugs.

So part of this is physical, right?

We tend to empathize with animals that look like us, especially those that look like human babies, so big forward-facing eyes and round faces, sort of a low-poly posture.

This is why if you get a Christmas card from your Minnesota great aunt or something, it usually has a fluffy penguin chick on it rather than something like a Glacier Bay wolf spider.

But it's not all physical, right?

How we think about animals has a cultural dimension, and we tell stories about these animals, but like any other story, those stories are shaped by the time and place we tell.

So think back to the moment in 1902, when a ferocious bear became a teddy bear.

What was the context? Well, America was urbanizing.

For the first time, almost the majority of people lived in cities, and the distance between us and nature became more and more distant.

There was a safe space where we could reimagine bears and express them romantically.

Nature has become so pure and lovely because we no longer have to fear it.

And we see that cycle repeated over and over again in all kinds of animals.

We always seem to be caught between wanting to demonize and exterminate a species, and wanting to sympathize with and sympathize with that species as vulnerable when that happens.

Therefore, we exert our power, but we feel insecure about its strength.

For example, this is probably one of thousands of letters and drawings children sent to the Bush administration to protect polar bears under the Endangered Species Act, back in the mid-2000s when awareness of climate change was suddenly on the rise.

We kept seeing a really grumpy polar bear stranded on a small ice floe.

I spent days looking through these files.

i really love them. this is my favourite.

As you can see, it's a polar bear drowning and being eaten by a lobster and a shark at the same time.

This one is from a kid named Fritz, and he actually has a solution to climate change.

He led all the way to ethanol-based solutions.

“I feel sorry for the polar bears,” he said.

I like polar bears

Anyone can use corn juice in their cars. from fritz. ”

Two hundred years ago, Arctic explorers would have written about polar bears jumping into boats and trying to eat them, even if they set them on fire. But these kids don't see polar bears that way, and in fact they don't even see them like I did in the 80's.

So we thought of these animals as the mysterious and fearsome rulers of the Arctic.

But look how quickly climate change changed the image of animals in our minds.

From bloodthirsty killer to victim of this delicate drowning. Come to think of it, it's like the conclusion of a story that Teddy Bear began telling in 1902. For at that time America had more or less conquered a share of the continent.

We were just about to wipe out these last wild predators.

Now the reach of society has expanded to the top of the world, making even the most remote and powerful bears on earth look like lovable and innocent victims.

But as we all know, there's also a little-told sequel to the teddy bear story.

The toy didn't take long from the 1902 Roosevelt hunt to a full-blown craze, because most people thought it was a fad, a kind of silly political novelty that would go away when the president left office. So by 1909, when President Roosevelt's successor, William Howard Taft, was ready to take office, the toy industry was on the hunt. next big thing.

They didn't get along very well.

In January of that year, Taft was the guest of honor at a banquet in Atlanta, but the big news was the menu a few days earlier.

They planned to serve him a Southern specialty, actually a delicacy called possum and tater.

So sometimes you roast a whole opossum on a bed of sweet potatoes and then leave a big tail on it like a big meaty noodle.

What was brought to Taft's table weighed 18 pounds.

After dinner, the orchestra began playing, the guests sang along, and Taft was suddenly surprised by a gift from a group of local supporters. It was a stuffed opossum, all round-eyed and bald-eared, the new product they had proposed as President William Taft's answer to Teddy Roosevelt's teddy bear.

They called it "Billy Possum".

Within 24 hours, the Georgia Billy Possum Company had launched to broker trade in these commodities across the country, and the Los Angeles Times announced with great confidence that "Teddy bears have been relegated to the back seat and for four years, maybe eight years, America's kids will be playing with Billy Possum."

From that point on, bouts of opossum fever ensued.

There were Billy Possum postcards, Billy Possum pins, and a Billy Possum pitcher for coffee time creme.

A little Billy Possum was on a stick that the kids could wave around like a flag.

But despite all the marketing, Billy Possum's life turned out to be pitifully short.

The toy was a fiasco and was almost completely forgotten by the end of the year. That means Billy Possum didn't even come around Christmas time. Come to think of it, this is a special tragedy for toys.

Therefore, its failure can be explained in two ways.

The first is, well, pretty obvious.

I just want to say out loud, opossums are terrifying. (Laughter) But perhaps more importantly, the Billy Possum story was all wrong, especially when compared to Teddy Bear's upbringing.

please think about it. What makes bears so impressive to us for most of human evolutionary history is their complete independence from us.

That is, they live parallel lives as threats and competitors.

By the time Roosevelt went hunting in Mississippi, his stature had been shattered, and the animal Roosevelt had roped to a tree had become the very symbol of all bears.

Whether those animals now lived or died depended entirely on people's sympathy or indifference.

It says very eerie things about the future of bears, but also very unsettling things about what we might become if the survival of even such animals were up to us now.

So, a century later, if we pay even a little attention to what's going on in our environment, the discomfort is felt more strongly.

We are now living in what scientists have begun to call "conservation dependence." What this term means is that we have done so much destruction that nature can no longer stand on its own, and that most endangered species cannot survive unless they remain in landscapes where we manipulate the world around them to their advantage.

So we really can't keep our hands off it, and we've done so much work.

We are currently training condors not to perch on power lines.

We teach whooping cranes to migrate south for the winter in the back of a small ultralight plane.

We vaccinate ferrets for plague.

Using drones to monitor pygmy rabbits.

So, we went from making species extinct to micromanaging many species indefinitely, but which ones?

That's right, the ones we've told compelling stories, the ones we decided we should keep.

The lines between conservation and domestication are blurring.

So what I've been saying is that the stories we tell about wildlife are so subjective that they can be irrational, romanticized, or sensationalized.

In some cases, they have nothing to do with the facts.

But in a world that depends on protection, these stories have very real consequences. Because how we feel about animals affects their survival more than anything we read in ecology textbooks.

Storytelling is important now.

Emotions matter.

Our imagination has become a force to influence the environment.

And maybe the teddy bear worked because the legend of Roosevelt and the Mississippi bear was something of an allegory for this grave responsibility society was just beginning to face at the time.

It will be another 71 years before the Endangered Species Protection Act is passed, but really, the whole spirit of it can be summed up in a stained glass window.

The bear was a helpless victim tied to a tree and the President of the United States decided to show the bear mercy.

thank you.

(Applause) [Illustration by Wendy McNaughton]

What does augmented reality and professional football have to do with empathy?

And what is the airspeed of an unladen Swallow?

Unfortunately, I'm only going to answer one of these questions today, so don't get discouraged.

When most people think of augmented reality, they think of Minority Report or Tom Cruise waving in the air, but augmented reality is not science fiction.

Augmented reality is something that will happen in our lifetimes, it will happen because we have the tools to make it happen, and people need to realize that augmented reality will change our lives as much as the internet and mobile phones.

So how can we reach augmented reality?

Step 1 is the Step I'm wearing right now, Google Glass.

I'm sure many of you are familiar with Google Glass.

What many people don't know is that Google Glass is a device that lets you see what I see.

Experience what it's like to be a professional athlete on the field.

For now, the only way for you to stand in the field is for me to explain to you.

You have to use words.

I have to create the framework and fill it with my imagination.

With Google Glass, you can wear it under your helmet and know what it's like to be running 160 mph across a field with blood in your ears.

You know what it's like to have a 250-pound man running with all his might to try to decapitate you.

I've been through that too, and it doesn't feel very good.

Here are some videos to give you an idea of ​​what Google Glass feels like under your helmet.

Unfortunately, this is not NFL practice footage. Because the NFL believes what happens when submarines surface is emerging technology. But (laughter), we do the best we can.

So let's pull up some videos.

(Video) Chris Kluwe: Go.

Well, being tackled sucks.

Wait, let's get a little closer.

Okay, are you ready?

go!

Chris Kluwe: As you can see, let's get a little taste of what it's like to be tackled on the football field from the perspective of the tackled side.

Here you may have noticed that the rest of the team is missing.

Here are some videos of it, courtesy of the University of Washington.

(Video) Quarterback: Hey Mouse 54! Mouse 54!

Blue 8! Blue 8! go!

oh!

CK: Again, this gets you a little closer to what it's like to be on that field, but this isn't what it's like to be in the NFL.

Fans want that experience.

Fans want to be on the field.

They want to be their favorite player and have already spoken to me on YouTube and said on Twitter:

Can you get this with a running back?

We want that experience. ”

Given that experience on GoPro and Google Glass, how can we make it even more immersive?

How do I proceed to the next step?

Well, we take that step by going to something called the Oculus Rift. I'm sure most of you are familiar with the Oculus Rift.

The Oculus Rift is said to be one of the most realistic virtual reality devices ever created, but that's no empty hype.

This video explains why it's not empty hype.

(Video) Man: Oh!

no! no! no! I don't want to play anymore! no!

oh my god! Oh oh!

CK: That's the experience of a man riding a roller coaster in fear of his life.

What do you think the fan's experience will be like when Adrian Peterson breaks through the line and gets video footage of him sprinting for a touchdown by arm-wielding a tackler?

What do you think the fan's experience will be like when Messi sprints down the pitch and puts the ball in the back of the net, or when Federer serves at Wimbledon?

What do you think his experience would be like as an Olympic downhill skier down a mountainside at over 110 mph?

Sales of adult diapers could skyrocket.

(Laughter) But this is not augmented reality yet.

This is just virtual reality, VR.

How can we reach augmented reality, A.R.

We get to augmented reality when coaches, managers, and owners see this information streaming that people want to see and say, "How are we going to improve this team?"

How can I use this to win matches? ”

Because teams always use technology to win games.

they like to win It brings them money.

A brief history of technology in the NFL.

In 1965, the Baltimore Colts gave their quarterbacks wristbands so they could call plays sooner.

They went on to win the Super Bowl that year.

Other teams followed suit.

More people watched the match because it was more exciting.

It was faster.

In 1994, the NFL installed helmet radios in quarterback helmets and later in defensive helmets.

More people watched the match due to the higher speed.

It was more interesting.

Imagine yourself back in the huddle as a player in 2023, with the next play displayed in the clear plastic visor you already wear in front of your face.

Never worry about forgetting to play again.

No more worrying about having to memorize playbooks.

You just go out and react.

And coaches really want this. Because if you miss a task, you lose the game, and coaches hate losing the game.

If you lose the game, your coach will be fired.

they don't want that.

But augmented reality is more than just an augmented playbook.

Augmented reality is also a way to take all that data and use it in real time to improve how you play games.

What will it be?

A very simple setup would have a camera in each corner of the stadium pointing downwards, giving a bird's eye view of all the people there.

It also provides information from helmet sensors and accelerometers, technologies currently in development.

Get all the information and stream it to the player.

Good teams stream in a way that players can use.

Too much information is bad.

It determines good teams and bad teams.

And now your IT department is just as important as the scouting department, and data mining is no longer for geeks.

It's also for jocks. did you know who?

What will it look like in the field?

Now imagine you are the quarterback.

After taking a snap, step back.

You are looking for an open receiver downfield.

Suddenly you see a bright flash on the left side of your visor and you know the blind side linebacker is charging.

Normally you can't see him, but with an augmented reality system you can know it.

you go in your pocket

Another flash warns that the receiver is open.

He throws the ball, but is hit the moment he throws it.

The ball goes off the track.

I don't know where it will land.

However, I could see a patch of grass glowing on the recipient's visor and knew it needed to be readjusted.

He ran, caught the ball, sprinted for a touchdown.

Crowds go crazy and fans watch him from every angle.

This is what brings great excitement to the game.

People want this experience, so a lot of people will watch it.

Fans want to be on the field.

They want to be their favorite player.

Augmented reality will become part of sports. Because it is too profitable not to use augmented reality.

But what I want to ask you is, is that the only thing that makes us happy with augmented reality?

Are you going to use it just for panem, circus and entertainment as usual?

Because we believe that augmented reality can be used for something more.

I believe that augmented reality can be used as a way to foster more empathy within the human species itself by literally showing someone what it's like to walk a mile in someone else's shoes.

We know how valuable this technology is to sports leagues.

It is worth billions of dollars in annual revenue.

But what value is this technology for a teacher trying to teach a classroom bully how harmful his behavior is from the victim's perspective?

What value is this technology for gay Ugandans and Russians trying to show the world what it's like to live under persecution?

What is this technology worth to anyone Commander Hadfield or Neil DeGrasse Tyson trying to inspire a generation of kids to think more about space and science than quarterly reports and the Kardashians?

Augmented reality is coming, folks.

The questions we ask, the choices we make, and the challenges we face are, as always, up to us.

thank you.

(applause)

I didn't join the Army to go to war, so I'm excited to be here to talk about veterans.

I joined the military not because of a desire or need to go abroad and fight.

Frankly, the reason I joined the Army was that college tuition was very expensive and they would help me with that. And I got into the Army because that's what I knew and that's what I thought I could do well.

I wasn't from a military family.

I'm not a military kid.

No one in my family had served in the military. And my first encounter with the military was when I was 13 years old. I was sent to military school because my mother had threatened me with the idea of ​​military school ever since I was eight years old.

I had some problems before I gave birth, but my mother always told me,

And I looked at her and said, "Mommy, I'll try harder."

And when I was 9, she started handing me pamphlets to show that she wasn't playing, so I looked at the pamphlet and thought, 'Okay, Mom, I know you're serious, and I'll try harder.

And by the time I was 10 and 11, my attitude just got worse.

I was on academic and disciplinary probation before reaching double digits, and I was 11 when I first felt handcuffs on my wrists.

So when I was 13, my mother came to me and said, "I don't do this anymore.

I will send you to military academy. ”

And I looked at her and said, "Mommy, I know you're upset. I'll try harder."

Then she said, "No, I'm going next week."

That was how I first got to know the whole concept of the military. Because she thought this was a good idea.

The first time I was there, I had to wholeheartedly disagree with her. Because literally in the first four days I had already run away from this school five times.

They had a big black gate surrounding the school and every time they turned their backs I just jumped out of the black gate and accepted their offer to leave whenever I didn't want to be there.

So I just said, "Then I want to quit." (Laughter) And it never worked.

And I kept getting lost.

But in the end, after staying there for a while and finishing my first year at this military school, I realized that I was actually growing.

I realized that the fun I had in this school, the fun in the structure of this school, was something I had never found before. The fact that I finally felt like I was part of something bigger, part of a team, and the fact that it actually mattered to people that I was there, the fact that leadership wasn't just a punchline there, it was a real, actually central part of the whole experience.

So when it came time to actually finish high school, I started thinking about what I wanted to do, but like most students, I had no idea what that meant or what I wanted to do.

And it reminded me of people I admire and respect.

I thought about the many people I admired in my life, especially many men.

They all happened to be wearing United States uniforms, so the questions and answers were very easy for me.

When asked what I wanted to do, I immediately answered, "I would be an army officer."

So the Army trained me through this process, and I will say that I didn't join the Army because I wanted to go to war, but the truth is, I joined in 1996.

Nothing was really happening.

I never felt that I was in danger.

When I went to my mom, I gave her the paperwork because I was 17 years old when I first joined the army, so I literally needed my parents' permission to get into the military, but she thought it was like military school.

She didn't know that the papers she was signing were actually signing her son to become an army officer, so she was like, "Well, it used to be good for him, so I'm going to let him continue."

And I went through that process, and I kept thinking, this is great, I'm going to serve and train for a weekend or two weeks out of the year. And years after I registered, years after my mother signed the papers, the whole world changed.

And after 9/11, there was a whole new context for my chosen profession.

When I first joined, I didn't join to fight, but now that I do, this is exactly what will happen.

And I thought a lot about the soldiers that I ended up leading.

The first time, right after 9/11, three weeks after 9/11, I was on a plane going overseas, and I remember going overseas because I wasn't going overseas with the military, I had a scholarship to go abroad.

I received a scholarship that allowed me to go abroad, study abroad, and live abroad. Living in England, it was interesting, but at the same time, the same people I was training with, the same soldiers I was training with all along and preparing for war, are now actually going to war.

They were about to find themselves in the middle of a place, but in fact the majority of people, the majority of us in training, couldn't even point it out on a map.

All the time I spent years finishing graduate school and sitting in an Oxford building that was literally hundreds of years before the United States was founded, I sat there talking with the Dons about the assassination of Archduke Ferdinand and how it influenced the start of World War I. All the while, my heart and mind was on the soldiers now wearing Kevlar and clutching anti-aircraft vests, wondering how I would change, exactly how. Clean the machine gun in the dark.

It was the new reality.

By the time I finished that and rejoined my unit and started preparing for my deployment to Afghanistan, my unit already had soldiers on their second and third deployments before I made my first.

I remember the first time I went outside with my unit. When you enlist in the army and go on a combat tour, everyone's eyes are on your shoulder. Because you have combat patches on your shoulders.

So as soon as you meet people, you shake hands and your eyes go to their shoulders. Because I want to know where they served or in which unit they served.

And I was the only one walking bare shoulders, burning every time someone stared at it.

However, I have the opportunity to speak with the soldiers and ask them why they registered.

I enrolled in college because tuition is expensive.

Many of my soldiers enrolled for completely different reasons.

They signed up out of a sense of duty.

They are angry and want to do something about it and signed up.

They signed up because the family said this was important.

They registered because they wanted to take revenge in some way.

They signed for various reasons.

And now I realize that we are all fighting these conflicts abroad.

And what surprised me was that I began to hear very naively these words, which I could not understand at all. Because right after 9/11, people started to hear this thought of coming up to you and saying, "Well, thank you for your service."

And I followed suit and started telling all the soldiers the same thing.

This is before I deploy.

But I had no idea what that meant.

I just said it because it sounds right.

I said this because it seemed like the right thing to say to those who served abroad.

"Thank you for your service."

But I didn't even know what the context was, what it was, or what it meant to the people who heard it.

When I first returned home from Afghanistan, I thought all danger was gone once I returned safely from the conflict.

I thought that even if we managed to come back from a conflict zone, many people would be able to wipe the sweat off their foreheads and say, "Oh, I'm glad we avoided that incident," without realizing that the war was still going on when they returned home.

It lives on in our hearts.

It unfolds in every memory of us.

It is reflected in our every emotion.

Please forgive me if you are not good at large crowds.

Forgive me if I spend a week in a place where 100% light is disciplined. Walking around with a white light is prohibited. This is because an object with white light can be seen from miles away, whereas an object with little green or blue light cannot be seen from a distance.

So if suddenly you're 100 percent light disciplined and a week later you're back in the middle of Times Square, and you sometimes struggle to adjust, please forgive me.

Forgive me that it is not so easy to return to a sense of normalcy when you return to a family that was completely without you, and now that you are back. Because the whole normal thing has changed.

I remember wanting to talk to people when I got home.

I wanted people to hear about my experience.

I wanted people to come up to me and say, "What did you do?"

I wanted people to come up to me and say, "How was it? How was the food?"

What was your experience like? How are you? "

And the only question I got from people was, "Did you shoot anyone?"

And they were curious and willing to say anything.

Sometimes there is fear or anxiety that saying something will offend or cause something, so the general default is to say nothing.

The problem is that your service feels unrecognized and nobody cares.

Say "Thank you for your cooperation" and move on.

What I wanted to understand more was what was behind it and why "thank you for your hard work" wasn't enough.

In fact, there are literally 2.6 million Iraqi and Afghan veterans among us.

Sometimes we know who they are, sometimes we don't, but we know that even though that feeling, that shared experience, that shared bond, that experience, and that chapter of their life is closed, it's not over yet.

We think about "thank you for your service," but people say, "So what does 'thank you for your service' mean to you?"

To me, "thank you for your service" means acknowledging our story, questioning who we are, understanding the strength of so many people, the many people we serve, and why that service means so much.

"Thank you for your service" means acknowledging the fact that our greater service to this country has not in any way ended just because we have returned home and taken off our uniforms.

In fact, there is still so much to offer and so much to give.

Looking at people like my friend Taylor Urruela, who lost his leg in Iraq, he had two big dreams in his life.

One was to become a soldier. The other was to become a baseball player.

He lost his leg in Iraq.

Instead of coming back and deciding, "That second dream is over because I've already lost my leg," he decided he still had his dream of playing baseball and started a group called VETSports. The group now works with veterans across the country to use sports as a healing tool.

Someone like Tammy Duckworth, who was a helicopter pilot, needed to use both hands as well as her feet to steer the helicopter she was piloting, her helicopter was crashed and she tried to steer the helicopter, which did not respond to her directions or commands.

She is trying to land the helicopter safely, but the helicopter cannot land safely. I can't land safely because my legs are blown off and not responding to her leg commands.

She barely survives.

Paramedics arrived and saved her life, but as she was recuperating at home, she realized that "my work was not done yet."

And now, she's using her voice as an Illinois legislator to advocate and fight a range of issues, including veterans issues.

We signed up because we love the country we represent.

We signed up because we believe in the idea, and we believe in the people left and right of us.

And the only thing we ask, then, is that "thanks for your service" has to be more than just a quoted phrase, that "thanks for your service" means digging honestly to those who have stood up simply because they were asked, and what that means for us not only now, not only during combat operations, but long after the last vehicles have left, and long after the last shots have been fired.

These are the people I have served with and the people I look up to.

thank you for your help.

(applause)

How many of you have had your doctor ask you about sex?

how is your mental health?

use of alcohol?

These questions are almost universal.

But how many of us have had a doctor ask us about money?

Most of us don't.

But this is strange because child poverty is more prevalent in the United States than in most high-income countries.

It increases levels of stress hormones, creating conditions that can interfere with brain development.

Poor children in the United States are 1.5 times more likely to die and twice as likely to be hospitalized than middle-class children.

So my colleague Dr. Michael Hall and I started asking mothers about money.

We knew we needed to rethink what a doctor's appointment looked like to lift children out of poverty and give them a fair chance to a healthy life.

Our question led to an amazing solution: tax credits.

As it turns out, the earned income tax credit (EITC) is the best poverty cure in the United States.

The average mother makes $2,000 to $3,000 a year from it.

When families understand it, mothers and babies are healthier. The mother's depression is reduced and the baby's birth weight is increased.

But 1 in 5 families who could get it did not, and most of those households who did have lost hundreds of dollars to the for-profit tax preparation industry.

One day a mother asked us why she couldn't pay her taxes while she was waiting for the doctor.

(Laughter.) We all know that purgatory. Why not make the most of that time?

So we launched StreetCred, an organization that prescribes tax preparation at clinics that serve children.

This is a completely new approach and some question our sanity.

After all, we are doctors, not accountants.

But we have something that accountants don't. It's family access.

More than 90% of children in the United States see a doctor at least once a year.

Their parents trust us and will do anything to give them a better life.

A doctor in every clinic across the country could be doing this job as well. It's really that simple.

Hospitals are registered as tax preparation sites, and anyone from medical students to retirees can volunteer as tax preparers if they pass an IRS exam.

It's not as hard as you think, I promise.

I certainly never thought I would pay someone else's taxes, but here I am.

We are nearing the end of our third year.

In the first two rounds, Boston alone returned $1.6 million to 750 households.

This year -- (Applause) This year we expanded to nine locations in four states.

63% of our family have never heard of EITC.

How can you claim something you've never heard of?

And half have never taken advantage of free tax preparation.

$2,000 to $3,000 a year is a lot of money.

Take your hunger.

Adequate, nutritious, low-cost meals for a mother and two young children cost $477 a month.

With EITC funds, the family can feed for 5-6 months.

Or think about medicine.

20 million children in the United States do not have access to care that meets modern pediatric standards.

Yet the average cost of that care is only $400 per child per year.

EITC funding will help solve this access problem.

Perhaps most powerfully, this money gives mothers hope.

A mother used her refund money to help her son study in Spain.

She was struggling to pay her rent, but saw EITC money as an opportunity for a better future.

As doctors and as citizens, we have a chance to get to the root of this problem.

We can rethink healthcare as a place to address the causes of poor health, whether infectious or financial.

thank you.

(applause)

For those who can't see my wrinkles, my first attempt at online dating was in my freshman year of college in 2001.

Now, as you may have noticed, I am 6 feet tall, but when I arrived at my college of choice and realized that the average height for a men's Division 3 basketball team was 5 feet 8 inches, I abandoned the on-campus scene and went online.

Well, back then, online dating was pretty close to the "You've Got Mail" plot.

We'll be exchanging long emails for weeks before we meet in person.

However, in my case, I realize I have no chemistry and go back to square one.

So while online dating has changed a lot over the last 17 years, many of the frustrations remain the same.

Because it works.

This broadens your range of potential dates beyond your existing social and professional circles.

And this is what can go wrong.

Literally everything else.

(Laughter) There are a few things you should know about me. I'm an action-oriented, high-achieving math and theater nerd who eventually earned an MBA.

So when things go wrong, we tend to take a step back and apply our business toolkit to figure out why and fix it.

My love life was no exception.

The summer before I turned 30, I started dating offsite.

That meant I went solo camping in Maine for a week to reflect on my record of mediocre relationships.

Because I knew what I wanted in a partner.

Kindness, curiosity, empathy, purpose.

Still, here's what I picked online: People with an Ivy League degree who are at least 6 feet tall live within 12 subway stops.

I didn't intentionally prioritize these things. It's just the easiest to scrutinize online.

It's like a resume review, which is why they didn't suit me at all, even though they looked great on paper.

So when we got back online in the spring of 2016, we decided to redesign our processes using some classic business tools.

First, I went to OkCupid because I wanted to avoid the gamification of swipe-based apps.

Also, I wanted a writing sample.

Then, I set up a sales funnel, ditched my sense of type, and instead defined criteria for qualifying leads.

An incoming message had to do three things. One is that they must be complete sentences and written with proper grammar. I know it's not a copy and paste situation as I needed to reference something in my profile. And all sexual content had to be avoided.

I thought this was a pretty low hurdle, but in fact, out of 210 incoming messages, only 14% passed that hurdle.

(Laughs) Next, I can't see things I'm interested in online, so I wanted to meet in real life as soon as possible.

However, research and my experience have shown that it only takes someone about 30 seconds to tell you if they clicked.

So I invented the Zero Date.

Zero date is 1 drink, 1 hour.

The goal is to answer one question. "Would you like to have dinner with this person?"

Isn't "they are the people"?

Literally, "Would you like to spend three hours across the table from this person?"

You tell them you have a hard stop, like drinking with a girlfriend or a conference call with China, but it doesn't matter, they don't know about you.

The point is 1 hour.

If it's great, schedule a first date.

If that's not great, shift into entertainer mode and workshop some new stories for your next networking event.

Plus, since it's only an hour, you can narrow it down to up to 3 outfits in one night, then just get your hair done and choose one nice outfit for the week.

Zero dating also gave me an opportunity to see how they would react if I asked them out on a date.

I thought not everyone would dig my Moxie, but I was right.

Of my 29 prospects, only 15 responded to my message, and 6 of them scheduled zero dates.

My first zero date was with a set designer.

And we were both into yoga and liked bagels with peanut butter, so that seemed pretty promising.

But after two minutes, I realized it wasn't a big deal and was relieved I didn't have to have dinner with him.

After that, I was a little apprehensive about going on my next zero date.

But we had agreed to meet on the Brooklyn Heights Promenade with a flask of whiskey to watch the sunset, and let's be honest, it was two blocks from my apartment.

Plus this guy had a podcast, I had a podcast too, worst case scenario, we can talk about podcasts.

Chas sat next to me.

And this kind, empathetic man told great jokes and asked even better questions.

He's a lawyer and a writer, his eyes twinkle when he smiles, they squeeze when I kiss him, and at some point in the evening, zero dates turned into first dates.

And two years later, we have a washer, dryer, and two houseplants together.

Now, I can't promise that it will end up being a houseplant.

But the point of this story is that online dating isn't necessarily boring.

Don't treat it like a game or treat it like a resume review.

Instead, use it to source and identify leads and bring them offline as soon as possible on date zero.

Because it's not the swipe that matters.

It's about finding your person.

Good luck.

(applause)

Look at these images.

Now tell me if Obama here is real.

(Video) Barack Obama: Help families refinance their homes and invest in high-tech manufacturing, clean energy and infrastructure that will create quality new jobs.

Suphasorn Swajanakorn: Who?

The answer is none.

(Laughter) None of these are actually real.

Now let me tell you how we got here.

My inspiration for this piece was a project aimed at protecting the last chance to learn about the Holocaust from survivors.

It's called "New Dimensions in Testimony" and will allow you to have interactive conversations with holograms of real Holocaust survivors.

(Video) Man: How did you survive the Holocaust?

(Video) Hologram: How did you survive?

I think I survived because providence watched over me.

SS: It turns out that these answers were pre-recorded in the studio.

Still the effect is amazing.

You feel very close to his story and to him as a person.

I think there's something special about human interaction, and it's much deeper and more personal than what books, lectures, and movies can teach us.

So I saw this and started wondering if anyone could create a model like this.

Do they look, talk, act the same model as them?

So I tried to see if this was possible and came up with a new solution that allows you to build a model of a person using only photos and videos of existing people.

Being able to leverage this kind of passive information, photos and videos out there, is the key to scaling up for everyone.

By the way, this is Richard Feynman, a Nobel Prize winner in physics and also known as a legendary teacher.

Wouldn't it be great if we could bring him back to lecture and inspire millions of children? Probably in any language, not just English.

Or what if you could ask your grandparents for advice and listen to their comforting words, even if they are no longer with you?

Or, with this tool, you might be able to read all books aloud to anyone interested, regardless of whether the author of the book is alive or not.

The creative possibilities here are endless and for me it's very exciting.

And here's what it does so far:

First, we introduce a new technique that can reconstruct a high-definition 3D face model from any image without 3D scanning the person.

And this is the same output model from different views.

It also works with video, running the same algorithm on each video frame to generate a moving 3D model.

And here is the same output model from different angles.

This problem turned out to be quite difficult, but an important trick is to pre-analyze a large photo collection of people.

For George W. Bush, a simple Google search builds an average model, an iterative and sophisticated model that restores the representation of fine details such as wrinkles and wrinkles.

The interesting thing about this is that you can create photo collections from typical photos.

It doesn't matter what you look like or where the photo was taken.

The point is that there are a lot of them.

Color is still lacking here, so we next develop a new blending technique that refines the single averaging method to produce sharper facial textures and colors.

And this can be done for any expression.

Now you can control the model of the person, and the control method is done by a series of still photos.

Notice how wrinkles appear and disappear depending on your expression.

You can also interact with the model using video.

(Video) Daniel Craig: Yes, but somehow we managed to attract even more amazing people.

SS: And here's another fun demo.

What you see here is a model of controllable people I built from internet photos.

Now, transferring the motion from the input video can really make the whole party move.

George W. Bush: This bill is difficult to pass because there are many moving parts and the legislative process can be ugly.

(Applause) SS: So, going back a bit, our ultimate goal is rather to capture their mannerisms, their unique way of speaking and their smiles.

To that end, can we actually teach a computer to imitate the way a person speaks, simply by showing them video footage of that person?

And what I did exactly was let the computer watch Barack Obama's pure speech for 14 hours.

And here's what we can produce considering his voice alone.

(Video) BO: The results are clear.

American businesses have created 14.5 million new jobs for the 75th straight month.

SS: Only the mouth area is synthesized here, and here's how it's done.

Our pipeline uses a neural network to convert speech and input to these mouse points.

(Video) BO: We get it through work or through Medicare or Medicaid.

SS: Next, we synthesize textures, enhance details and teeth, and blend from the source video to the head and background.

(Video) BO: Women can get free health checkups and they won't charge more just because they are women.

Young people can stay on their parent's plan until they turn 26.

SS: These results seem very real and interesting, but also terrifying.

Our goal was to build an accurate model of the person, not misrepresent the person.

But what worries me is the potential for abuse.

People have long pondered this question since the days when Photoshop first hit the market.

As a researcher, I am also working on mitigation techniques, participating in the AI ​​Foundation's ongoing effort to combine machine learning and human moderators to detect fake images and videos, and combating my own research.

And one of the tools we plan to release is called Reality Defender, a web browser plugin that can automatically detect potentially fake content within your browser.

(Applause.) But despite all this, fake videos can still do a lot of damage, even before someone verifies them. That is why it is so important to make everyone aware of what is currently possible, have the right assumptions, and be able to be critical of what they are seeing.

We still have a long way to go before we can fully model individual people and secure this technology.

But I am excited and hopeful. Because when used correctly and carefully, any individual can have a positive impact on the world and it really helps shape our future the way we want it.

thank you.

(applause)

I'm really, really, really excited to be here.

I don't want to go into the basics, but I would like to go into a little more detail. Because we really know nothing about my syndrome.

I was born with this very rare syndrome. As far as we know, there are only 2 people in the world including myself with this syndrome.

Basically, what causes this syndrome is the inability to gain weight.

Yes, it sounds good as is.

(Laughter) I can eat whatever I want and I don't gain any weight.

I will be 25 in March and have never weighed more than about 64 pounds in my life.

When I was in college, I hid - well, I didn't "hide" it, everyone knew it was there - but it was a giant tub full of Twinkies, donuts, chips, skittles, and my roommate used to say, "At 12:30 a.m. I heard you reaching under your bed for food."

But I'm like, "Okay, okay, I can do this!"

Because this syndrome has its advantages.

It also has the advantage of not being overweight.

Blind people have an advantage.

Being really small has its advantages.

A lot of people would be like, "Lizzie, how can you say there's an advantage if you can only see in one eye?"

So the benefits are great, so let me explain what the benefits are.

I wear contacts - conTACT. half price contacts.

(Laughter) When I wear reading glasses, my power is halved.

If someone annoys me or is rude to me, stand to my right.

(Laughter) I feel like I'm not there. I don't even know you're standing there

Standing like this now, I have no idea if it's on this side of the room.

Also, since I'm little, I want to go to Weight Watchers or the gym and say: "Hello, I'm Lizzie. I'll be your sign.

Put my face on what you need and I say, "Hello!" I used this program. (Laughter) There are some wonderful things that this syndrome brings, but as you can imagine, it's also very difficult.

I was raised and raised 150% normally.

I was the first child of my parents.

And when I was born, the doctor said to my mother, "There is no amniotic fluid around your daughter.

Jeez. ”

So when I was born, it was a miracle that I came out screaming.

Doctors told my parents, "We want to warn you, think that your daughter will never be able to talk, walk, crawl, think, or do anything on her own."

Now, if you're a first-time parent, you'd think my parents would say this. "No way. Why? Why are we having our first child with all these unknown problems?"

But what they did is not.

The first thing they said to the doctor was, "We want to see her, and we're going to take her home, love her, and raise her to the best of our ability."

And that's what they did.

I owe my parents almost everything I have achieved in life.

Today my father is with me and my mother is watching over me at home.

hello mama! (Laughter) She's recovering from surgery.

She was the glue that held our family together and gave me strength to understand what she was going through. But thanks to the fighting spirit she instilled in me, I was able to proudly stand in front of people and say:

But it's okay ”

are you OK. It was scary and difficult.

One of the biggest things I had to deal with as a kid, I'm sure all of us in this room have dealt with before.

do you know what it is?

Starts with "B". can you guess?

Audience: Everyone! Lizzie: Boys?

(laughs) Bullying!

(laughs) I know what you're thinking.

(laughter) Why can't I sit here with them? (Laughs) I was bullied a lot, but like I said, I was raised normally, so when I started kindergarten, I didn't think I looked different at all.

I have no idea.

I saw myself as different from other children.

On the first day, I wore my Pocahontas gear to school, so I think this was a big reality slap for a 5-year-old.

We were ready!

(laughter) It was bigger than me, so I went in with a backpack that looked like a tortoise shell. Then he walked over to the little girl and smiled at her. Then she looked up at me like a monster, the scariest thing she had ever seen in her life.

My first reaction was, "She's really rude.

(Laughter) I'm a fun girl, but she's the one that's missing.

So let's go over here and play with blocks. Or boys. ”

(Laughter) (Lizzy laughs) I thought it would get better that day, but unfortunately it didn't.

The days got worse. A lot of people don't want anything to do with me, and I don't understand why.

why? what did i do I have done nothing to them!

In my mind, I was still a really cool kid.

I had to go home and ask my parents.

what did i do why don't they like me? ”

They sat me down and said, 'Lizzie, the only difference you have is that you're smaller than the other kids.

You have this syndrome, but it does not define who you are. ”

They said, ``Go to school, keep your head up, smile, and be yourself, and people will realize you are just like them.''

And that's what I did.

Ask yourself this question in your head right now. What defines you?

who are you?

Where are you from? is that your background? is your friend

what is that?

What defines who you are?

It took me a long time to figure out what defined me.

For a long time, I thought my appearance defined me. I thought my tiny little feet, tiny arms, tiny face was ugly.

I hated it.

When I went to middle school, I hated waking up in the morning getting ready and looking in the mirror and thinking, "Can I scrub this syndrome off?"

If I could just scrape it off, it would make my life a lot easier.

I may look like other kids. You don't have to buy clothes with Dora the Explorer on it. You didn't have to buy 'Illusion' stuff when you're trying to be like the cool kids. ”

I woke up in the morning with a different person than usual, and I wished, prayed, hoped, and tried to do whatever I could to avoid this kind of conflict.

It was what I hoped for every day and was disappointed every day.

I have a great support system around me, who never pity me, picks me up when I'm sad, and laughs with me when I'm happy. And they taught me that even though I have this syndrome, even if things are difficult, it shouldn't define me.

My life is in my hands, just as your life is in yours.

You are the person sitting in the front seat of the car.

You decide if your car goes bad or good.

You decide what defines you.

Let me tell you, it can be very difficult to understand what defines you. Because there were times when I got so frustrated and annoyed that I said, "I don't care what defines me!"

When I was in high school, I unfortunately found a video posted by someone labeling me the ugliest woman in the world.

This video has over 4 million views. Eight seconds long, silence, thousands of comments. People said, "Lizzie, please, please, do something for the world and put a gun to your head and kill yourself."

If someone said that to you, if a stranger said this to you, think about it.

Of course I cried a lot, and I was ready to fight back, and something clicked in my head and I thought, 'Let's just leave it alone'.

I began to realize that my life was in my hands.

You can choose to do this very well or you can choose to do this very bad.

With gratitude, I was able to open my eyes and see what I had and let it define me.

I can't see in one eye, but I can see in the other.

I may get sick often, but my hair is very beautiful.

(laughter) (audience) Yes, yes!

thank you.

You guys are like the best little section here.

(Laughter) (Lizzy laughs) You put me out of my mind!

(Laughter) Well... where was I?

Audience: Your hair!

hair! hair. Okay, okay, thank you. thank you, thank you, thank you.

So, I can choose to be happy, or I can choose to be angry with my status quo and continue to complain, but at some point I started to realize: am I going to let the people who called me a monster define me?

Are you going to forgive those who said "kill with fire!"? define me?

No; I will let my goals, successes and achievements define me. It's not the appearance, it's not the fact that you have a visual impairment, or that you have this syndrome that no one knows what it is.

So I told myself that I was going to improve myself and do whatever I could to make myself better. Because in my heart I thought the best way I could get revenge on all the people who made fun of me, made fun of me, called me ugly, called me a monster, was to improve myself and show them this.

Say something negative. I turn it around and use it as a ladder to reach my goals.

that's what i did.

I told myself I wanted to be a motivational speaker, I wanted to write a book, I wanted to finish college, I wanted to have my own family, I wanted to have my own career.

Eight years later, I'm still standing in front of you giving motivational speeches.

First of all, I have achieved it.

I wanted to write a book; I am planning to submit a manuscript for my third book in the next few weeks.

(Applause.) I wanted to graduate from college, and I just graduated from college.

(Cheers and applause) I have a degree in Communications with a minor in English from Texas State University in San Marcos.

I tried really, really hard to get some real life experience during my degree, but my professors just didn't have it.

Finally, I wanted to have my own family and my own career.

The family part is a bit further down the road, but the career part I feel is doing really well given the fact that when I decided I wanted to be a motivational speaker I came home and sat in front of my laptop and went to google and typed 'how to be a motivational speaker'.

(Laughter) I'm not kidding.

I tried my best. I used people who said, "I can't do that," to motivate me.

I used their negativity to ignite the fire to move forward.

use it use it Use that negative feeling you have in your life to make yourself better. Because I assure you, I assure you, you will win.

I would like to ask you one last question.

Get out of here and ask yourself what defines you.

But remember: Bravery starts here.

thank you.

(applause)

I've been hearing some disturbing sad news lately, so I've been thinking a lot about loving myself.

We've been taught that loving others is an important value, but I don't think loving ourselves was ever considered an issue worth talking about.

why?

Maybe it's because we love ourselves so clearly that we can't bring up this issue and emphasize its importance.

All of us can't avoid being egoistic at times.

We like to do things our way.

If everything in life is going well, can we love ourselves?

Not necessarily.

Perhaps the reason why it's hard to discuss "self-love" is because it sounds kind of narcissistic and a little creepy.

If someone looks in the mirror and says, "How I love myself! Never mind!"...

I'm not talking about myself!

It makes me want to say, "Fit me! Keep looking in the mirror."

I want to say that you don't have to do that to love yourself.

Life isn't always easy.

Of course, there is nothing better than being happy for the rest of your life.

However, there may be many people in our lives who say, "I hate you so much" and "I wish I could disappear from this world."

When we experience suffering, we eventually come to the realization that we must take responsibility for ourselves and love ourselves in the sense that we take care of ourselves.

When someone says, "I hate you," if we answer, "Yes, I hate myself, too," the moment we say that, we will surely lose the will to live.

I myself have felt the need for such an attitude many times.

You never know what will happen in the future, so there may be another situation where you have to love yourself in the sense of taking care of yourself.

It would be wonderful if you could live a trouble-free life.

For a long time, I didn't understand who I was.

People thanked me when I did something good for others and thought I was basically a pretty good person.

There were times when I felt relieved like that.

On the other hand, when I really hurt someone, I felt like I was basically a cruel person, and I was very disappointed in myself.

Loving yourself can be harder than loving others. Because we know ourselves thoroughly, thoroughly.

We look back at everything we've done in the past and think, 'Oh, I did this and that...'.

And not only the good things we have done come back to us, but also the unpleasant things we have done.

Knowing all these aspects of yourself, can you still love yourself?

At this point, I thought there must be something fundamentally wrong with our thought process.

Then I started doing the following to change that. First, I looked at someone who was pretty good, or not so good, and honestly looked back at myself.

And for the time being, I accepted all of my "self", for better or worse.

Instead of criticizing yourself by saying, "I might be nice at heart" or "I might be cruel at heart," ask yourself, "Who am I really?"

I decided to accept all of my 'selves' as part of myself and wondered why there are so many different 'selves' within this one person.

In summary, it's for different people and different situations.

Talking to grandma is very relaxing.

When I talk to people at work, it may sound like I'm talking about difficult things with a serious look on my face.

I have no doubt that my tone of voice could not have been so gentle when speaking to someone who rubbed me the wrong way.

I try not to get involved with people like that.

In any case, my "me" has its own personality.

It may be very difficult to love each "self" equally in order to love yourself, but you can say, "When you are with this person, you can love your own "self."

With that person, I become someone I even hate.

But I quite like my 'me' when I'm with this particular person. I'm not too bad ”

In fact, loving yourself may not be so difficult after all.

Let's have some romance.

Suppose there are two girls and I both have feelings.

One day, I went on a date with one of them and had dinner with him.

I enjoy being with her, we talk a lot, we crack jokes often, we smile at each other and we get along very well.

I hurry to the station to catch the last train.

I also like the other woman, but I can't talk or joke much during the date...

There is often an awkward silence.

Feel like a miserable loser.

I didn't want to continue with her, so we said goodbye to each other after dinner.

After two dates, if someone asks me which one I would like to see again, I will choose the first date without hesitation.

I definitely like her, but rather because I like myself when I'm with her.

When I am with her, "myself" is fun, and I feel that "myself" life is worth living.

The definition of "love" may be to love someone. That's not wrong, but I would like to add that to love is to be able to love yourself with the help of the person you love.

That's what I want to think.

“When you are with that person, you can be honest with yourself and be free to let your inner self out without any difficulty.

Unfortunately, some of our relationships come to an end.

For some, the conflict ends.

Others end with death.

When we grieve over the loss of someone dear to us, we often miss that person's voice and hugs.

Only when I am with them can I be honest with myself.

Only when they are around can I be that stupid.

But that person is no more, and I can no longer live the life of that "me" that I love. ”

Is that what we are really sad about?

And of course, vice versa.

When someone says "I love you" to me, I exclaim "Yes!"

But when someone says, "You made me love myself," or "I love myself more when I'm with you than when I'm with other people," it hits me even harder.

That my existence justifies the existence of a person in such a way moves me with deep joy and something that moves me.

Every time we find the “self” we love, we may find a foothold to live on.

In life, we feel the need to be loved by many, a certain percentage of people, whether in groups, classes, or workplaces.

But the 'me' we love may not be so necessary.

If you have 2 or 3 favorite “selves” in yourself, you can use them as a stepping stone to move forward.

Five or six might be more than enough.

You may think you only have three friends in your class at school, or you may think you have three friends who like you.

It all depends on how you receive it.

Loving yourself doesn't mean looking in the mirror and saying, "I'm crazy about myself." Instead, it means learning to love yourself with someone's help or through someone else.

Perhaps that's where we really begin to love ourselves.

That is why we love others as essential human beings, feeling our need.

That's all I want to say. thank you.

I am an artist.

Being an artist is the greatest job in the world.

And I feel so sorry for each and every one of you who have to spend your days discovering new galaxies or saving humanity from global warming.

(Laughs) But being an artist is also hard work.

I spend 9-6 hours on this every day.

(Laughter) I even started a side business just to complain about the difficulty of the creative process.

(Laughter) But today I don't want to talk about what makes my life difficult.

I want to talk about what is easy.

And that's you. And the fact that you can speak a language fluently that you probably don't even realize.

You are fluent in the language of reading images.

Deciphering such images requires considerable intellectual effort.

But no one told you how this works, so you just know it.

College, shopping, music.

What makes languages ​​powerful is their ability to communicate very complex ideas in a very simple and efficient format.

These images represent exactly the same idea.

But if you look at the college hat, for example, you realize that it doesn't represent the accessory you wear on your head when you receive your diploma, it represents the whole concept of college.

Well, what paintings can do is that they can not only convey images, they can even evoke emotions.

Suppose you come to a strange place and see this.

I feel happy and relieved.

(Laughter) Or maybe it's just a little bit of anxiety or outright panic.

(Laughter) Or blissful peace and quiet.

(Laughs) But visuals are of course more than just graphic icons.

If I wanted to tell the story of a modern day struggle, I'd start with an armrest and two pairs of elbows fighting between two seats on an airplane.

What I like about it is this universal law of fighting within 30 seconds and once it's yours, keep it for the rest of the flight.

(Laughter) Well, commercial airlines are full of these images.

Nothing better describes discomfort than this neck pillow.

They're designed to make you more comfortable -- (laughter) but they're not.

(Laughs) That's why I never sleep on planes.

I sometimes slip into a painful coma.

And then you wake up from there with the worst taste in your mouth.

A bad taste that can't be expressed in words, but can be drawn.

(Laughter) Actually, I love to sleep.

And when I go to bed, I really like to sleep with a spoon.

I've been spooning at a near-professional level for nearly 20 years, and all that time I had no idea what to do with my lower arm.

(Laughter) (Applause) And the only thing that's even more complicated than trying to get some sleep on a plane is if you have small children.

They show up in your bed around 4am with the false excuse, "I had a bad dream."

(Laughter.) And of course you feel sorry for them, they're your kids, so put them in your bed.

And at first I have to admit they are really cute, warm and snuggly.

The moment you fall asleep again, they inexplicably start spinning—(laughter).

(Laughter) We call this helicopter mode.

(Laughter) Now, the more deeply something is etched into your consciousness, the less detail it needs for us to react emotionally.

(Laughter) So why does an image like this work?

We readers are incredibly good at filling in the blanks, so this works.

Now, when painting, there is the concept of negative space.

And the idea is that instead of drawing the actual object, we draw the space around it.

Therefore, the bowl in this illustration is empty.

But black ink prompts the brain to project food into the void.

What we see here is not an owl in flight.

What you actually see is two AA batteries standing on top of a nonsensical painting, moving the desk lamp up and down to animate the scene.

(Laughter) That image really only exists in your head.

So how much information is needed to trigger such an image?

My goal as an artist is to use as little as possible.

I'm trying to achieve a level of simplicity where the whole concept would fall apart if one more element was removed.

That's why my personal favorite tool as an artist is abstraction.

I came up with this system called Abstract O Meter. Here's how it works.

That is, a symbol, any symbol. For example, the heart and arrow that most of us read as symbols of love. I'm an artist so I can draw this with any level of realism or abstraction.

Now, if you get too realistic, you're just making people uncomfortable.

(Laughter) If you go too far and do something very abstract, nobody really knows what they're looking at.

So you have to find the perfect spot on that scale. Somewhere in the middle in this case.

Now, reducing the image to a simpler form opens up all sorts of new connections.

And that allows for a whole new angle in storytelling.

(Laughter) So what I like to do is take images from really remote cultures and put them together.

Now, if we had a bolder mention -- (Laughter) that would be more fun.

But, of course, I know things eventually get so murky and I start to lose some of you guys.

Therefore, as a designer, it is absolutely critical to have a good understanding of your audience's visual and cultural vocabulary.

Seeing this image, a commentary on the Athens Olympics, I assumed that readers of The New Yorker would have a rudimentary idea of ​​Greek art.

Otherwise the image will not work.

But if so, you might also appreciate small details like the pattern of beer cans on the bottom of the vase.

(Laughter) What I argue over and over again with magazine editors, who are usually the people who use words, is that you, their reader, are much better at taking radical leaps with imagery than you are being appreciated for.

And the only thing that annoys me is that it often seems to drive me into a small set of really tired visual clichés that are considered safe.

When a businessman climbs a ladder, the ladder moves and morphs into a stock market graph or something with a dollar sign. That's always good.

(Laughter) If you're an editorial decision maker in this audience, I'd like to give you some advice.

Every time a picture like this is published, a baby panda dies.

(laughs) Literally.

(Laughter) (Applause) What are the good and bad visual clichés?

It's a piece of paper.

And it really depends on the story.

In 2011, when the earthquake and tsunami hit Japan, I was thinking about covering.

And I looked up the classic symbol of the Japanese flag, Hokusai's "The Great Wave", one of the greatest paintings of all time.

And when the situation at the Fukushima power plant got out of hand, the story changed.

And I remember television footage of workers walking through the site in protective gear, and what struck me was how quiet and peaceful the site was.

So I wanted to create an image of a silent catastrophe.

And that's the image I came up with.

(Applause.) Thank you.

(Applause.) What I want to do is create an aha moment for you and the reader.

Unfortunately, that doesn't mean I have an "aha" moment when creating these images.

I never sit at my desk with the proverbial light bulb off in my head.

What it really takes is a very slow, low-key process of making minimal design decisions, and then, with any luck, leading to a good idea.

So one day I was on a train trying to decipher the graphic rules for water droplets on windows.

Then you realize, "Oh, this is a clear image with an upside-down blurry background."

So I thought, wow, this is really cool, but I have absolutely no idea what to do with this.

After a while, I returned to New York and painted an image of myself stuck in a traffic jam on a bridge in Brooklyn.

It's really frustrating, but it's also kind of poetic.

And only later did I realize that I could take both of these ideas and combine them into this idea.

And what I want to do is not show a realistic scene.

But maybe, like poetry, it makes you realize you already had this image, but only now do I dig it out and make you realize you've been carrying it around all along.

But like poetry, this is a very delicate process and I don't think it's efficient or scalable.

And perhaps the most important skill for an artist is to really empathize.

It takes craft to come up with those images, and -- (Laughter) creativity -- (Laughter) Thank you --

But then you have to step back and reassess what you've done from the reader's perspective.

I have tried to become a better artist by observing images better.

To that end, I started a practice for myself called Sunday Sketching. So, on Sunday, I picked up a random object I found around the house to see if the object triggered ideas that had nothing to do with the original purpose of the object.

And that usually means I'm blank for a long time.

And the only trick that works in the end is to open your mind and go through all the images you've stored there to see if anything clicks.

If that happens, just add a few lines of ink and connect to save this very short moment of inspiration.

And the great lesson there is that real magic doesn't happen on paper.

It happens in the mind of the beholder.

When your expectations and knowledge collide with my artistic intentions.

Your ability to interact with images, to read them, to ask them questions, to be troubled or bored, to be inspired by them, is as important as my artistic contributions.

Because that's what turns artistic expression into creative dialogue.

So your image reading skills are not only great, but it's what makes my art possible.

And for that I am very grateful.

(Applause) (Cheers) Thank you.

(applause)

When I was little, I always imagined that one day I would run away.

From the age of 6, I kept clothes and a bag of canned food in the back of my closet.

There was a deep restlessness inside me, an underlying fear of falling prey to the routine and boredom of life.

So many of my early memories involve complex fantasies of walking across borders, hunting for berries, and meeting all sorts of weird people living unconventional lives on the streets.

Many years have passed since then, but many of the adventures I fantasized about as a child — traveling to other worlds and weaving paths — have come true through my work as a documentary photographer.

But no experience more faithfully recreates my childhood dreams than living among and documenting the lives of vagabonds across America.

This is a nomad's dream, another kind of American Dream, lived by young vagabonds, travelers, hitchhikers, vagrants, vagrants.

In most of our minds, vagrants are creatures of the past.

While the word "hobo" conjures up old black-and-white images of weathered old men covered in coal and legs dangling from boxcars, these photographs are in color, depicting communities swirling around the country, intensely vibrant and creatively free, and seeing a side of America that no one else sees.

Like their predecessors, today's nomads travel the steel and asphalt arteries of the United States.

By day, they hop on freight trains, stick their thumbs up, and hit the highway with anyone from truck drivers to soccer moms.

At night, they sleep under the stars, huddled between their packs of dogs, cats, and pet mice.

Some travelers choose to travel on their own terms, abandoning materialism, traditional jobs and college degrees in exchange for a little adventure.

Others, such as dropouts from foster homes and runaway teens fleeing abusive and unforgiving homes, come from the bottom of society and have been denied the opportunity to mobilize into the upper echelons of society.

While others see stories of poverty and economic ruin, the traveler sees his own existence through the prism of liberation and freedom.

Rather than enslaving themselves to the unrealistic opportunities of the traditional American dream, they would rather live in excesses that are considered a wasteful consumer society.

They take advantage of the fact that in the United States, up to 40 percent of all food ends up in the trash, scavenging for perfectly good produce in bins and bins.

They sacrifice material comforts in exchange for space and time to explore creative interiors, dream, read, and work on music, art, and writing.

But there are many aspects of this life that are far from idyllic.

No one loses their inner demons by hitting the road.

Addiction is real, environments are real, freight trains hurt and kill people, and anyone who has ever lived on the streets can attest to an exhaustive list of laws that criminalize the existence of the homeless.

Who knows that in many cities across the United States it is now illegal to sit on the sidewalk, wrap yourself in blankets, sleep in your car, or serve food to strangers?

I know about these laws because I have seen friends and other travelers commit these so-called crimes and end up in jail or appear in court.

Many of you may be wondering why, because of discriminatory laws, some people choose to live like this, eating out of garbage bins, sleeping under bridges, and working seasonal jobs here and there.

The answers to such questions are as varied as those of travelers, but travelers often answer with one word: freedom.

Until we live in a society where dignity in work is guaranteed so that every human being can work not only to live, but to live well, there will always be an element of people seeking open roads as a means of escape, liberation and, of course, rebellion.

thank you.

(applause)

So I thought, "Let's talk about death."

You seemed passionate today.

Actually, it's not about death.

It's inevitable, it's scary, but what I really want to talk about is that I'm just fascinated by the legacy that people leave behind when they die.

That's what I want to talk about.

There, Art Buchwald left a legacy of humor with a video released shortly after his death titled "Hello! I'm Art Buchwald. I just died."

And Mike, whom I met on my TED-winning trip to Galapagos, has left notes in cyberspace where he chronicles his journey through cancer.

And my father left me a handwritten legacy through letters and notebooks.

For the last two years of his life, when he was ill, he wrote down his thoughts about me in a notebook.

He was a mirror of my life, writing about my strengths, weaknesses and gentle suggestions for improvement, citing specific events.

After he died, I realized that no one wrote to me anymore.

Handwriting is a disappearing art.

I love emailing and thinking as I type, but why should I abandon old habits and develop new ones?

Why can't we write letters or communicate by email in our lives?

Sometimes I wish I could trade a hug for a few years when I was too busy to sit down and chat with him.

But it's too late.

But then I take out his letter and read it, and the paper he touched is in my hand, and I feel a connection with him.

So maybe we all need to leave a valuable legacy to our children, not a financial one.

The value of things with a personal touch, such as signed books, heart-searching letters.

If some of this powerful TED audience were motivated to buy beautiful paper -- John, it's recycled paper -- and write beautiful letters to their loved ones, it might actually start a revolution in our children attending calligraphy classes.

So what am I going to leave my son?

I collect signed books, and the authors in the room know I'm looking for signed books. I'm also looking for CDs, Tracy.

I plan to publish my notebook.

As I witnessed my father's body being engulfed in fire, I sat by the funeral pyre and wrote.

I don't know how, but I plan to put his thoughts and my thoughts into a book and leave the published book to my son.

Finally, I would like to conclude with a few verses of what I wrote on the occasion of my father's cremation.

Linguists, please pardon the grammar. Because I haven't seen Grammar in the last ten years.

I tried it out for the first time since I came here.

"Pictures in frames, ashes in bottles, infinite energy trapped in bottles, forcing me to face reality and deal with becoming an adult.

I hear you, and I know you want me to be strong. But now I am swallowed by this raging wave of emotions, surrounded, suffocated, longing to cleanse my soul, to once again stand on a solid footing, to keep fighting and thriving as you taught me.

In the midst of my despair your whispers of encouragement hold me and lift me to the shores of sanity, to live again and love again. ”

thank you.

(music) ♪ It's all in the gospel ♪ ♪ The Magdalene girl comes to pay her respects ♪ ♪ But her heart is swirling ♪ ♪ When she finds the tomb empty ♪ ♪ The straw was rolled ♪ ♪ No sign of a corpse ♪ ♪ In the darkness and the cold ♪ ♪ When she reaches the door ♪ ♪ Sees an unholy sight ♪ ♪ A lonely figure and a ring of light ♪ ♪ He just drifts past Calvary Hill ♪ ♪ Hurry up in Alm ♪ ♪ Yes, but she might still catch him ♪ ♪ Tell me where he's gone, Lord ♪ ♪ And why are you in such a hurry? ♪ ♪ Oh, don't disturb me, little girl ♪ ♪ There is no time to waste ♪ ♪ For tomorrow at noon the boat will sail ♪ ♪ And I must be there by dawn ♪ ♪ Oh, you can't let me go ♪ ♪ Nothing can stop me. ♪ ♪ I must overcome ♪ ♪ Through the teeth of this storm ♪ ♪ In the mouth of the strong wind ♪ ♪ May the angels protect me ♪ ♪ If all else fails , was born and raised in the shadow of a shipyard in a small seaside town. Northeast coast of England.

Some of my earliest memories are of huge ships blocking the edge of the street and the sun for most of the year.

As a child, I watched thousands of men come down that hill every morning to work in the shipyards.

Every night I watched the same men walk home.

I have to say that the shipyard wasn't the most pleasant place to live next door or really work.

The shipyard was noisy, dangerous, highly toxic and had a terrible health and safety record.

Nevertheless, the men and women who worked on those ships took great pride in their work, and it was only natural.

Some of the largest ships ever built on earth were built right down my street.

My grandfather was a shipwright, but there were few other jobs in town, and as a child I wondered if that was my destiny.

I was pretty determined not to.

I had another dream, not necessarily a realistic dream, when I was eight years old when I was bequeathed a guitar.

It was a battered old one with five rusty strings and out of tune, but I soon learned to play it and realized that I had found a friend for life, an accomplice, an accomplice in my plan to escape this unrealistic industrial environment.

Well, they say that if you dream something hard, it will come true.

Either that or I was very lucky, this was my dream.

I've dreamed of leaving this town, and like those ships, once launched there's no coming back.

I dreamed of becoming a songwriter, singing my songs to millions of people around the world, receiving huge amounts of money, becoming famous, marrying a beautiful woman, having children, raising a family, buying a big house in the country, raising a dog, growing wine, and having a room full of Grammy Awards and platinum discs.

So far so good, right? (laughter) And then one day the songs stopped coming. Until now, I've been troubled by periods when my work as a writer has stagnated, albeit temporarily, but this is a chronic one.

Day after day, we are faced with a blank page and nothing comes of it.

And those days turned into weeks and weeks into months, and soon those months turned into years with little reward for the effort. No song.

So you start asking yourself questions.

What did I do to make God so angry that he abandoned me so much?

Is songwriting talent as easily taken away as it seems given?

Or maybe there's a deeper psychological reason.

That was always the Faustian pact anyway.

You are rewarded for revealing your innermost thoughts and personal feelings on a page for the entertainment, analysis, and scrutiny of others, and perhaps you have given up enough of your privacy.

Yet, looking at your work, can you argue that your best work is not about yourself, but about someone else?

Did your best work come about when you sidestepped your own ego, stopped telling your own story, and told the story of someone else, perhaps someone without a voice, and stood in his shoes for a while with empathy, or saw the world through his eyes?

It is often said, "Write what you know."

If you couldn't write about yourself anymore, who would you write about?

It is ironic, then, that the landscape I have tried so hard to escape from, the community I have more or less abandoned and exiled, should be the very landscape, the very community I must return to find my missing muse.

And as soon as I did that, songs started coming out fat and fast as soon as I was determined to honor the community I was born in and tell their story.

I described it as a kind of projectile vomit, a torrent of ideas, characters, voices, poems, couplets, whole songs almost completely formed and materialized before my eyes as if they had been trapped inside me for years.

One of the first things I wrote was just a list of names of people I knew. They become characters in a kind of three-dimensional drama, in which they explain who they are, what they do, and their hopes and fears for the future.

Jackie White.

He is a shipyard foreman.

My name is Jackie White, I'm the garden superintendent, and please don't mess with Jackie on this dock.

I am stubborn like an iron plate. It would be a shame if you were late when we had to push the boat out on a spring tide.

Now you can die and hope for heaven, but you have to work your shift and I expect you all to support us to the fullest. Because if St. Peter at the gate asks you why you were late, you tell him that you had to build the ship.

We built battleships and cruisers for Her Majesty, supertankers for Onassis, and everything in between. We built the largest ship by tonnage the world has ever seen♪ And the only life worth knowing is in the shipyards♪ Steel in the stockyards, iron in the soul♪♪ Ships will remind us♪♪ Where hulls used to be♪ But even more ironically, sometimes we reveal more about ourselves than we intended.

The song is called "Dead Man's Boots" and describes how difficult it is to find a job. In other words, you can only get a job at a shipyard if someone dies.

Or maybe your father let you apprentice when you were 15.

However, sometimes fatherly love is mistaken for being dominant, and conversely, the scope of a son's ambitions seems like the rice cake in the picture.

(music) ♪ You can see these work boots in my hands ♪ ♪ They're perfect for you now, son ♪ ♪ Take them, they're my gifts ♪ ♪ Would you like to try them on? ♪ ♪ I hope someday you'll see me walking in these boots ♪ ♪ Someday you'll see me walking in these boots ♪ ♪ And among the men in your place ♪ ♪ Those who work on the pontoons ♪ ♪ Old and curly but these dead man's boots ♪ ♪ You're barely a sapling, but you think you're a tree ♪ ♪ If you need a seed to thrive ♪ ♪ First you have to put down roots ♪ ♪ Put one foot in, then the other ♪ ♪ These dead man's boots, old and curled up ♪ ♪ My friends work ♪ ♪ And when I need a place in the world ♪ ♪ And it's time for a man to put down roots ♪ ♪ And let's walk to the river in the old man's boots ♪ ♪ I said, ``Why would I do that? I made my own plans and was going to leave this place Sept. when I grew up These dead man's boots know the way down the hill They can walk there themselves and they probably will I have so many options, I have so many other roads And you won't see me walking in these dead man's boots What did you make him think of? I'd be happy to be like him ♪ ♪ when there's hardly a dime left ♪ ♪ Or a broken pot to piss in? ♪ ♪ He wanted the same thing from me ♪ ♪ Was that his last wish? ♪ ♪ He said, "What the hell are you going to do?" ♪ ♪ "Anything but this!" ♪ ♪ These dead man's boots know the way down the hill ♪ ♪ They can walk there on their own and they probably will ♪ ♪ But they won't walk with me 'cause I've gone the other way No, even if your life is over ♪ ♪ Get this in your head, I'm not you ♪ ♪ I'm done with all the arguments, no more fights ♪ ♪ And you'll die before you see me in dead man's boots ♪ (Applause) Thank you.

So whenever a large ship was launched, a high official from London would be called onto the train to give a speech, and a bottle of champagne would be broken on the bow, thrown off the slipway into the river, and launched into the sea.

Occasionally, a very important ship would come with a member of the royal family, such as the Duke of Edinburgh or Princess Anne.

And remember, it wasn't that long ago that the British royal family was thought to have magical healing powers.

Sick children were tied up in crowds and tried to touch the cloaks of kings and queens to cure their terrible diseases.

Not my time, but I was still very excited.

So today is launch day, Saturday, and my mom made me wear my Sunday vest.

I am not very happy with her.

All the kids are out in the street and we're waving with our little Union Jacks. And on the top of the hill appeared a convoy of motorcycles.

In the middle of the bike is a big black Rolls-Royce.

There is a Queen Mother in the car of Rolls Royce.

This is a big deal.

So the procession marches down my street at an imposing pace, and as I approach my house I begin to wave my flag forcefully, and there is Empress Dowager Wu.

I can see her, and she seems to be looking at me too.

she recognizes me She waved and smiled.

And wave the flag even more forcefully.

The Empress Dowager and I, please give us a minute.

she recognized me

and she is gone.

Well, it didn't fix anything.

It was actually the other way around.

I got infected.

I was infected with a thought.

I don't belong on this street

I don't want to live in that house.

I don't want to go to that shipyard.

I want to ride in that car. (laughs) I want a bigger life.

I want to live beyond this town.

I want to live a different life.

It's my right.

It's my right as much as her right.

So, I think I'm going to be here at TED to tell that story, and I think it's appropriate to say the obvious: there's a symbiotic and intrinsic connection between storytelling and community, community and art, community and science and technology, community and economy.

It is my belief that any abstract economic theory that denies the needs of the community or the contribution it makes to the economy is shortsighted, cruel and untenable.

(Applause.) The fact is, whether you're a rock star, a shipyard welder, an Upper Amazon tribesman, or the Queen of England, at the end of the day, we're all in the same boat.

♪ Oh, the retinue are indignant and frantic ♪ ♪ As you can see, the Queen herself took a taxi to the train station ♪ ♪ The porters, surprised by the lack of royal luggage ♪ ♪ Push her and the three corgis into the back of the carriage ♪ ♪ The train is packed full of European aristocrats ♪ ♪ None of the aristocrats are famous for their chemistry ♪ ♪ There's a fight over seats ♪ ♪ Excuse me. Please, my lord ♪ ♪ But you know it's mine, so go back to where you came from!" ♪ ♪ "Yes, but where are you going?" And there's the Pope of Rome♪♪ There's no such thing as a nuisance house in any palace in Europe♪♪ There's the Duchess of Cornwall and the loyal Prince of Wales♪♪ Looking for a top hat and being squished by a tail was uncomfortable♪♪ Well, they didn't have a ticket♪♪ Now, that's just the details♪♪ I didn't have time to buy, I just had to win♪♪ If I don't get to the shipyard, I'll go to jail! ♪ ♪ When the last ship sails ♪ ♪ Oh, the roar of chains ♪ ♪ And the cracking of timber ♪ ♪ You hear the noise of the end of the world ♪ ♪ Like a mountain of steel to the sea ♪ ♪ And the last ship sails ♪ ♪ And whatever you promised ♪ On the Earth or in Heaven or under the Sun When the last ship Sails Oh the door of the chain And the crashing of timbers In your ears Like mountains of steel making their way to the sea And the last ship sails Thank you for listening to my song.

thank you. (Applause.) Thank you.

Ok, you should join if you know.

(music) (applause) ♪ Just a castaway ♪ ♪ Island lost at sea, oh ♪ ♪ Another lonely day ♪ ♪ There's no one here but me, oh ♪ ♪ I'm lonelier than anyone can bear ♪ ♪ Save me before I fall into despair ♪ ♪ Sending S.O.S. Sending ♪♪ S.O.S. to the world. To the world I hope someone gets what's mine I hope someone gets what I have Love can break your heart ♪ ♪ Send an S.O.S. Sending ♪♪ S.O.S. to the world. Message in a bottle♪ Message in a bottle♪ ♪ Message in a bottle♪ ♪ I walked out this morning ♪ ♪ I can't believe what I saw ♪ ♪ 100 billion bottles ♪ ♪ Washed up on the shore ♪ ♪ It seems that I'm not alone ♪ ♪ I'm a castaway of 100 billion ♪ ♪ I'm looking for a house ♪ ♪ I'm sending S. Send ♪♪ S.O.S. to the OS world. To the world ♪ ♪ I hope someone gets mine ♪ ♪ I hope someone gets mine ♪ ♪ I hope someone gets mine ♪ ♪ Message in a bottle ♪ ♪ Message in a bottle ♪ ♪ Message in a bottle ♪ So you sing after me, okay, next part.

It's super easy. sing in unison.

please.

♪Send S.O.S. ♪ Come on, come on.

Audience: Send ♪ S.O.S.♪ Sting: Send ♪ S.O.S.♪ Audience: Send ♪ S.O.S. ♪ Sting: Send ♪ S.O.S. ♪ Audience: ♪ Send S.O.S. ♪ Sting: ♪ Send S.O.S. ♪ Audience: ♪ Send S.O.S. ♪ Sting: ♪ Outgoing ♪ ♪ Outgoing S.O.S. ♪ ♪ Send an S.O.S. ♪ ♪ Send an S.O.S. ♪ ♪ Yay ♪ Thank you, TED. good night.

(applause)

I have seen a UFO once.

When I was eight or nine years old, I was playing in the street with a friend a few years older than me when I saw featureless silver discs hovering over houses.

We watched it for a few seconds, then it flew away incredibly quickly.

As a child, I was furious that it defied the laws of physics.

We ran inside to let the adults know, but they were skeptical. Are you skeptical too?

Years later, I got my back. One adult said to me, "I saw a flying saucer last night.

I had just come out of the pub after a few drinks. ”

I stopped him there. I said, "I can explain the sightings."

(Laughter) Psychologists have shown that our brains cannot be trusted to tell the truth.

It's easy to fool yourself.

I saw something, but which is more likely -- did I see an alien spacecraft, or did my brain misinterpret the data my eyes gave me?

I have been wondering ever since. Why can't we see flying saucers flying around?

Why not at least see life in the universe?

It's a puzzle, but over the last 30 years, I've discussed it with dozens of experts in various fields.

And there is no consensus.

Frank Drake began looking for alien signals in 1960, but so far has found none.

And with each passing year, the absence of this observation, the lack of evidence of alien activity, becomes more and more puzzling.

The birth age of the universe is more or less 13.8 billion years.

Expressing the age of the universe in years, our seed was born about 12 minutes before midnight on December 31st.

Western civilization existed for a few seconds.

Extraterrestrial civilization may have begun during the summer.

Imagine a summer civilization developing a level of technology more advanced than ours. However, its technology is based on accepted physics. I'm not talking about wormholes or warp drives, though. Whatever it is, it's just an extrapolation of the kind of technology TED admires.

That civilization could program a self-replicating probe to visit every planetary system in the galaxy.

If they had launched their first probe just after midnight one day in August and then before breakfast the same day, they could have colonized the galaxy.

Intergalactic colonization isn't that hard, it just takes time.

Any civilization from millions of galaxies could colonize our galaxy.

Sound surreal?

Perhaps so, but are aliens doing some discernible activity - placing worldlets around stars to capture free sunlight, collaborating on Wikipedia Galactica, or simply yelling "we are here" to space?

So where are you all?

We expect these civilizations to exist, so this is a puzzle, right?

After all, there could be a trillion planets in our galaxy, and maybe more.

No special knowledge is required to think of this question. I have researched this question with many people over the years.

And they found that they often framed their thinking in terms of the barriers that would need to be removed in order for the planet to host a communicative civilization.

And they usually identify four major barriers.

Habitability -- that's the first barrier.

We need a terrestrial planet in the very "Goldilocks Zone" where water flows as a liquid.

they are there

In 2016, astronomers confirmed the presence of a planet in the habitable zone of the closest star, Proxima Centauri. It's so close that the Breakthrough Starshot Project plans to send a rover there.

We will become a space-faring race.

But not all worlds are habitable.

Some will freeze if they are too close to the star, others will freeze if they are too far away.

Abiogenesis, the creation of life from inanimate objects, is the second barrier.

The basic building blocks of life are not unique to Earth. Amino acids are found in comets, complex organic molecules are found in interstellar dust clouds, and water is found outside planetary systems.

The ingredients are there, but we don't know how they come together to create life. Perhaps there will be worlds where life does not begin.

The development of technological civilization is the third wall.

Some say we already share Earth with an alien intelligence.

A 2011 study showed that elephants can work together to solve problems.

A 2010 study showed that captive octopuses can recognize different humans.

A 2017 study found that crows can plan for future events -- wonderful and clever creatures -- but they can't contemplate Breakthrough Starshot plans, and if we were to disappear today, they wouldn't continue to carry out Breakthrough Starshot -- why should they?

Space travel is not the ultimate goal of evolution.

There will be worlds where life does not produce advanced technology.

Communication Across Spatial -- That's the fourth barrier.

Perhaps advanced civilizations choose to explore inner space rather than outer space, or do engineering at small rather than wide distances.

Or maybe you just don't want to risk encountering neighbors who are more advanced and potentially hostile.

For some reason, there will be worlds where civilizations stay silent or don't spend a lot of time communicating.

As for the height of the barrier, your guess is as accurate as anyone else's.

In my experience, when people sit down and do the math, it's common to conclude that there are thousands of civilizations in the galaxy.

But I'm back to the puzzle again. Where are they?

By definition, UFOs - including the ones I've seen - are unidentifiable.

You cannot simply assume that they are spacecraft.

You can have fun playing with the idea that aliens are here.

Some say that the Xia civilization colonized the galaxy and sowed the seeds of life on Earth...

Or we live in a cosmic nature reserve, a zoo.

Another idea is that we live in a simulation.

The programmer just hasn't revealed the aliens yet.

However, most of my colleagues argue that E.T. If it exists, just keep looking. This is a given.

The universe is vast.

The signal was difficult to locate and I hadn't looked for it for very long.

Definitely we should spend more money on exploration.

It's about understanding our place in the universe.

That's too important a question to ignore.

But there is an obvious answer. It means we are lonely.

it's just us.

There could be 1 trillion planets in our galaxy.

Is it possible that we are the only creatures able to ponder this question?

Well, I don't know if 1 trillion is a big number in this context.

In 2000, Peter Ward and Don Brownlee proposed the idea of ​​rare earths.

Remember the four barriers people use to estimate the number of civilizations?

Ward and Brownlee said there may be more.

Let's look at one possible barrier.

This is a recent proposal by geophysicist David Waltham.

This is my very simplified version of Dave's more sophisticated argument.

We are here today because, for four billion years, Earth's previous inhabitants have enjoyed more or less fair weather, with ups and downs.

But long-term climate stability is strange simply because astronomical impacts can lead the planet to freeze or freeze.

There is a hint that our moon helped, which is interesting. A popular theory is that the Moon was born when a Mars-sized object, Theia, collided with the newly formed Earth.

The result of that collision could have been an entirely different Earth-Moon system.

Eventually there was a large moon, which allowed the Earth to have both a stable axial tilt and a slow rotational speed.

Both factors affect climate and it is suggested that they contribute to climate change mitigation.

Great for us, right?

But Waltham showed that things would have been different if the moon had been just a few miles larger.

The Earth's axis of rotation will wander chaotically.

Rapid climate change is possible and not good for a complicated life.

The moon is big but not too big, just the right size.

"Goldilocks" satellites around a "Goldilocks" planet - probably a barrier.

You can imagine there are many more barriers.

For example, simple cells were born billions of years ago...

But perhaps the development of complex life required a series of improbable events.

As life on Earth gained access to multicellularity, sophisticated genetic makeup, and sex, new opportunities opened up and animals became possible.

But perhaps it is the fate of many planets that life settles at the level of simple cells.

For purely illustrative purposes, let me propose to add four more barriers in addition to the four barriers that people said are blocking the path to communication civilization.

Again, purely for illustrative purposes, let's assume a 1 in 1000 chance of surmounting each barrier.

Of course, there may be many ways to get over the barrier, and it may be better than one in a thousand.

Similarly, there could be more barriers, and the chance could be one in a million.

Let's see what's going on in this photo.

If there are a trillion planets in the galaxy, how many trillions of civilizations out there can contemplate projects like Breakthrough Starshot as much as we do?

Habitability -- having the right kind of planet around the right kind of star -- 1 trillion becomes 1 billion.

Stability, that is, a permanently favorable climate, would turn billions into millions.

Life must begin - a million becomes a thousand.

A complex life form must arise - a thousand becomes one.

Sophisticated tool usage needs to be developed. This equates to 1 planet in 1,000 galaxies.

Understanding the universe requires developing the skills of science and mathematics. That's one planet in a million galaxies.

To reach the stars, they must be social creatures, capable of communicating abstract concepts to each other using complex grammars. That's the equivalent of one planet in one billion galaxies.

And we must avoid not only disasters we cause ourselves, but also disasters from the air.

The planet around Proxima Centauri was blown up by a flare last year.

A planet in a trillion galaxies, just like the visible universe.

I think we are alone.

My colleagues who agree that we are alone often see the barriers of bioterrorism, global warming, and war in front of us.

A silent universe, because technology itself becomes a barrier to the development of a truly advanced civilization.

Melancholy, right?

I argue quite the opposite.

I grew up watching Star Trek and Forbidden Planet, and I've seen a UFO once, so the idea of ​​this cosmic loneliness is certainly a bit poignant.

But to me, the cosmic silence screams, "We are lucky creatures."

All barriers are behind us.

We are the only species that has cleared them, the only species that can determine its own destiny.

And if we come to realize how special our planet is, how important it is to protect our homes and find others, and how incredibly lucky we are all just to be cosmic aware, humanity may survive for a while.

And all the amazing things we dreamed aliens might have done in the past could become our future.

thank you very much.

(applause)

People always say something about religion.

(Laughter) The late great Christopher Hitchens wrote a book called "God Is Not Great" with the subtitle "Religion Poisons All."

(Laughter.) But last month in Time magazine, Rabbi David Wolpe, who I call Rabbi of America, said that to balance that negative character, significant social change can only be brought about through organized religion.

Now, this kind of remark about negative and positive aspects is very old.

I have in my pocket a book by Lucretius, author of On the Nature of Things, written in the first century BC. he said: "Tantum Religio Potuit Suadere Malorum"--I could have memorized it--that is, I was talking about how religion can make people do evil, and the fact that Agamemnon made the decision to place his daughter Iphigenia on the sacrificial altar in order to protect the prospects of his army.

So there's been this long debate about religion over the centuries, actually thousands of years.

People talked a lot about it, said good things, bad things, and indifferent things about it.

What I want to convince you of today is a very simple argument. Because these arguments are kind of silly, because there is no such thing as a religion that makes these claims.

There is no such thing as religion, so there is no good or bad.

You cannot be indifferent.

And if we think about the claim that things don't exist, one obvious way to try to prove the non-existence of the claimed thing is to give a definition of the thing and see if something satisfies it.

Let's start with that small route.

So if you look up the dictionary and think about it, one very natural definition of religion is that it involves belief in a god or spiritual being.

As I said, it's in many dictionaries, but you can actually find it in the writings of Sir Edward Tyler, the first professor of anthropology at Oxford University and one of the first modern anthropologists.

In his book on primitive cultures, he states that the core of religion is what he called animism: the belief in spiritual subjectivity, the belief in spirits.

The first problem with this definition comes from Paul Beatty's recent novel Tough.

There is a man talking to a rabbi.

The rabbi said he didn't believe in God.

The man said, "If you are a rabbi, why do you not believe in God?"

He replied, "That's the beauty of being Jewish.

You don't have to believe in God per se, just being Jewish. (Laughter) So if this guy is a rabbi, a Jewish rabbi, and you have to believe in God to be religious, then you get the rather counterintuitive conclusion that Judaism is not a religion, because it is possible to be a Jewish rabbi without believing in God.

That seems like a pretty counterintuitive idea.

There is another objection to this view.

A friend of mine, an Indian friend, when he was still a little boy, went to his grandfather and said, "I want to talk to you about religion." Then my grandfather said:

Come back when you're a teenager. ”

So he came back when he was a teenager and said to his grandfather, "Now that I know I don't believe in God, it might be too late."

Then his grandfather, who was a sage, said, "Oh, you belong to the atheist category of the Hindu tradition." (Laughter) And finally, there's this guy who is notorious for not believing in God.

His name is the Dalai Lama.

He often jokes that he is one of the world's leading atheists.

But it is true. Because the Dalai Lama's religion does not include belief in God.

This just goes to show that I gave the wrong definition, and you might think that I should come up with another definition and test it against these cases and find something that captures atheistic Judaism, atheistic Hinduism, and atheistic Buddhism as forms of religion, but I actually think that's a bad idea. And the reason I think it's a bad idea is because I don't think our conception of religion works that way.

As for how our conception of religion works, we actually have a list of paradigm religions and their sub-parts. And when something new comes along that purports to be a religion, we ask, "Well, is it like any of these?"

right?

And I think it's not just our way of thinking about religion. So to speak, from our point of view, anything on that list should be a religion. That's why I don't think a description of religion that excludes Buddhism and Judaism could be a good starting point. Because Buddhism and Judaism are on our list.

But why is there a list like this?

what happened? How was this list created?

The answer is very simple, but I think that's why it's so crude and debatable.

I'm sure many will disagree with this, but here's my story. True or not, I think this story gives a good idea of ​​how the list came about. So it helps you think about what your list will be used for.

I think the answer is that European travelers started traveling around the world roughly since the time of Columbus.

They come from a Christian culture, and when they arrived in a new place, they noticed that there were people who did not have Christianity and asked themselves the following questions. What can we get in place of Christianity?

And that list was basically constructed.

It consists of what other people had instead of Christianity.

Now, there are difficulties in proceeding that way. That is, Christianity is a very special tradition among that list.

It contains all sorts of very specific things that are the result of the peculiarities of the history of Christianity, but one thing that is central to it, one thing that is central to most understanding of Christianity, is that it is the result of a peculiar history of Christianity, but it is a very faith-based religion.

A religion in which people are very concerned about whether they believe in what is right.

The history of Christianity, the inner history of Christianity, is primarily the history of people killing each other for believing in the wrong things, and apparently starting in the Middle Ages, including the struggles with other religions, and the struggles with Islam.

Now, this is a very specific and special history that Christianity has, and not everywhere has ever been on this kind of list.

I think there is another problem here.

Something very specific happened.

In fact, as advertised before, a very peculiar event took place in the history of the kind of Christianity that we see around us today, mainly in the United States. It happened in the late nineteenth century. That particular event of the late 19th century was a kind of trade-off between science, this new way of organizing intellectual authority, and religion.

If you think about the 18th century, if you think about intellectual life before the late 19th century, everything you did, thought, whether it was in the physical world, in the human world, in the extra-human world, or in the moral world, was framed against a background of religious and Christian assumptions.

For example, we cannot explain the creation story in the Abrahamic tradition, the natural world, which tells us nothing about its relation to the creation story in the first book of the law.

So everything was put together that way.

However, things changed in the late 19th century and it became possible for the first time to make a serious intellectual career as a naturalist like Darwin.

Darwin was concerned about the relationship between what he said and the truth of religion, but he was able to write a book on his subject without having to relate it to religious claims, just as geologists could talk about it.

In the early nineteenth century, if you were a geologist and made a claim about the age of the Earth, you had to explain whether it was consistent, or how it was consistent or inconsistent with the age of the Earth implied by the Genesis account.

By the end of the 19th century, it would be possible to write geology textbooks discussing the age of the Earth.

So there was a great change, and that division of labor, the intellectual division of labour, as I put it, took place, and it kind of congealed, and by the end of the nineteenth century there was a real intellectual division of labour, in Europe, that made it possible to do all sorts of serious work, increasingly, even philosophy, without being bound by the idea that "Well, what I have to say must be in accord with the deep truths given to me by our religious traditions."

So imagine someone coming from that world, that late 19th century world, to the country I grew up in, Ghana, to the society I grew up in, Asante, and coming into that world in the early 20th century with this list of questions. What did they get in place of Christianity?

Now, here's one thing he would have noticed. By the way, someone actually did this.

His name is Captain Rattray and he was sent as an anthropologist for the British government to write a book on Asante religion.

This is Soul Disc.

Many of them are on display in the British Museum.

I would love to tell you an interesting and different history of how many things from my society ended up in the British Museum, but I don't have the time.

In other words, this object is the Soul Disc.

What is Soul Disc?

It was hung around the neck of the Soul Washer of King Asante.

what was their job? To wash the king's soul.

It would take a long time to explain how the soul is such a washable thing, but Rattray knew this was a religion because the soul was involved.

And likewise there were many other things, many practices.

For example, every time anyone drank, more or less, they poured a little of what was called a booze into the ground and gave some of it to their ancestors.

my dad did this Every time he opened a bottle of whiskey, which I'm glad it was so often, he would remove the cap, pour a little on the ground, and talk to Akroma Amphim, the founder of our product line, and my great-uncle Yao Anthony, to recommend it a little.

And finally, a large public ceremony was held.

Here is another British soldier's depiction of one such ceremony in the early 19th century, in which the King was involved. Apart from preparing for war, one of the big parts of the king's job was tending to the graves of his ancestors. When a king dies, the chair he sat on is painted black and placed in the king's ancestral temple, and King Asante must go every 40 days to worship his ancestors.

It's a big part of his job and people think that if he doesn't do it things will fall apart.

So, as Rattray puts it, he's both political and religious.

So all this would be considered religion to Rattray, but what I mean is, if you look into the lives of these people, you will find that they are conscious of their ancestors every time they do something.

Every morning at breakfast, they go out in front of their houses to make offerings to the Nyame Dua, the tree of the gods outside their homes, and also to speak to the gods, higher and lower gods, ancestors, etc.

This is not a world where religion and science are separated.

Religion is not separate from other areas of life. And in particular, what is crucial to understand about this world is that it is a world where the work that science does for us is done by what Rattray calls religion. For if they want an explanation for something, if they want to know why the crops have failed, if they want to know why it is raining or not, if they need rain, if they want to know why their grandfather died, they are going to appeal to the very same being, the very being. Talk to the same gods about it, in the same language.

Such a great division, a division between religion and science, has not yet happened.

Now, this is just a historical curiosity, but for much of the world this is still true.

I recently had the privilege of attending a wedding in a village of 200 people in northern Namibia, 20 miles south of the Angolan border.

These were modern people.

With us was Oona Chaplin. As some of you may know, one of the villagers came to her and said, "I've seen you in 'Game of Thrones'." I mean, they weren't people isolated from our world, but still God or spirits were still strongly there for them, and as we rode the bus to and from the various parts of the [ceremony], they prayed for us not only in a common way, but for the safety of our journey. And they meant it, and when they said that my mother, the groom's [grandmother], was with us, they didn't mean it in a figurative sense.

They meant that even though she was dead, she still existed.

So in most of today's world, the separation between science and religion doesn't happen today, and as I say, these don't -- this guy used to work for Chase and the World Bank.

They are citizens of the same world as you, but from regions where religion plays a very different role.

So the next time someone wants to make some big generalizations about religion, think about it, maybe there is no such thing as religion, so what they say can't be true.

(applause)

At every stage of our lives, we make decisions that will have a profound impact on the lives of those we will become in the future, but when we actually become those people, we are not necessarily thrilled with the decisions we make.

So teenagers pay a lot to have their tattoos removed, but teenagers pay a lot.

Young people rush to marry, while middle-aged people rush to divorce.

Older people work hard to lose what middle aged people have worked hard for.

again and again.

As a psychologist, the question that fascinates me is why do we make decisions that our future selves regret?

Well, I think one of the reasons, and I'm trying to convince you today, is that we have a fundamental misconception about the power of time.

We all know that the rate of change slows down throughout human life, that children seem to change by the minute, but parents seem to change by the years.

But what is the name of this magical point in life where change suddenly crawls out of the gallop?

Are you in your teens? Are you middle aged?

Is it aging? It turns out that for most people, the answer is now, wherever they are.

What I want to convince you of today is that we are all walking with an illusion, an illusion that history, our personal history, has just ended.

Here's some data to back up that claim.

Here, we present research on changes in people's personal values ​​over time.

There are 3 values ​​here.

Everyone here has them all, but you probably know that the balance of these values ​​changes as you grow up and age.

So how does that happen?

Well, we asked thousands of people.

Half of them were asked to predict how much their values ​​would change in the next 10 years, and the other half were asked to tell us how much their values ​​had changed in the last 10 years.

This enabled a very interesting kind of analysis. This allowed us, for example, to compare the predictions of 18-year-olds with the reports of 28-year-olds, allowing such analyzes to be performed throughout their lifetimes.

Here's what we found.

First of all, you are right. Change slows as you age, but secondly, you are wrong. Because change is not as slow as we think.

At any age between 18 and 68 in our dataset, people significantly underestimated the magnitude of change they would experience in the next decade.

We call this the "end of history" illusion.

To get an idea of ​​the magnitude of this effect, if we connect these two lines, we find that 18-year-olds expect as little change as 50-year-olds actually do.

Now it's not just about values. There are many other things.

For example, personality.

Many of you are probably aware that psychologists now claim that there are five basic facets of personality. They are neuroticism, openness to experience, agreeableness, extroversion, and integrity.

Again, we asked people how much they expected to change in the next 10 years and how much they had changed in the last 10 years. And as a result, you will get used to seeing this diagram over and over again. This is because the rate of change slows down as we age. But at any age, people underestimate how much their personalities will change in the next decade.

And it's not just temporary things like values ​​and personality.

You can ask people about their likes and dislikes and their basic preferences.

For example, name your best friend, your favorite type of vacation, your favorite hobby, and your favorite music.

People can name these things.

Ask half of them, “Do you think this will change in the next 10 years?”

And half of them said, "Has things changed in the last 10 years?"

And what we discovered, we've seen it twice before, is no different this time. People predict that the friends they have today will be their friends 10 years from now, and that the vacations they enjoy most today will be the ones they will enjoy 10 years from now. And yet people ten years older than me all say, "Yeah, you're right, you've really changed."

Does this matter?

Is this just a miscalculation with no consequences?

No, it's pretty important. Here's an example of why.

It disrupts our decision-making in important ways.

Think about your favorite musicians today and remember your favorite musicians ten years ago.

I put mine on the screen for your reference.

So when people were asked how much they would pay now to see their favorite musician perform in a concert 10 years from now, on average they said they would pay $129 for a ticket.

Yet when I asked him how much he would pay to see his favorite performer ten years ago perform today, he said only $80.

Now, in a perfectly rational world, these would be the same numbers, but we overestimate its stability and thus overpay for the opportunity to indulge our current tastes.

Why does this happen? I'm not entirely sure, but it probably has something to do with how easy it is to remember and how difficult it is to imagine.

Most of us remember who we were 10 years ago, but it's hard and hard to imagine who we'll be in the future, so we mistakenly think it's unlikely.

I'm sorry, but when people say "I can't imagine that," they're usually talking about their own lack of imagination, not the improbability of the events they're describing.

In short, time is a powerful force.

It changes our tastes.

It reconstructs our values.

It changes our personality.

We seem to appreciate this fact, but only in retrospect.

Only by looking back can we see how much has changed in 10 years.

As if for most of us, now is a magical time.

It's a watershed on the timeline.

It's time to finally be yourself.

Humans are a work in progress, misinterpreting themselves as finished.

You are as fragile, fleeting, and temporary as everyone before you.

The constant constant in our lives is change.

thank you.

(applause)

I'm good with words, so I read poetry all the time, write about it often, and break it down to see how it works.

I understand the world best and most completely in words rather than pictures and numbers, for example. When I have a new experience or a new feeling, I get a little frustrated until I try to put it into words.

I think I have always been.

When I was a kid, I devoured science fiction. I still do

And I found poetry by Andrew Marvel, Matthew Arnold, Emily Dickinson, William Butler Yeats because they were quoted in science fiction, I loved the sound of it, and I kept reading about Ottava Lima and inner caesura and enjambment and other technical stuff you care about if you're already into poetry. Because poetry has already made me happier, sadder and more alive.

And I became a poetry critic because I wanted to know how and why.

Now, poetry is not one thing that serves one purpose, just like music or computer programming serves one purpose.

Poetry in Greek, which simply means "made things", is a set of techniques, ways of creating patterns that verbalize emotions.

The more techniques you know, the more things you can create, and the more patterns you can recognize in things you already love and love.

That said, poetry seems to be particularly good at certain things.

For example, we all die at some point.

Poetry helps us live with it.

Poetry is made up of words and nothing but words.

Details in poetry are like peculiarities, individualities that distinguish people from each other.

Poetry is easy to share, easy to convey, and when you read poetry, you can imagine someone speaking to you or for you, perhaps to someone far away, to someone you have reconciled, or to someone who has passed away.

That's why we can read poetry when we want to remember something or someone, to celebrate, to look beyond death, or to say goodbye. And that's one of the reasons why poetry seems important, even to people who don't live in much of the world of words, except me.

Poet Frank O'Hara said, "If you don't want poetry, bully me instead," but he also said that when he decided he didn't want to live anymore, he thought he wouldn't write poetry anymore, which discouraged him.

Poetry helps me want to live. And I hope to show why by showing how some poems respond to the fact that we live in one culture all at once and not in another at all.

So this is one of the first poems I memorized.

It may be for children or adults.

"From afar, from the evening, and from the morning, from the sky of the Twelve Winds, the life that weaves me blows, and here I am.

Now take a breather, I can't even disperse it yet, but grab it quickly and tell me what's on your mind.

Speak now and I will answer. How can I help you? Towards the twelve squares of the wind, I go on an endless road. ”

[A. E. Hausmann] Well, this poem fascinated science fiction writers.

At least three sci-fi titles are listed. I think it's because poetry brings news from the future, the past, or from all over the world, and the patterns of poetry seem to tell what's inside someone's heart.

They say poetry can bring people together temporarily, and I think it's true. Not just because it rhymes, but it rhymes cleanly and simply in the 2 and 4 "says" and "hows", and the anticipatory hints in the 1 and 3 "answers" and "quarters", and how it rhymes sticks in my mind, as if the poem itself is one.

By exaggerating the speed of our lives, we exaggerate the fact that we die.

Years on Earth are one speech, one breath.

It's a poem about loneliness—the 'I' in the poem feels unsustainable—and while it may look like a plea for help until you get to the word 'help', this 'I' facing you and taking your hand is more like a teacher or a genie, at least he wants to believe.

This is probably not the first time a poet has written a poem that he wanted to hear.

Well, this next poem really changed what I liked, what I read, and what I felt I could read even as an adult.

If you've never seen it, you may not know what it means.

"The Garden" "Oleander: The coral that appeared in the 50's lipstick advertisements.

Such a tree of knowledge Hitting (thin air) means kissing or hitting.

Does it show up under the guise of overused usage because we are bad?

Great masculine menace, allusive and vulgar. ”

[Ray Ermantraut] Well, I found this poem in 1989 in a collection of almost equally confusing poems.

I just heard that there are some obscure and scandalous writers called linguistic poets, and I wanted to go and see for myself what they were like.

This is about the Garden of Eden and the Fall and the story of the Biblical Fall, where sex and death and sin as we know them come into the world at the same time.

It also talks about how appearances can be deceiving, how our culture sweeps us into doing or saying things we don't intend or like, and Ahmantraut's style attempts to help stop or slow us down.

"Slap" means "kiss", such as an air kiss or lip smack, but sexual attraction can appear threatening, so it can lead to "slap" like domestic violence.

Red, which means fertility, can also mean poison.

Oleander is poisonous.

And overused usages like 'slap' for 'kiss' and 'hit' help us understand how unrecognized assumptions can make us feel bad because sex is sinful or sexism is so permissive.

We let men tell women what to do.

The poem responds to an old lipstick advertisement, and the sharpness, reversal and suspension of its statements are all about resisting the language of advertising that simply tells us what to want, what to do, and what to think.

That resistance forms much of the gist of this poem, and Amantraut tells me what it's like to hear grave threats and deadly dishonesty in the language of everyday life. And I think when she can do that, she can show other people, women and men, what it's like to say to women and men who feel that way and feel so alienated and threatened that they're not alone.

Now, how do you know you're right about this rather confusing poem?

In this case, I emailed the poet a draft of the talk and she said, "Yes, yes, that's it."

yes. (Laughter) (Applause) But usually you don't know. you never know

I can't be sure, but that's okay.

All we can do is listen to poetry, see poetry, and speculate and see if they give us what we need. Nothing bad will happen if part of the poem is wrong.

Now, the next poem is older than Armandrout's, but slightly younger than A. E. Hausmann's.

"Hero!"

Green and dark eyes In the dark form of grass Run away.

Good stars, pale rudder and sharp spur, run away.

Fear of bed, fear of life, and fear of death, run away.

That brave man coming from below and walking without meditation, that brave man. ”

[Wallace Stevens] Now, the reason the sun looks so serious in Wallace Stevens' poem is because the characters in the poem are so afraid.

In the morning, the sun rises through the branches, driving away the dew and eyes on the grass and breaking the stars imagined as an army.

"Brave" has a traditional flamboyant meaning and a modern meaning of bravery.

This sun is not afraid to show its face.

But the characters in the poem are afraid.

He may have stayed up all night.

That is what Stevens reveals in the fourth stanza, where escape is the refrain.

This person may also want to run away, but may be encouraged by the example of the Sun to rise.

Stevens saves the sonically strange word "meditation" for last.

Unlike the sun, humans think.

We meditate on past and future, life and death, up and down.

And it can scare us.

Poems, patterns of poetry, show us not only what someone thought, what someone did, what happened, but what it is like to be that kind of human being, so anxious, so lonely, so curious, so stupid, so stupid, so brave.

That's why poetry is so permanent, so personal, yet so ephemeral, it seems to be both inside and outside of you at the same time.

Scottish poet Dennis Riley likened poetry to a needle, a piece of the outside that I shake inside, and American poet Terrence Hayes wrote six poems called "The Wind in the Box."

One of them asks, "Tell me what you will do when you die."

And the answer is whether he remains in us as wind, as air, as word, or not.

No matter where you live, it's never been easier to find poetry that may be in you, in your heart, from a long time ago or from the present moment, from afar or from the immediate vicinity of where you live.

Poetry can help you communicate and express how you feel, but it can also introduce you to feelings, ways of the world, people, and perhaps people from a very long time ago that are very different from your own.

Some poems even say that's what they can do.

That's what John Keats does in his most mysterious, perhaps verse.

Perhaps unfinished, perhaps he left it unfinished, and it is mysterious because it may be directed to the characters in the play. But maybe it's just Keats thinking about what he can do with his writing, his handwriting, and in that I, at least I hear mortal destiny, and the power of old poetry techniques, and I feel, even for a moment, that I almost met someone else, someone very memorable from a long time ago, you may be feeling too.

"This living hand, which is warm now and can be grasped earnestly, if it is cold, in the icy silence of the grave, haunts your days, chills your dreaming nights, may red life flow once again in my veins, and you may calm your conscience--this is it--I hold it against you."

thank you.

(applause)

Who would want hordes of cockroaches to come upon them when nature's most loathsome creatures have a big secret?

But one of the biggest differences between natural and human technology has to do with robustness.

A robust system remains stable in complex new environments.

Surprisingly, cockroaches can self-stabilize even over rough terrain.

Hitting them with a jetpack or subjecting them to an earthquake-like tremor showed that they could self-stabilize without using any brain power, thanks to their superbly coordinated legs.

Complex terrain like grass can be navigated without problems and without any instability.

We discovered a novel behavior due to its shape that actually automatically rolls sideways through this artificial test lawn.

A robust system can perform multiple tasks with the same structure.

Here's a new behavior we discovered.

The animal rapidly flips and disappears within 150 ms using its legs, the same structure it uses when running. You can't see it.

They can run upside down over poles, branches, and wires very quickly, and disturbing one of those branches can do this.

They can perform robotic gymnastic movements that we haven't made yet.

And with the same structure, it has almost unlimited mobility and unprecedented access to various areas.

They have wings to fly when warm, but use the same wings to flip over when unstable.

very effective.

Robust systems are also fault tolerant and failsafe.

This is a cockroach leg.

It has thorns, sticky pads, and claws, but even with the feet off, it can traverse rough terrain with little loss of speed, as you can see in the video below. Extraordinary.

They can run up the mesh without using their feet.

Here we show an animal alternating between normal tripods. Three-legged, three-legged, three-legged, but in nature insects often lack legs.

This one is moving without two middle legs.

Sometimes it loses three legs on a tripod and has a new gait, a hopping gait.

And I point out that these videos are all 20x slower, so when you watch this, it's actually very fast.

A robust system is also resistant to damage.

This is an animal that climbs walls.

It looks like a fast, smooth vertical climb, but when you slow it down, you see something completely different.

Here's what they do:

It intentionally crashes head-on into a wall so it doesn't lose speed and can climb over it in 75ms.

They are also able to do this because they have an extraordinary exoskeleton.

And they actually consist of compliant joints, which are tubes and plates connected to each other.

This is the anatomy of the abdomen of a cockroach.

If you look at these plates, you will see a compliant membrane.

An engineering colleague at the University of Berkeley designed a novel manufacturing technique with students that essentially consists of origami exoskeletons, laser cuts, lamination, and folding to create robots.

Now I can do it within 15 minutes.

Called DASH for Dynamic Autonomous Sprawled Hexapod, these robots are highly compliant robots and are very robust as a result of these features.

Indeed, it has incredible damage resistance.

(Laughter) There are also some cockroach habits.

So they can use their smart and obedient bodies to climb walls in a very easy way.

They may even disappear as part of a rapid reversal beginning.

Now I want to know why they can go anywhere.

We found that they could pass through gaps as small as 3 millimeters, the height of a dime, or the height of a stack of dice. When you do this, you can actually run through that narrow space at high speed, even though you can't see it.

To get a better sense of it, they did a CT scan of the exoskeleton and found that the exoskeleton can compress the body by over 40 percent.

We put them in a materials testing machine for a stress-strain analysis and found that they could withstand a force of 800 times their body weight, after which they could fly and run quite normally.

So you never know where your curiosity-based research will go, and one day a swarm of cockroach-inspired robots might pounce on you.

(laughs) Thank you.

(applause)

let me talk

It dates back 200 million years.

This is the story of the neocortex, which means "new skin."

Because in these early mammals only mammals have a neocortex, a rodent-like creature.

It was about the size of a postage stamp, just as thin, covering a brain the size of a walnut, but capable of new types of thinking.

It is possible to invent new behaviors instead of the fixed behaviors of animals other than mammals.

So when rats are escaping from predators, when their path is blocked, they try to invent new solutions.

It may or may not work, but if it does, remember it and take a new course of action that can actually spread virally to the rest of the community.

Another rat watching this might say, "Hey, that's so clever to go around that rock," and might similarly take on new behaviors.

Non-mammal animals cannot do any of these things.

They acted fixedly.

Now they can learn new behaviors, but not in a lifetime.

Perhaps over thousands of lifetimes, new fixed behaviors can evolve.

200 million years ago there was no problem at all.

The environment changed very slowly.

It could take 10,000 years for a significant environmental change to occur, during which time new behaviors would evolve.

Well, it worked, but then something happened.

Sixty-five million years ago, there was a sudden and drastic change in the environment.

We call this the Cretaceous extinction event.

That's when the dinosaurs went extinct, when 75 percent of the plant and animal species went extinct, and then when mammals overtook their ecological niche, in anthropomorphic terms, biological evolution decided, "Hmm, this neocortex is pretty good," and started growing it.

And mammals got bigger, brains got bigger at an even faster pace, and the neocortex got bigger even faster, basically developing these characteristic ridges and folds to increase its surface area.

If you take the human neocortex and stretch it out, it's about the size of a table napkin, but it's still a thin structure.

It's about the thickness of a table napkin.

But it has so many convolutions and bulges, it now occupies 80 percent of our brain, it's where we do our thinking, it's a great sublimator.

We still have the old brain that provides the basic impulses and motivations, but I may have a desire for conquest, and it's sublimated by the neocortex into writing poetry, inventing apps, and giving TED talks, and it's the neocortex that actually does the action.

Fifty years ago, I wrote a paper explaining how I thought the brain worked and described it as a series of modules.

Each module can do things according to the pattern.

It could learn patterns. You may have memorized patterns.

It might be possible to implement the pattern.

And these modules are organized in a hierarchy, and we created that hierarchy in our own way.

And 50 years ago, very little was actually done.

That led me to meet President Johnson.

I've been thinking about this for 50 years, and a year and a half ago I published a book on the same topic, How To Create A Mind, and now I have a ton of evidence.

The amount of data about the brain that comes from neuroscience doubles every year.

The spatial resolution of brain scans of all kinds is doubling every year.

We can now look inside a living brain and see connections between individual neurons that are connected and firing in real time.

We can watch your brain generate thoughts.

It turns out that your thoughts make up your brain and are very important to how it works.

So let me briefly explain how it works.

I actually counted these modules.

There are about 300 million of them and they are created in these hierarchies.

Here's a quick example.

There are lots of modules out there that can recognize crossbars up to a capital A, but that's all they care about.

They don't care if a beautiful song plays or if a pretty girl walks by, but when they see a crossbar headed for a capital A, they get very excited and say "crossbar" and output it to the output axon with high probability.

It goes to the next level and these layers are organized at the conceptual level.

Each is more abstract than the next, so the next could be "uppercase A".

It reaches a higher level than one might say "Apple".

Information flows downwards.

When an Apple recognizer sees A-P-P-L, it thinks "Hmm, I think it's most likely E," and sends a signal to all E recognizers, "Watch out for E. I think E might be coming."

The E recognizer lowers the threshold and recognizes sloppy things that could be E.

Normally you wouldn't think so, but we expect E and that's enough. Yes, I've seen E. And Ringo says, "Oh, I've seen Ringo."

Five more levels up, and you're pretty high up in this hierarchy, and you might have a module that expands into different senses, seeing a certain fabric, hearing a certain voice quality, smelling a certain perfume, and saying "my wife just walked into the room."

10 more levels and you're at a very high level.

You're probably in the frontal lobe and have a "that was ironic" module.

That's interesting. she is cute "

You might think these are more sophisticated, but it's actually the layers below that that are more complex.

There was a 16 year old girl who had brain surgery but was conscious because the surgeon wanted to talk to her.

This is possible because there are no pain receptors in the brain.

And every time I stimulated a specific tiny dot on her neocortex, shown here in red, she would laugh.

So at first they thought it might be triggering some kind of laughter reflex, but instead they quickly realized they had discovered humor-sensing points in her neocortex, and whenever they stimulated these points, she found everything funny.

“You guys are so funny just standing there” was a typical comment, but apart from during surgery they weren't funny.

So how are you today?

Well, computers are actually beginning to learn human language with techniques similar to the neocortex.

I actually described the algorithm, which is similar to what I've been working on since the 90's, called Hierarchical Hidden Markov Models.

"Jeopardy" is a very broad natural language game, and Watson scored higher than the top two players combined.

The question "Long and boring speech delivered by frothy pie toppings" was answered correctly and immediately answered "What is meringue halange?"

And Jennings and the other guy didn't get it.

This is a pretty sophisticated example of computers actually understanding human language, and I actually got my knowledge from reading Wikipedia and a few other encyclopedias.

Five to ten years from now, search engines will actually be based on actually understanding and reading billions of pages on the web and in books, rather than just looking for word-link combinations.

So as you walk by, Google will pop up and say, "Mary, you raised concerns with me a month ago that glutathione supplements were not crossing the blood-brain barrier.

Well, a new study came out 13 seconds ago showing a whole new approach to that and a new way to take glutathione.

Let me summarize. ”

Another exponential trend is shrinking technology, so 20 years from now we will have nanobots.

They enter our brain through capillaries, essentially connecting our neocortex to a synthetic neocortex in the cloud, providing neocortical extension.

Today, i.e., mobile phones have computers in them, but if you need 10,000 computers in a few seconds to do a complex search, you can access them in the cloud for a second or two.

In the 2030s, if we need additional neocortices, we will be able to connect directly from the brain to the neocortex in the cloud.

So I was walking in and I said, 'Oh, it's Chris Anderson.

he's coming to me

You should think of something nice to say.

You have 3 seconds.

The 300 million modules in the neocortex have a limit.

We need another billion. ”

Accessible on the cloud.

And our thinking becomes a hybrid of biological and non-biological thinking, but the non-biological part is subject to my Law of Profit Acceleration.

It will grow exponentially.

Remember what happened the last time you expanded the neocortex?

That was two million years ago when we took human form and developed such large foreheads.

Other primates have slanted eyebrows.

They do not have a frontal cortex.

But the frontal lobes are not really qualitatively different.

This is a quantitative expansion of the neocortex, but that additional amount of thinking was the factor that allowed us to make qualitative leaps and invent language, art, technology, and TED conferences.

No other species did such a thing.

And over the next few decades, we will do the same again.

We will extend the neocortex again, but only this time we will not be restricted to the fixed architecture of the enclosure.

It will expand without end.

That additional volume will be a factor enabling further qualitative leaps in culture and technology.

thank you very much.

(applause)

Election night 2008 was the night that split me in two.

It was the night Barack Obama was elected.

[143] years after the abolition of slavery and [43] years after the passage of the Voting Rights Act, an African-American was elected president.

Many of us didn't think this was possible until the moment it happened.

And in many ways it was the culmination of the black civil rights movement in the United States.

That night I was in California, the epicenter of another movement at the time, the Marriage Equality Movement.

Gay marriage is on the ballot in the form of Proposition 8, and as election results begin to arrive, it becomes clear that same-sex couples will be stripped of their marriage rights recently recognized by a California court.

So the night that Barack Obama won the historic presidency, the lesbian and gay community suffered their most painful defeat.

And things got even worse.

Almost immediately, African Americans began to be criticized for passing Proposition 8.

This was largely due to erroneous polls that blacks voted about 70 percent for the bill.

This turned out to be untrue, but the idea that black homophobia was pervasive took hold and was picked up by the media.

I couldn't walk away from the interview.

I heard a gay commentator say that the African-American community is notoriously homophobic and that civil rights were achieved for us, but we want to disenfranchise others.

There were even reports of racist slurs being hurled at some participants in gay rights rallies after the election.

And on the other hand, some African Americans ignored or ignored the homophobia that really exists in our community.

And while some people were outraged by the comparison between gay rights and civil rights, I was once again overwhelmed with the depressed feeling that two minority groups, of which I am a member, were competing with each other instead of supporting each other, and frankly, I was infuriated.

Now that I'm a documentary filmmaker, after being furious on stage and yelling at TV and radio, I instinctively wanted to make a film next.

And what guided me in making this film was, how did this happen?

Why was the gay rights movement at odds with the civil rights movement?

And this wasn't just an abstract question.

I am a beneficiary of both movements, so this was really personal.

But after the 2008 election, something else happened.

Progress towards gay equality has accelerated at a pace that will surprise and shock everyone, and continues to reshape laws, policies, institutions and entire nations.

And it began to become more and more clear to me that the conflict between the two movements didn't really make sense, that they were actually much more interconnected, and indeed that part of the way the gay rights movement was able to achieve such incredible results so quickly was by using some of the same tactics and strategies that the civil rights movement had laid down in the first place.

Let's take a look at some of these strategies.

First, looking at some of the major events in both freedom movement timelines, it's really interesting to visually see how quickly the gay rights movement has progressed.

Well, there are many milestones in the civil rights movement, but the first one is the Montgomery bus boycott of 1955.

It started when a woman named Rosa Parks refused to give up her seat to a white person during a protest against racism on public transportation in Montgomery, Alabama.

The movement lasted a year and revitalized the civil rights movement like never before.

And I call this strategy the "I'm sick of having my feet on your neck" strategy.

So gays and lesbians have been in society since society began, but homosexual acts were still illegal in most states until the mid-20th century.

Only 14 years after the Montgomery bus boycott, a group of LGBT people followed the same strategy.

Known as Stonewall, this is where a group of LGBT patrons fought back against police assaults at a Greenwich Village bar that led to a three-day riot in 1969.

By the way, Black and Latinx LGBT people were at the forefront of this rebellion. This is a very interesting example of the intersection of our struggles against racism, homophobia, gender identity and police brutality.

After Stonewall, gay liberation groups sprung up across the country and the modern gay rights movement as we know it began.

So the next notable moment in the timeline is the 1963 March on Washington.

This was a seminal event for the civil rights movement and a place where African Americans sought both civil and economic justice.

And, of course, it's where Martin Luther King Jr. gave his famous "I have a dream" speech, but what's actually lesser known is that this march was organized by a man named Bayard Rustin.

Bayard is openly gay and is considered one of the civil rights movement's greatest strategists.

Later in life, he would also be an ardent advocate for LGBT rights, proving his life to be a crossroads of struggle.

The March on Washington was one of the high points of the movement, where there was an ardent belief that African Americans could be part of American democracy.

I call this strategy the "visibly in large numbers" strategy.

Some early homosexual activists were actually directly affected by and participated in the marches.

"We marched with the Reverend Martin Luther King, seven of whom were members of the Mattershin Society, an early gay rights group," said gay pioneer Jack Nichols. "And from that moment on, we dreamed of a gay rights march of similar scale."

A few years later, a series of marches took place, each adding to the momentum of the gay freedom struggle.

The first was held in 1979 and the second in 1987.

The third time was held in 1993.

Nearly a million people gathered and people were so energized and excited by what had happened that they returned to their communities and started their own political and social organizations to further raise the profile of the movement.

The day of the march, October 11, was later declared the National Coming Out Day and is still celebrated around the world today.

These marches laid the foundation for the historic changes taking place in the United States today.

And the last is the "love" strategy.

The name itself speaks for itself.

In 1967, the Supreme Court ruled in Loving v. Virginia, nullifying all laws prohibiting interracial marriage.

It is considered one of the Supreme Court's landmark civil rights cases.

In 1996, President Clinton signed into law the Defense of Marriage Act, known as DOMA, which required the federal government to only allow marriages between men and women.

In the U.S. v. Windsor case, a 79-year-old lesbian named Edith Windsor sued the federal government for being forced to pay inheritance tax on her deceased wife's estate, which heterosexual couples were not obligated to do.

And as the case moved through the lower courts, the Loving case was repeatedly cited as a precedent.

When it went to the Supreme Court in 2013, it agreed and DOMA was ousted.

It was unbelievable.

However, the gay marriage movement has continued to make headway in recent years.

To date, 17 states have passed laws granting marriage equality.

It has become a de facto battle for gay equality, and even in places no one expected, like Texas or Utah, laws against gay equality seem to be fought in courts every day.

A lot has changed since that night in 2008 when I felt like I was being torn in two.

I kept making that movie.

It's a documentary film called "The New Black" that explores how the African American community is grappling with gay rights issues in light of the gay marriage movement and the fight over what civil rights means.

And I wanted to capture some of this incredible change that was happening, but by luck or politics, another marriage war was being geared up, this time in Maryland, where African-Americans make up 30 percent of the electorate.

So the tension between gay rights and civil rights started to rise again, but this time I was lucky enough to catch how some people were uniting the movement.

Here's a clip of the film's characters Kares Taylor-Hughes and Samantha Masters taking to the streets of Baltimore trying to persuade voters.

(Video) Samantha Masters: That's the man who's right here.

Yes, are you registered to vote?

Man: No. Kares Taylor-Hughes: Okay. how old you?

Men: 21. KTH: 21? You must be registered to vote.

You must be registered to vote.

Men: I'm not going to vote for gay shit.

SM: Okay, why? what happened? Man: I don't agree with that.

SM: That's not cool.

Man: What made you gay? SM: So why did you become straight?

So what made you straight?

Man 2: I can't answer that question. (laughter) KSM: I didn't have the same rights as you before, but black men like you have stood up for women like me, so I know I have the same opportunities.

So, as a black person, you have the opportunity to stand up for others.

Whether you are gay or not, they are your brothers and sisters here and they need you to represent.

Man 2: Who are you to tell someone you can't have sex or be together?

They don't have that kind of power.

No one has the authority to say, "I can't marry that young woman."

Who has that power? nobody

SM: But do you know?

Our state puts the power in your hands, so I want you to vote for six.

Man 2: Okay.

SM: I'll vote for 6 votes, okay? Man 2: Okay.

KSM: Okay, do you guys need community service time?

you do? got it. You can always volunteer with us and get some community service time.

Do you want it too?

we will feed you We deliver pizza.

(Laughter) (Applause) Yoruba Richen: Thank you.

What struck me about this clip, shot during filming, is how well Calles shows how he understands the history of the civil rights movement, but isn't bound by it.

She doesn't limit it to just black people.

She sees it as a blueprint for expanding gay and lesbian rights.

Perhaps she's young, around 25, so she could do this a little easier, but the fact is that voters in Maryland passed the Marriage Equality Amendment, and in fact, this was the first time that marriage equality was directly voted on and passed by voters.

African Americans supported it at a higher level than ever recorded.

It's a complete reversal from that night in 2008 when Proposition 8 passed.

It was monumental and felt monumental.

Our LGBT community has gone from being a pathological, stigmatized and criminalized group to being seen as part of humanity's great quest for dignity and equality.

We've gone from a time when we had to hide our sexuality to maintain a job and a family, to literally sitting at the table with the president and getting a position to cheer at his second inauguration.

I just want to read what he said at his inauguration: "We, the people, declare today the most obvious truth, that we are all created equal.

It is the star that still guides us today, just as it guided our ancestors to Seneca Falls, Selma and Stonewall. ”

Now we know that not everything is perfect. Looking at what is happening on LGBT rights issues, especially internationally, says something about how far we've come when our president puts the gay freedom struggle within the context of the other great freedom struggles of our time: the women's rights movement and the civil rights movement.

His statement shows not only the interconnectedness of these movements, but how each borrowed from and inspired the other.

So, just as the Reverend Martin Luther King learned from and borrowed from Gandhi's tactics of civil disobedience and non-violence on which the civil rights movement was based, the gay rights movement saw what worked in the civil rights movement and used some of the same strategies and tactics to turn profits at an even faster pace.

Perhaps there is another reason for the relatively rapid progress of the gay rights movement.

While many of us continue to live in racially segregated spaces, LGBT people are everywhere.

We are in urban communities, rural communities, communities of color, immigrant communities, churches, mosques and synagogues.

We are your mothers, brothers, sisters and sons.

And when loved ones and family members come out, it may be easier to support their quest for equality.

And indeed, the gay rights movement asks us to support justice and equality from the space of love.

It may be the biggest and greatest gift this movement has given us.

It asks us to access the most universal and most intimate: love for brothers and sisters and neighbors.

I would like to end with the words of one of the greatest freedom fighters who has passed away, Nelson Mandela of South Africa.

Nelson Mandela led South Africa through the dark and brutal days of apartheid and out of the ashes of legalized racism led South Africa to become the first country in the world to ban discrimination based on sexual orientation in its constitution.

Mandela said, "To be free is not just to break free from your chains, but to live in a way that respects and enhances the freedom of others."

So as these movements continue and the struggle for freedom continues around the world, let us not forget that they are not only interconnected, but that we must support and strengthen each other if we are to truly be victorious.

thank you.

(applause)

I grew up in a very small rural town in Victoria.

I had a very normal, modest upbringing.

I went to school, played with my friends, and fought with my sisters.

It was all very ordinary.

Then, when I was 15, a member of the local community contacted my parents and said they wanted to nominate me for a Community Achievement Award.

Then my parents said, "Well, that's very good, but there's one obvious problem with that.

She didn't really achieve anything." (Laughter) And they were right.

I went to school, got good grades, worked a humble job at my mom's hair salon after school, and spent a lot of time watching Buffy the Vampire Slayer and Dawson's Creek.

Yes I know. What a contradiction!

But they were right.

I wasn't doing anything out of the ordinary.

I wasn't doing anything that would be considered an accomplishment if I didn't take disability into account.

Years later, when I was teaching my second class at a high school in Melbourne, about 20 minutes into my 11th grade law class, this boy raised his hand and said,

And I said, "What speech?"

You know, I spent about 20 minutes talking to them about defamation law.

And he said, "I know how to speak to motivate you.

When people in wheelchairs come to school, they usually say something that inspires them, right? ”

(Laughs) "Usually it's a large hall."

That's when I realized something. This child had only experienced disabled people as an object of inspiration.

For this child, we are not. And it's not his fault. I mean, it's true for many of us.

For many of us, people with disabilities are not teachers, doctors, or manicurists.

we are not real people. We are there to inspire.

And actually, I'm sitting on this stage looking like I'm in this wheelchair. Perhaps you expect me to inspire you. right? (Laughter) Right.

Now, ladies and gentlemen, I am afraid I am going to disappoint you greatly.

I'm not here to inspire you.

I am here to tell you that we have been duped about our disability.

Yes, we've been sold the lie that disability is bad, capital B, capital T.

It's bad and living with a disability makes you special.

It's not a bad thing and it doesn't make you special.

And over the last few years, we've been able to spread this lie further through social media.

You may have seen images like "The only obstacle in life is a bad attitude."

Or, "Your excuse is invalid."

Or there's something like, "Before you quit, let's do it!"

These are just a few examples, but there are many such images out there.

You know, you might have seen a little girl with no hands drawing with a pencil in her mouth.

You may have seen a child running with a carbon fiber prosthetic leg.

And there are a lot of these images out there, but they are what we call inspiration porn.

(Laughter.) And I use the term porn purposely because porn targets one group of people for the benefit of another.

So in this case we are objectifying the disabled for the benefit of the able-bodied.

The purpose of these images is to inspire and motivate you. So that we can look at these images and think, "No matter how bad my life is, it could be worse."

I might be that person too. ”

But what if you were that person?

I was there long before my work was known in any way.

They congratulated me for waking up in the morning and remembering my name. (Laughter) And it's been objectified.

These images, those images, target people with disabilities for the benefit of people without disabilities.

They are there so that you can look at it, think that things are not so bad for you, and put your worries into perspective.

And life as a disabled person is actually a bit difficult.

We get over some things.

But what we are trying to overcome is not what you think it is.

They have nothing to do with our bodies.

I use the term "disabled" quite deliberately because I subscribe to what is called the social model of disability. In this model, we are more disabled by the society in which we live than by our bodies or our diagnoses.

So I have lived in this body for a long time.

I really like it.

It does what I'm supposed to do, and I've learned to make the most of it, just like you, and it's also about the kids in these pictures.

They aren't doing anything out of the ordinary.

They are just making the most of their bodies.

So is it really fair to objectify them like we do and share images of them?

When people say, "You inspire me," they mean it as a compliment.

And I know why it happens.

Your disability makes you special because of that lie, and because we were sold this lie.

And to be honest it's not.

And I know what you're thinking

See, I'm stuffing my inspiration here and you're thinking, "Hey Stella, don't you get inspired by something sometimes?"

And the problem is me.

I always learn from other people with disabilities.

But I'm learning that I'm no luckier than them.

I'm learning that using barbecue tongs to pick up dropped items is a genius idea. (Laughter) I'm learning a nifty trick to charge my cell phone battery from my chair battery.

genius.

We are learning from each other's strength and perseverance, not against our bodies or diagnoses, but against the world that exceptions and objectifies us.

I really think this lie we've been sold about disability is the greatest injustice.

It makes life difficult for us.

And the reason the quote "the only obstacle in life is a bad attitude" is bullshit is because it's not true, and because of the social model of disability.

No matter how much you smile on the stairs, it won't turn into a ramp.

I never have. (Laughter) (Applause) People who are deaf can't smile at a TV screen and see subtitles.

No matter how much you stand in the middle of a bookstore and display a positive attitude, not all books will be converted to Braille.

it won't happen.

I really want to live in a world where disability is the norm, not the exception.

I want to live in a world where a 15-year-old girl sitting in her bedroom watching Buffy the Vampire Slayer isn't told she's accomplished anything just because she's sitting there doing it.

I want to live in a world where expectations of people with disabilities are not so low that just remembering your name when you get out of bed in the morning is a blessing.

I want to live in a world where the real achievements of people with disabilities are valued. I also want to live in a world where a 11th grade kid in a Melbourne high school wouldn't be the least bit surprised that their new teacher is a wheelchair user.

Having a disability doesn't make you special, but it does make you question what you think you know about your disability.

thank you.

(applause)

Less than a year after September 11th, I was writing about shootings and murders for the Chicago Tribune, and it left me feeling pretty dark and depressed.

Since I was active in college, I decided to help a local group hang a door knocker against animal testing.

I thought it would be a safe way to do something positive, but of course we had the worst luck and everyone got arrested.

The police took this blurry photo of me with the leaflets as evidence.

My charges were dropped, but a few weeks later, two FBI agents knocked on my door and told me they would put me on a domestic terrorist list if I didn't cooperate in spying on protest groups.

I would like to say that I was not daunted, but I was so scared, and when my fears subsided, I became obsessed with figuring out why this happened and how animal rights and environmentalists who have never hurt anyone could become the FBI's biggest threat to domestic terrorism.

Years later, I was invited to testify before Congress about my reporting and told lawmakers that while everyone was talking about the green transition, some were risking their lives to protect forests and stop oil pipelines.

They physically expose their bodies to the line between whaling boat harpoons and whales.

These are the same ordinary people as the Italian protesters who voluntarily climbed over barbed wire fences to save beagles from animal testing.

And these movements were so incredibly effective and popular that in 1985 their opponents coined the new term eco-terrorist to change the way we look.

They just made it up.

These companies now support new laws such as the Animal Business Terrorism Act, which turns their activities into terrorism if they cause loss of profits.

Most people, including members of Congress today, have never even heard of this law.

Less than 1 percent were on the floor at the time of the House passage.

The rest were in the new memorial outside.

They admired Dr. King because his style of activism was branded terrorism if done in the name of animals or the environment.

Proponents say such laws are necessary for vandals, arsonists, militants and other extremists.

But now, companies like TransCanada are using presentations like this to explain to police how to prosecute non-violent protesters as terrorists.

The FBI training document on ecoterrorism is not about violence, it is about public relations.

Companies in several countries are now pushing new laws outlawing the photography of animal cruelty on farms.

The latest lawsuit was filed in Idaho just two weeks ago, and today we are suing it for being as unconstitutional as it is a threat to journalism.

The first prosecutor of the so-called "agua gag" was a young woman named Amy Meyer, who was on a public road when she witnessed sick cows being bulldozed outside a slaughterhouse.

And Amy did what all of us do. she filmed it.

When I found out about her story, I wrote about it. And within 24 hours, it caused such an uproar that prosecutors dropped all charges.

But apparently, exposing such things is itself a threat.

Through the Freedom of Information Act, I learned that counter-terrorism units are monitoring my articles and speeches like this.

He also posted this nice article about my book.

They described it as "compelling and well-written".

(Applause) You're advertising your next book, right?

The point of all this is to scare us, but as a journalist I have an unwavering faith in the power of education.

Our greatest weapon is sunlight.

Dostoevsky wrote that a man's whole job is to prove that he is a man and not a piano keyboard.

Time and time again throughout history, those in power have used fear to silence the truth and silence dissent.

It's time to set a new record.

thank you.

(applause)

Four years ago, a security researcher, or as most people call a hacker, discovered how to literally throw money into an ATM.

His name was Barnaby Jack, and the technique was later called "jackpotting" in his honor.

I'm here today because I think we actually need a hacker.

Barnaby Jack could have easily turned himself into a career criminal or James Bond villain with that knowledge, but instead chose to show the world his research.

He believed that sometimes threats must be demonstrated in order to come up with a solution.

I feel the same way.

That's why I'm here today.

We are often terrified and fascinated by the power that hackers currently hold.

they scare us.

But their choices have dramatic consequences that affect us all.

I am here today because I think we need hackers, and indeed hackers can be the immune system of the information age.

Sometimes they make us sick, but at the same time they find hidden threats in our world and force us to solve them.

I knew that I might be hacked by giving this talk, so I saved the trouble.

In true TED fashion, this is my most embarrassing photo.

But it will be hard to find me in it, because I'm like the boy standing next to me.

I was so nerdy at the time that even the boys on the Dungeons & Dragons team wouldn't let me join.

This was me, but what I wanted to be was Angelina Jolie.

She played Acid Burn in the 1995 film The Hackers.

She was cute and could rollerblade, but being a hacker made her powerful.

And I wanted to be like her, so I spent a lot of time in hacker chat rooms and online forums.

I remember finding a bit of PHP code late one night.

I wasn't quite sure what it did, but I copied and pasted it and used it to access password protected sites.

open Sesame.

It was a simple trick, and I was just a script kid at the time, but that trick felt like discovering endless possibilities at my fingertips.

This is the rush of power that hackers feel.

A geek like me found access to superpowers that required intelligence skills and tenacity, but luckily no radioactive spiders.

But with great power comes great responsibility. And you like to think that if we had that power, we would only use it for good.

But what if you could read your ex's emails or add a few zeros to your bank account?

What would you do then?

In fact, many hackers can't resist this temptation, and are somehow responsible for the billions of dollars lost each year to fraud, malware, or simple identity theft, which is a serious problem.

But there are other hackers, hackers who like to break things. And it is precisely those hackers who are able to find weak elements in our world and fix them.

This is what happened last year when another security researcher named Kyle Lovett discovered a big hole in the design of certain wireless routers like the one you have in your home or office.

He learned that anyone could remotely connect to these devices over the Internet and download documents from hard drives attached to those routers without the need for a password.

Of course he reported it to the company, but the company ignored his report.

You probably thought universal access was a feature, not a bug, until two months ago when a group of hackers used it to get into people's files.

But they didn't steal anything.

They left a note: Your router and documents are accessible to anyone in the world.

To fix it you have to:

We look forward to helping you.

By breaking into people's files like that, they certainly broke the law, but they also forced the company to fix their product.

Disclosing vulnerabilities to the public, a practice called full disclosure in the hacker community, is a controversial practice that makes us think about how hackers are having an evolving impact on the technologies we use every day.

This is what Khalil did.

Khalil, a Palestinian hacker from the West Bank, discovered a serious privacy flaw in Facebook and attempted to report it through the company's bug bounty program.

These are usually nice deals where companies reward hackers for revealing vulnerabilities they find in their code.

Unfortunately, due to some misunderstandings, his report was denied.

Frustrated by this exchange, he decided to use his findings to post on Mark Zuckerberg's wall.

This got their attention, and luckily they fixed the bug, but because he didn't report it properly, he was denied the bounty normally paid for such discoveries.

Thankfully for Khalil, a group of hackers was keeping an eye on him.

In fact, they raised over $13,000 in rewards for this discovery, sparking significant debate in the tech industry about how hackers come up with incentives to do the right thing.

But I think there's an even better story here.

Even companies founded by hackers like Facebook have a complicated relationship with hackers.

Therefore, more conservative organizations will need time and adaptation to embrace the hacker culture and the creative chaos it brings.

But I think it's worth the effort. Because the alternative to fighting all hackers blindly is to counter uncontrollable forces at the cost of stifling innovation and regulating knowledge.

These are the ones that come back and bite you.

If you follow hackers willing to risk their freedom for ideals like web freedom, it's even more true, especially in an age like today when governments and corporations are vying for control of the Internet.

I find it amazing that someone in the shadowy corners of cyberspace, perhaps someone like Anonymous, the leading brand of global hacktivism, can become the voice of opposition and the last line of defense.

This ubiquitous hacker movement needs no explanation today, but six years ago it was just an internet subculture dedicated to sharing silly pics of funny cats and trolling campaigns.

Their transformative moment came in early 2008 when the Church of Scientology attempted to remove certain leaked videos from certain websites.

This is when Anonymous was spawned from a seemingly random gathering of internet inhabitants.

After all, it turns out that when you try to remove something from the internet, the internet doesn't like it and responds with cyberattacks and elaborate pranks, leading to a series of organized protests all over the world, from my hometown of Tel Aviv to Adelaide, Australia.

It proved that Anonymous and this idea could rally masses from keyboards to the streets, and laid the foundation for dozens of upcoming operations against perceived injustices in the online and offline world.

Since then they have chased many targets.

They exposed corruption and abuse.

They are hacking popes and politicians, and I think the impact is greater than simple denial of service attacks that take down websites or leak sensitive documents.

Like Robinhood, I think they are in the business of redistribution, but it's not your money that they're after.

It's not your document. It's your attention.

They draw attention to the causes they stand for, draw our attention to them, and act as a global magnifying glass for issues we are less aware of, but perhaps should be aware of.

They go by many names, from criminals to terrorists, and while their illicit means cannot be justified, the causes they fight for are important to all of us.

In fact, hackers can do more than just destroy things.

They can unite people.

And if you don't like the internet when you try to delete something from it, watch what happens when you try to shut it down.

This happened in January 2011 in Egypt, when President Hosni Mubarak, in a desperate attempt to quell a revolution raging in the streets of Cairo, dispatched a private force to Egypt's internet service providers to physically cut off the country's connection to the world overnight.

It was unprecedented for a government to do such a thing, and it became personal to the hackers.

Hackers like the Telecomix group were already on the ground, helping Egyptians evade censorship using clever evasive tactics such as Morse code and amateur radio.

It was a low-tech high season that the government couldn't stop at the time, but when the net was completely down, Telecomix brought in the big ones.

They found a European service provider who still had a 20-year-old analog dial-up access infrastructure.

They opened up 300 of those lines for Egyptians to use, providing them with a slow but comfortable internet connection.

This worked.

It worked so well, in fact, one guy used it to download an episode of How I Met Your Mother.

But with Egypt's future still uncertain, Telecomix was preparing those internet lines when the same thing happened in Syria just a year later, and Anonymous became the first international group to publicly condemn the actions of the Syrian army, perhaps by defacing its website.

But for this kind of power, it really depends on your position. A hero to one person can be a villain to another, so the Syrian Electronic Army is a group of pro-Assad hackers supporting his controversial regime.

They have taken down several high-profile targets in recent years, including an Associated Press Twitter account that posted a message that President Obama was injured in an attack on the White House.

Of course, the tweet was fake, but as a result, the Dow Jones Index drop that day was definitely a lie, and many people lost a lot of money.

This kind of thing is happening all over the world right now.

Hackers are a force for social, political and military influence in conflicts from Crimea to Latin America, Europe to the United States.

Individuals and groups, volunteers and military conflicts, hackers are everywhere.

I might add that they come from all classes, ethnicities, ideologies and genders.

They are now shaping the world stage.

Hackers are an extraordinary force for change in the 21st century.

Because access to information is an important currency of power, something governments want to control, something they're going to set up whatever surveillance programs they want, and that's what they need hackers for.

So the establishment has long had a love-hate relationship with hackers, as the same people who demonize hacking also use it in general.

Two years ago I met General Keith Alexander.

He's the NSA director and US cyber commander, but he wore jeans and a T-shirt instead of the uniform of a four-star general.

This was at DEF CON, the world's largest hacker conference.

Perhaps like me, General Alexander didn't see 12,000 criminals in Las Vegas that day.

I think he saw untapped potential.

In fact, he was there to make a hiring pitch.

"In this room we have the manpower our country needs," he said.

Well, the hackers in the back row replied, "Then please stop arresting us."

(Applause.) Sure, hackers have been standing outside the fence for years, but considering what we know now, who is more closely monitoring our online world?

The rules of the game are no longer so clear, but hackers are perhaps the only ones still able to challenge tyrannical governments and data-hoarding corporations on their own playing field.

For me it represents hope.

Hackers have done a lot in the last 30 years, but they have also impacted civil liberties, technological innovation, and internet freedom. So I think it's time to take a closer look at how we portray hackers. Because if you keep expecting hackers to be bad guys, how can they be heroes too?

After years in the hacker world, I've come to see both the problem and the beauty of hackers. They see something broken in the world and they can't let it go.

Forced to either exploit it or try to change it, they find vulnerable aspects of a rapidly changing world.

They make us and force us to fix things or demand better things. I think we need them to. Because at the end of the day, it's not the information that wants to be free, it's us.

thank you very much.

thank you. (Applause) Let's hack the planet!

Welcome to 5 Dangerous Things You Should Let Your Kids Do.

I have no children.

I borrow a friend's child, so (lol) take all this advice with a grain of salt.

I'm Gamer Tully.

I'm a contract computer scientist by day, but I'm the founder of something called the Tinkering School.

This is a summer program aimed at helping children learn how to build their own ideas.

So we build lots of stuff and put power tools into the hands of second graders.

So if you're thinking of sending your child to tinkering school, he or she will come back bruised and bleeding.

(Laughter) As you know, we live in a world that is subject to ever stricter child safety regulations.

There seems to be no end to how crazy child safety regulations can get.

We display a suffocation warning on all plastic films manufactured in the United States or sold with merchandise in the United States.

The coffee cup has a warning that the contents may become hot.

And we seem to think that anything sharper than a golf ball is too sharp for children under 10.

So where does this trend stop?

If we round up every corner and eliminate all sharp objects, all foreign objects from the world, children will get hurt the first time they touch something sharp or not made of round plastic.

So, as the boundaries of what we judge as our safe zone become ever smaller, we deprive our children of precious opportunities to learn how to interact with the world around them.

And despite our best efforts and intentions, children are always going to find ways to do the most dangerous things possible in any environment.

(Laughter) So, despite the provocative title, this presentation is actually about safety, and about some simple things we can do to raise our kids to be creative, confident, and in control of their surroundings.

And what I present to you now is an excerpt from a book in progress.

The book is called "50 Dangerous Things".

Those are the 5 Dangerous Things.

The first is playing with fire.

Learning how to control one of nature's most fundamental forces is a pivotal moment in a child's personal history.

Whether we remember it or not, this is the first time we can actually control one of these mystical things.

These mysteries will only be revealed to those who get the chance to play it.

So, play with fire.

It's like fire, one of the greatest things we've ever discovered.

As they play, they learn the basic principles of fire, intake, combustion and exhaust.

These are the three functional elements of fire that are necessary to achieve a well-controlled fire.

And you can think of an open-air bonfire as a laboratory.

I don't know what children will learn by playing with it.

Let them play freely. And believe me They will learn more than just playing with Dora the Explorer toys.

(Laughter) The second is owning a pocket knife.

Pocket knives have kind of drifted out of our cultural consciousness, and I think this is terrifying.

(Laughter) Your first pocket knife is like your first all-purpose tool.

You know, it's a spatula, a pry bar, a screwdriver and a blade.

And it is a powerful and empowering tool.

And many cultures give knives. For example, toddlers pick up knives as soon as they become children.

Inuit children cutting whale blubber.

I first saw it in a Canadian Film Commission movie when I was 10 years old, and it left an impression on me when I saw a baby playing with a knife.

And this shows that children can develop a broad sense of self through tools from an early age.

We will lay down some very simple rules. Always disconnect from the body, keep the blade sharp, and never use force. These are things that children can understand and practice.

And yes, they are going to cut themselves.

I have a terrible scar on my leg that I pricked myself.

But hey, they're young. It heals quickly.

(laughter) Third: Throw the spear.

Our brains are actually wired to throw things, and it turns out that, just like muscles, they tend to atrophy over time if you don't use parts of your brain.

But when you train a muscle, that particular muscle exerts force on your entire system, and that goes for your brain as well.

Therefore, throwing exercises have been shown to stimulate the frontal and parietal lobes involved in visual acuity, 3D understanding, and structural problem solving, helping to develop visualization skills and predictive abilities.

And because pitching is a combination of analytical and physical skill, it's very well suited for that kind of full-body training.

This kind of goal-based practice is very effective as it also helps children develop attention and concentration.

Number [4]: ​​Disassemble the appliance.

There's an interesting world inside your dishwasher.

The next time you are about to throw away your appliances, don't throw them away.

You can take it apart with your child or send it to my school and we will take it apart together.

Even if they don't know what the parts are, thinking about what they are used for is a great exercise for children to get a sense of being able to take things apart and understand some of the parts, no matter how complicated they are.

It's the feeling of knowing something.

So these black boxes we take for granted are actually complex things made by other people and we can make sense of them.

Fifth: Two parts.

Breaking the Digital Millennium Copyright Act.

(Laughter) Besides safety regulations, there are laws that try to limit how we interact with what we own, in this case digital media.

This is a very easy task. Buy a song on iTunes, burn it to a CD, rip the CD to MP3, and play it on the same computer.

you just broke the law.

Technically, the RIAA could come and prosecute you.

It is an important lesson for children that some of these laws are broken by accident and that the laws must be interpreted.

This is something we often talk about with our kids when we mess with things, break them, or take them apart and use them for something else.

Also, when you drive your car and go out, it's the same.

Driving is a really empowering activity for young children, so this is an alternative -- (Laughter) and you can drive with your child if you don't mind actually breaking the law.

This is a great stage for children.

This happens around the same time they are grabbed by something large in the outside world, such as a dinosaur, and are trying to grab it.

A car is a similar object, and you can get into it and drive it.

And it allows them to really grasp the world in ways they normally don't have access to.

And it's perfectly legal.

Find a large vacant lot, make sure it's empty and private, and have them drive over.

It's actually very safe.

And it's fun for the whole family.

(laughs) Well, I think that's all. It's number five and a half. OK.

Halfway through my PhD, I got stuck hopelessly.

All the research directions I have tried have come to a dead end.

It seems my basic assumption no longer works.

I felt like a pilot flying through fog and was disoriented.

I stopped shaving.

I couldn't get out of bed in the morning.

I felt inadequate to walk through the university gates. Because I was not like Einstein or Newton or any other scientist who learned about the results. Because in science we only learn about results, not processes.

And obviously I couldn't be a scientist.

But I had enough support to get through it and discover something new about nature.

This is the amazing sense of stillness of being the only human in the world who knows the new laws of nature.

And then I started a second project in my PhD and it happened again.

I got stuck, but I managed to get through it.

And I started thinking maybe there's a pattern here.

When I asked other graduate students, they said, "Yes, that's exactly what happened to us. But nobody told us about it."

We all studied science as if it were a series of logical steps between questions and answers, but doing research is nothing like that.

At the same time, I was also studying to become an improvisational theater actor.

Working day and night on physics, laughing, jumping, singing and playing guitar.

Improvisational theater, like science, ventures into uncharted territory. Because you have to create a scene on stage without a director, without a script, with no idea what you're playing or what the other characters are doing.

But unlike science, improvisational theater tells us from day one what will happen when we are on stage.

You will fail miserably.

I'm stuck.

And we practiced staying creative in that dead end.

For example, there was a practice where everyone formed a circle and each person danced the world's worst tap dance. Then everyone else applauded and cheered and supported you on stage.

When I became a professor and had to guide my students through a research project, I realized again that I didn't know what to do.

I have studied thousands of hours of physics, biology, and chemistry, but not an hour of how to teach, how to lead someone into the unknown with me, and motivation.

So I turned to improvisational theater and from day one I told my students what happens when they start doing research. This has to do with the picture we have in our minds of what the research will look like.

Because when a person does something, say I want to touch this blackboard, my brain first builds a schema. This is an accurate prediction of what my muscles will do before I start moving my hand. If blocked, if my schema doesn't match reality, it causes extra stress called cognitive dissonance.

So the schema should more closely match reality.

But if you believe science teaching and textbooks, you will have the following scheme of research.

When A is the question and B is the answer, research becomes a direct path.

The problem is that when an experiment goes wrong or a student gets depressed, it's perceived as something completely wrong and causes a lot of stress.

That's why I teach my students a more realistic schema.

Below is an example that does not match the schema.

(Laughter) (Applause) So I'm teaching my students a different schema.

If A is the question and B is the answer, then if you keep your creativity in the cloud and start working, the experiment goes wrong, the experiment goes wrong, the experiment goes wrong, the experiment goes wrong, and so on until you reach a place associated with negative emotions, like someone pulled the carpet under your feet, where the basic premise no longer makes sense.

And I call this place the cloud.

Now you can get lost in the cloud for a day, a week, a month, a year, or even your entire career. However, if we are lucky and have enough support, we may see a new answer C in the material at hand, or by contemplating the shape of the cloud, we may find a new answer C and choose it.

The experiment won't work, the experiment won't work, but when I get there, I'll publish a paper called A arrow C and tell everyone about it. It's a great way to communicate, but as long as you don't forget how you got there.

Now, this cloud is an essential part of our research, an essential part of our technology. Because the clouds are guarding the perimeter.

It guards the boundaries of the known and the unknown. Because discovering anything truly new requires changing at least one of the basic assumptions. So in science, you're doing something very heroic.

Every day, we strive to bring ourselves closer to the line between the known and the unknown, to confront the clouds.

Notice here that I put B in the known countries. Because we knew about it from the beginning, C will always be more interesting and important than B.

So while B is essential for further research, C is much deeper, and that's the beauty of research.

Now, my research group has changed greatly just by learning the word cloud. Because students come to me and say, "Uli, I'm in the cloud." And I say, "Wow, you must be miserable."

(Laughs) But I'm kind of happy. Because we may be approaching the line between the known and the unknown, and we have a chance to discover something really new. Because, as far as how our minds work, it just knows that the cloud is normal, essential, and actually beautiful. We can join the Cloud Appreciation Society and it detoxifies me the feeling that something is deeply wrong.

And as a mentor, I know what to do. It is to strengthen support for students. Psychological research shows that when you're feeling fearful or hopeless, your mind narrows down to a very safe and conservative way of thinking.

If you want to explore the perilous path necessary to get out of the cloud, you need the other emotions that come with connection from someone else: solidarity, support, and hope. So it's best to step into the unknown together, like improvisational theater or science.

So by learning about the crowd, you can also learn very effective ways to have conversations in the crowd from improvisational theater.

Improvisational theater came to my aid here as well, as this is based on core principles of improvisational theater.

It means saying "yes and" to offers from other actors.

It means accepting the offer, saying “yes and” and building on it.

For example, if one actor says, "This is a pool of water," and the other actor says, "No, it's just a stage," the improvisation ends.

It's dead and everyone is frustrated.

It's called blocking.

Scientific conversation can get in the way of many things if you are not conscious of communication.

Saying "yes, and" sounds like this:

"Here's a pool full of water." "Yes, let's jump in."

"Look, there's a whale! Let's grab it by its tail.

Pull us to the moon! ”

Thus, by saying “yes and” we avoid our inner criticism.

We all have critics in our hearts who defend what we say, so people don't think we're obscene, crazy, or unoriginal, and science is filled with fear of being thought unoriginal.

Saying "yes and" avoids criticism and unlocks hidden voices of creativity that you may not even be aware of, and they often provide answers about the cloud.

So, knowing about the cloud and knowing about saying "yes and" has made my lab very creative.

Students began competing with each other for ideas and made amazing discoveries at the interface between physics and biology.

For example, we were stuck for a year trying to understand the complex biochemical networks inside cells and said, 'We're deep in the clouds. And then my student Shai Sheng Oor had a playful conversation saying, "Let's draw this on paper, this network." Instead of saying, "But we've done it many times and it doesn't work," I said, "Yeah, and let's use a very large piece of paper," and Ron Milo said, Use paper that looks like a giant architect's blueprint. Know where to print. ”And then I printed and looked at the network. I made the most important discovery there. This complex network is composed of a small number of simple, repetitive patterns of interaction, like stained-glass window motifs.

We call them network motifs, and they are the basic circuits that help us understand the logic of how cells make decisions in all organisms, including our bodies.

Soon after this, I was invited to speak in front of thousands of scientists around the world, but my knowledge of the cloud and the word "yes and" stayed in my lab. Because science doesn't talk about processes or subjective or emotional things.

Talk about results.

So there was no way to talk about it at the conference.

It was inconceivable.

And I've seen other groups of scientists get stuck without even words to describe what they're seeing, with their thinking narrowed down the very safe path, and their science's potential not being realized to its fullest potential, in a dire situation.

That's what I thought.

I try to make my lab as creative as possible. And if everyone else does the same, science will eventually become better and better.

By chance, when I went to hear Evelyn Fox Keller talk about her experience as a female scientist, that perspective was turned upside down.

And she asked, 'Why not talk about the subjective and emotional aspects of doing science?

It's no coincidence. It's a matter of values. ”

As you know, science demands objective and rational knowledge.

That's the great thing about science.

But we also have a cultural myth that the practice of science—what we do every day to acquire that knowledge—is as objective and rational as Mr. Spock.

And when you label something as objective and rational, automatically the other side, the subjective and emotional, is labeled as unscientific, anti-scientific, or threatening science, and we just don't talk about it.

And it all clicked to me when I heard that science has a culture. Because if science has culture, it can change culture, and I can be a change agent working to change science culture as much as possible.

So in my next lecture at a conference, I talked about my science. Then we talked about the importance of the subjective and emotional aspects of doing science and how we should talk about it. And when I looked at the audience, they were cold.

In 10 consecutive PowerPoint presentation meetings, I couldn't hear what I was saying.

And I tried meeting after meeting, again and again, without success.

I was in the clouds

And finally I was able to use improvisation and music to get out of the crowd.

Since then, at every conference I go to, I give a science talk and a second special talk called "Love and Fear in the Lab." And start by singing a song about a scientist's greatest fear. It's about us working hard, discovering something new, and someone else releasing it before we discover it.

We call it "scooping," but being scooped is a terrible thing.

We become afraid to talk to each other, which is not fun. Because we came to science to share our ideas and learn from each other. So I sing a blues song called "Scoop Again." It's — (applause) — a song called "Scoop Again," where I ask the audience to be my backing singer and I tell them, "Your text is 'scoop, scoop.'" It sounds like "Scoop, scoop!"

Something like this.

♪I got scooped again♪ ♪Scoop! scoop! ♪ And aim for it.

♪I got scooped again♪ ♪Scoop! scoop! ♪ ♪ I got scooped again ♪ ♪ Scoop! scoop! ♪ ♪ I got scooped again ♪ ♪ Scoop! scoop! ♪ ♪ I got scooped again ♪ ♪ Scoop! scoop! ♪ ♪ Oh Mom, can't you feel my pain ♪ ♪ Heaven help me, I'm scooped up again ♪ (Applause) Thank you.

Thank you for singing back up.

Then everyone starts laughing, breathing, realizing there are other scientists around with the same problem, and talking about the emotional and subjective things going on in their research.

I feel like a big taboo has been removed.

Finally, I am able to speak at academic conferences about this.

And scientists formed peer groups to meet regularly to discuss the emotional and subjective events that occur in teaching and entering the unknown, and even began courses on the process of doing science, going into the unknown together, and much more.

So my vision is to show that matter is made of atoms, just as every scientist knows the word 'atom', that every scientist will know a word like 'cloud' to say 'yes and', and that science will become more creative, making more unexpected discoveries and even more playful for the benefit of all of us.

What I want you to remember from this talk is that the next time you face an unsolvable problem in your work or life, the word that describes what you will see is the "cloud."

And instead of going through the cloud alone, you can go through the cloud with someone who is your source of support, able to say yes to your ideas, help you say yes to your own ideas, and increase your chances of finding unexpected discoveries, moments of calm where you can glimpse your C for the first time through the scraps of the cloud.

thank you.

(applause)

Half a year ago, I received an email from an Israeli man who read my book. The email read, "You may not know me, but I'm your 12th cousin."

It read, "I have a family tree with 80,000 people on it, including you, Karl Marx, and several European nobles."

Well, I didn't know how to interpret this.

A piece of my mind, okay, when is he going to ask me to wire $10,000 to a bank in Nigeria, right?

I also thought, 80,000 relatives, would I want that?

Some of the ones you already have have enough problems.

I won't say your name, but you know who you are.

But another part of my mind also said this was amazing.

Here I am alone in my office, but not alone at all.

I'm connected to 80,000 people around the world, which is the equivalent of 4 Madison Square Gardens full of cousins.

Some of them are great, some are frustrating, but they all relate to me.

So this email inspired me to start researching genealogy. I always thought genealogy was a very solid and proper field, but it turns out to be undergoing a fascinating revolution, and it's also a controversial one.

This is partly due to DNA and genetic testing, but partly due to the Internet.

Now there are sites that take the Wikipedia approach when it comes to genealogy, collaboration, and crowdsourcing, and you load your genealogy and these sites look it up to see if A.J. is right. Jacobs in your tree is the same as A.J. Jacobs is in another tree and if so can be joined. Join and join and join to complete a giant mega family tree with thousands and even millions on board.

I am part of what is called the Geni World Family Tree. A staggering 75 million people are registered there.

That means 75 million people are related by blood, marriage, or both.

(Laughter) It's on all seven continents, including Antarctica.

Are doing. Whether you know it or not, many people are on this service and can see the link.

This is my cousin Gwyneth Paltrow.

She doesn't know I exist, but we are officially cousins.

There are only 17 links between us.

And then there's my cousin Barack Obama.

(Laughter.) And he's my aunt's fifth great-aunt's husband's father's wife's seventh great-nephew, so practically my older brother.

And my cousin, of course, is actor Kevin Bacon (laughs). He is the cousin of my cousin's twice-abducted wife's niece's husband and the once-abducted niece's husband.

That is, Kevin Bacon's 6th, plus or minus a few degrees.

I'm not proud of myself. Because your tree includes celebrities and historical figures. Because we are all connected. 75 million may seem like a lot, but in a few years it's very likely that we'll have a family tree that includes all, almost everyone, of all 7 billion people on the planet.

But does it really matter?

what is important?

I think it's important. Here are five quick reasons why.

First, it has scientific value.

This is an unprecedented human history, giving us valuable data on how diseases are inherited and how people move. A team of scientists at MIT is currently studying the world's genealogy.

The second is to bring history to life.

When I discovered my connection to Albert Einstein, I told my 7-year-old son about it, and he was totally enthralled.

Well, Albert Einstein isn't just a white guy with weird hair.

He is Uncle Albert. (Laughter) And my son wanted to know, "What did he say? What is E = MC squared?"

And it's not all good news.

I found a link to serial killer Jeffrey Dahmer, but let me tell you it's on my wife's side.

(Laughter) (Applause) So I want to make that clear. sorry you

The third is interconnectivity.

We all come from the same ancestry and we don't have to believe the literal translation of the Bible, but scientists are talking about Y-chromosome Adam and Mitochondrial Eve, and these are about 100,000 to 300,000 years old.

We all have a little bit of their DNA.

They are our great, great, great, great, great, and will go on about 7,000 times, but grandparents. So literally we are all biological cousins ​​as well, and although estimates vary, perhaps the most distant cousin on Earth is about the 50th cousin.

Now, we don't just share ancestors and descendants.

If you have children and they have children too, look how quickly the offspring multiply.

After 10 or 12 generations, you will have thousands and millions of descendants.

Fourth, a kinder world.

Now I know there is a family feud.

I have three sons, so I see how they fight.

But I also think there is a human prejudice in wanting to treat one's own family just a little bit better than a stranger.

I think this tree is bad news for bigots. Because they have to recognize that they are cousins ​​with thousands of people who happen to be in troubled ethnic groups. If you look back in history, a lot of the terrible things we've done to each other is because one group considers another group to be subhuman, and we can't do that anymore.

We are not just part of the same species.

we are part of the same family.

We share 99.9 percent of our DNA.

Finally, number five, the democratization effect.

Some genealogies tend to be elitist, as they say, "I am a descendant of Mary, Queen of Scots, but you are not and cannot enter my country club."

But it would be really hard to do that now because everyone is involved.

I am a descendant of Mary Queen of Scots - by marriage, but still.

It's a really fascinating time in our family's history. Because families are changing rapidly.

With same-sex marriage, sperm donors, and interracial marriage on an unprecedented scale, some of my conservative cousins ​​are a little uneasy, but I actually think it's a good thing.

I think the more inclusive the concept of family, the better. Because that way you have more potential caretakers. And as my aunt's eighth cousin twice eliminated Hillary Clinton says - (laughter) - it takes a village.

I mean, I have hundreds, thousands, millions of new cousins.

I wondered what I could do with this information.

So I decided why not throw a party.

that's what i do.

And you are invited.

I hope that next year, next summer, it will be the biggest and best family gathering ever.

(Applause.) Thank you. I want you to be there.

I want you to be there.

It takes place at the New York Science Hall, a great venue, but also on the grounds of the former World's Fair. I think this is very appropriate. Because I think this is a fusion of family reunions and the World's Fair.

There will be exhibits, food and music.

Paul McCartney is 11 steps away so I hope he brings his guitar.

He hasn't responded yet, but I'm expecting it.

And the day will come when the charming cousins ​​will speak.

It's still early, but there are already some lined up.

My cousin, Kath Sunstein, who is probably the brightest jurist, speaks.

He was a former member of the Obama administration.

And on the other end of the political spectrum is George H.W. Bush, number 41, whose father has agreed to participate, comedian Nick Kroll, Dr. Oz, and many more to come.

And of course, most importantly, you guys. I want you to be there. Visit GlobalFamilyReunion.org to find out where you fit in your family tree. These are big questions of family and tribe, and I don't know all the answers, but I have a lot of wise relatives, including you, and I think we can figure it out together.

Only together can we solve these big problems.

So thank you, cousin to cousin. I can't wait to meet you.

good bye.

(applause)

First, I would like to say a few words about my social life, which may seem irrelevant, but it is.

People who meet me at a party and find out that I am an English professor who specializes in languages ​​usually have one of two reactions.

A group of people look frightened. (Laughter) They often say, "Oh, you should be careful what you say."

I'm sure he'll hear every mistake I make. ”

and they stop talking. (laughter) And they're waiting for me to leave and talk to someone else.

Another group of people light up and say, "You are the one I want to talk to."

And they tell me anything they think is going wrong with English.

(Laughter) A few weeks ago, I was at a dinner party and the man next to me to my right started talking about how the Internet is degrading English.

He brought up Facebook and said, "Unfriending? I mean, is that a real word?"

I would like to give some thought to this question. What makes words real?

Both my dinner companion and I know what the verb "unfriend" means, but when will new words like "unfriend" become a reality?

Who has the authority to make such formal decisions about language in the first place?

These are the questions I want to talk about today.

Most people think that when they say a word isn't real, they mean it's not in a standard dictionary.

Of course, this raises many other questions, such as who writes the dictionary.

Before I go any further, let me clarify my role in all of this.

I don't write dictionaries.

But I collect new words just like a lexicographer. The great thing about being a historian of the English language is that you can call it 'research'.

When I teach the history of English, I ask my students to teach me two new slangs before I start class.

Over the years, I've learned some great new slang this way. Among them are wonderful words that fill important gaps in the English language, such as "hangry" for being grumpy or angry when you're hungry, and "adorkable" for being adorable in a way that's goofy.

(Laughter.) But if these are mostly used as slang and not yet in the dictionary, how real are they?

Now let's move on to the dictionary.

I will raise my hand. How many people regularly refer to dictionaries, both in print and online?

Well, so do most of you.

Now for the second question. Raise your hand again. How many of you have looked up the editor of the dictionary you use?

Ok, less.

We know to some extent that there is a human hand behind the dictionary, but we don't really know who that hand belongs to.

I'm actually fascinated by this.

Even the most critical people tend to be the least critical of dictionaries, making no distinctions between dictionaries and not asking too many questions about who edited them.

Consider the phrase "look it up in the dictionary." This suggests that all dictionaries are exactly the same.

Consider the library here on campus. Upon entering the reading room, on the pedestal of this place of honor and respect, lies a large, complete dictionary open and ready for us to stand before and answer.

Don't get me wrong. Dictionaries are great resources, but they are human and not timeless.

What impresses me as a teacher is that we teach our students to critically question every text they read, every website they visit, except dictionaries. Dictionaries we tend to treat as uncopyrighted, as if they came out of nowhere to give us answers about the true meaning of words.

Here's the problem: Ask any lexicographer and they'll say they're just trying to keep up with language changes.

They observe what we say and write, trying to understand what sticks and what doesn't.

they have to gamble. We want to look cutting edge and catch hit words like LOL. But they don't want to include words that look trendy and won't hit. And I think the word they're focusing on right now is YOLO, you only live once.

Now that I'm hanging out with the lexicographers, you might be surprised at one of the places we hang out.

Every January, we attend the Annual Meeting of the Dialect Society of America, where we vote specifically for the word of the year.

We have about 200 or 300 people, including some of the most famous linguists in the United States.

The meeting will be held just before happy hour to give you a feel for the meeting atmosphere.

Anyone who comes can vote.

The most important rule is that you can vote with only one hand.

In the past, "tweet" was awarded in 2009, and "hashtag" was awarded in 2012.

"Chad" was the word of the year for 2000. Because no one knew what Chad was before 2000. In 2002, "weapons of mass destruction" was the word.

I'm currently voting on other categories as well, but my favorite category is the most creative words of the year.

Past winners in this category have included a “reconnection area” located after security at Milwaukee Airport where you can reconnect.

(Laughter) Undo your belt and put your computer back in your bag.

And my favorite word in this poll is "multi-sabo".

(Laughter) And multislack is the act of having multiple windows on your screen, making it look like you're working on the web when you're really just goofing around.

(Laughter.) (Applause.) Will all these words stick? Absolutely not.

And we've made some questionable choices, like in 2006 when the word of the year was "Pluto," meaning "relegation."

(Laughter) But it seems that some of the past winners, such as "app" and "e" as prefixes and "google" as verbs, are now completely obscure.

Well, a few weeks before our vote, Lake Superior State University released its list of banned words for the year.

What's surprising about this is that there's often actually quite a lot of overlap between their list and the list we're considering for our word of the year. This is because we are aware of the same thing.

We are looking at words that are gaining attention.

It's really a question of attitude.

Are you bothered by language fads and language changes, or do you find it fun and interesting and worth learning as part of a living language?

The list by Lake Superior State University continues a fairly long tradition of complaints about new words in the English language.

Here is Henry Alford Dean of 1875. He was very concerned that "desirability" was a really bad word.

In 1760, Benjamin Franklin wrote to David Hume denouncing the word "colonization".

Over the years, we have also seen concerns about new pronunciations.

This is Samuel Rogers in 1855, concerned with some fashionable pronunciations that he finds offensive, and remarks, "As if contemplation wasn't enough, the balcony makes me sick."

(Laughter) The word was borrowed from the Italian language and pronounced 'bal co ni'.

These complaints now strike us as old-fashioned, if not downright adorable -- (Laughter) -- but here's the problem. We are still pretty excited about language change.

I have a whole file of newspaper articles in my office expressing concern about illegal words that should never have been in the dictionary, such as "LOL" when it appeared in the Oxford English Dictionary and "defriend" when it appeared in the Oxford American Dictionary.

Another article also expressed concern that "invite" as a noun, "impact" as a verb (because only teeth are affected), and "incentivize" are described as "a crude and bureaucratic gaffe."

Now, it's not that lexicographers ignore this kind of attitude towards language.

They try to provide us with some guidance, often through usage labels, about language that is considered slang, informal, or offensive, but they fall into a kind of bondage. Because they are trying to explain what we are doing. They also know that we often refer to dictionaries for information on how to properly or properly use words.

In response, the American Heritage Dictionary contains usage notes.

Usage notes tend to occur with words that are troubling in some ways, but changing meanings are also troubling.

Now, usage notes involve very human decisions, but I think as dictionary users we are often less aware of those human decisions than we should be.

To show what I mean, I'll look at an example, but before I do, I'd like to explain what the lexicographers are trying to do with this usage note.

Think about the word “peruse” and how we use it.

I'm sure many of you are thinking about skimming, skimming, and skimming.

Some may need to walk as they are looking at grocery store shelves etc.

If you consult most standard dictionaries, you might be surprised to find that the first definition is "read carefully" or "peruse".

American heritage has it as its first definition.

Then there is the second definition, Skim, next to which is written "Usage Issues".

(Laughs) And it's worth a look, as it includes usage notes.

Here's a usage note: "Peruse has long meant ``read thoroughly''...

However, the term is often used more loosely, simply to mean "to read."

Extending the word further to mean "to skim, to skim" has traditionally been considered fallacious, but our poll results suggest it is gaining some acceptance.

When asked about the statement "I just had time to skim the manual," 66 percent of the [use] committee said it was unacceptable in 1988, 58 percent in 1999, and 48 percent in 2011.

Ah, the Use Committee, a credible body of language authorities that are becoming more lenient on this issue.

Now, you're probably thinking, "Wait, who are the members of the usage panel?"

And what should we do with their remarks? ”

If you look at the front title of the American Heritage Dictionaries, you can actually find the names of the people on the "Usage" panel.

But who looks at the dictionaries' prefaces?

About 200 people participate in the usage panel.

They include academics, journalists, creative writers, and more.

There are Supreme Court justices and several linguists.

As of 2005, that list includes me.

(Applause.) Here's what we can do for you.

I can see that there are different opinions about the controversial usage.

That is and should be our scope of authority.

We are not a language school.

Once a year I receive a ballot asking whether new usages, new pronunciations, new meanings are acceptable.

Well, here's what I do to fill out the ballot.

I listen to what others say and write.

I don't listen to my likes and dislikes about English.

To be honest, I don't like the word "impactive", but it's nowhere near whether "impactive" will become common usage and become more acceptable in prose.

So what I do responsibly is research usage. This often involves researching online databases such as Google Books.

If you search for "impactive" in Google Books, you'll find:

Indeed, the term "impactive" has proven useful for a certain number of writers, and seems to have become more and more useful over the past two decades.

Well, there will be changes in the language that we all don't like.

There will be changes that make you wonder, "Really?"

Is it necessary to change the language so much? ”

My point is that we should not be quick to conclude that the change is terrible, to impose our language likes and dislikes on others, and to think that the English language is in trouble.

it's not. It's rich, vibrant, and filled with the creativity of the speakers who tell it.

Looking back, I think it's interesting that the word "nice" used to mean stupid, and the word "decimation" used to mean killing 1 in 10 people.

(Laughter) I think Ben Franklin was stupid to worry about "notice" as a verb.

Well, did you know?

Those of us who worry about "impact" as a verb or "invite" as a noun will look pretty stupid in 100 years.

Languages ​​don't change faster than we can keep up.

Languages ​​don't work like that.

I hope you find it fun and engaging, not something to worry about, just like a lexicographer.

We hope you enjoy being part of the creativity that continues to rework our language and keep it robust.

So how do words get listed in dictionaries?

It's because we use it and keep using it that it permeates and lexicographers pay attention to us.

If you're thinking, "But wouldn't it be up to all of us to decide what the words mean?"

Dictionaries are great guides and resources, but no objective dictionary authority can be the final arbiter of word meaning.

If the community of speakers uses the word and knows what it means, it's real.

The words may be slang, colloquial, or words you find illogical or unnecessary. But the words we use, the words, are real.

thank you.

(applause)

Think about the difficult choices you will face in the near future.

Be it between careers as an artist and an accountant, living in the city or in the countryside, or even between two people getting married, you can marry Betty, you can marry Lolita.

Or maybe it's a choice between having a child, having a sick parent live with you, or raising a child in your partner's religion, but you're cold.

Or whether you donate your savings to charity.

Perhaps the hard choice you made was something big, something significant, something important to you.

A difficult choice seems like an opportunity to suffer, wring your hands and grind your teeth.

But I think we misunderstand hard choices and the role they play in our lives.

Understanding the hard choices reveals the hidden power that each of us holds.

What makes choosing difficult is the relationship between options.

One option is better than the other in an easy choice.

In difficult choices, one option is better in some ways, the other is better in others, and neither is better than the other overall.

You'll have to decide whether to keep your current job in the city or to uproot your life and find a more rewarding job in the countryside. Because in some ways it's better to stay and in other ways it's better to move, but overall it's not a matter of which one is better.

You shouldn't think that every hard choice is a big one.

Suppose you are deciding what to eat for breakfast.

Eat fiber-rich bran cereals and chocolate donuts.

Suppose that the main thing in the choice is good taste and health.

Cereal is healthier and donuts are much tastier, but overall it's a tough choice as neither is better than the other.

Understanding that even small choices can be difficult can make big difficult choices less difficult.

After all, we manage to figure out what to eat for breakfast. Then perhaps you can decide whether to stay in the city or live in the country for a new job.

Nor should we think that difficult choices are difficult because we are stupid.

When I graduated from college, I wasn't sure if I wanted to pursue a career in philosophy or law.

I really loved philosophy.

As a philosopher, there are many wonderful things you can learn from your armchair.

But I come from a humble immigrant family, where my luxury was eating pork tongue and jelly sandwiches for school lunches, so the thought of spending my whole life just sitting in my armchair and just thinking... was inconceivable...

Well, it seemed to me the height of luxury and frivolity.

So I took out a yellow pad, drew a line down the middle, and did my best to come up with reasons for and against each option.

I remember wishing I knew what my life would be like in each career.

If God or Netflix will send me a DVD that summarizes my two future careers, I'm good to go.

A side by side comparison of them will tell you which one is better and the choice will be easier.

But I didn't have the DVD. And I couldn't decide which was better, so I made the difficult choice that many people make. So I chose the safest option.

Fear of losing my job as a philosopher led me to become a lawyer.

it wasn't me.

Now I'm a philosopher and I study hard choices. And a common motivational default when dealing with difficult choices, fear of the unknown, is based on a misunderstanding of the choice.

It's a mistake to think that one option is actually better than the other when it comes to making hard choices, but we're too stupid to know which and we don't know which, so we'll probably choose the least risky option.

Even with enough information to consider two options side by side, it can be difficult to make a choice.

It's not our fault or our ignorance that the hard choices are hard. It is difficult because there is no best option.

Now, even if there is no best option, if the balance does not tip in favor of one option over another, then surely they should be equally good.

So it might be fair to say that for the hard choices, it's somewhere in between the equally good choices.

But it can't be right.

If your choices are equally good, you can just toss a coin between them. It seems a mistake to think that how should we decide between a career, where to live, and who to marry, flip a coin.

There's another reason to think that a hard choice isn't a choice between equally good options.

Suppose you have a choice between two jobs: an investment banker or a graphic artist.

Many things are important in such a choice, such as enjoying the job, achieving financial security, and finding time to raise a family.

Perhaps the artist's career will put him at the forefront of new forms of pictorial expression.

Perhaps your career as a banker will put you at the forefront of new forms of financial manipulation.

(Laughter) Imagine two jobs as you like, not one better than the other.

Now let's say we want to improve one of them a bit.

Suppose your bank begs you to add $500 to your salary each month.

Has more money made the bank job better than the artist job?

necessarily.

A higher salary would make a banker's job better than it used to be, but it may not be enough to make a banker better than an artist.

But if improving one job doesn't make it better than the other, the original two jobs can't be equally good.

Start with two things that are equally good, improve one and it should be better than the other.

Not so with difficult choices.

Now you have a puzzle.

We have two jobs.

Neither is better than the other, nor is it equally good.

So how do you choose?

Something seems to have gone wrong here.

Perhaps there is a problem with the selection itself, it is impossible to compare.

But it can't be right.

I'm not trying to choose between two incomparable things.

After all, we're weighing the merits of two jobs, not the merits of number 9 and a fried egg.

It is possible, and we do often, to compare the overall benefits of the two jobs.

I think this mystery arises because we make assumptions about value without thinking.

We unknowingly assume that values ​​such as justice, beauty, and kindness resemble scientific quantities such as length, mass, and weight.

Answer non-value-related comparison questions, such as which of two suitcases is heavier.

There are only three possibilities.

One weight is greater than, less than, or equal to the other.

Properties such as weights can be represented by real numbers such as 1, 2, 3, etc., and only three comparisons are possible between any two real numbers.

One number is greater than, less than, or equal to the other number.

Not so with values.

As post-Enlightenment creatures, we tend to assume that scientific thinking holds the key to all that matters in the world, but the world of values ​​is different from the world of science.

Things in one world can be quantified with real numbers.

Things from other worlds cannot do that.

We should not assume that the "is" world of length and weight has the same structure as the "should" world of "what should we do".

So if what is important to us—the joy of our children or our love for our partners—cannot be expressed in real numbers, there is no reason to believe that there are only three possible choices, and that one option is better, worse, or equal to the other.

We need to introduce a new fourth relationship that goes beyond better, worse, or equals to account for what's going on in difficult choices.

I would say that the alternatives are "equivalent".

If the alternatives are equivalent, which one you choose may be very important, but it doesn't mean that one alternative is better than the other.

Rather, the alternatives are in the same neighborhood of value and within the same league of values, but at the same time are very different types of value.

That's why the choice is difficult.

Understanding difficult choices in this way reveals something about ourselves that we didn't know.

Each of us has the power to create reasons.

Imagine a world where every choice you face is an easy choice, i.e. there is always the best option.

If you have the best option, choose it. Because part of being rational is doing better, not worse, and choosing what has the most reasons to choose.

In such a world, we would have reason enough to wear black socks instead of pink socks, eat cereal instead of donuts, live in the city instead of the country, and marry Betty instead of Lolita.

A world full of easy choices leaves us captivated by reason.

Come to think of it, (laughter) it's absurd to believe that the reasons given to you indicate that you're the best reason to pursue the hobby you're doing right now, live in the same house, and do the same job.

Instead, you were faced with an equal choice—the hard choice—and made your own reasons for choosing that hobby, that home, that job.

When the alternatives are equal, the reasons given to us, the reasons that determine if we are making a mistake, are silent about what to do.

Here in the space of difficult choices, we can exercise our normative power, the power to make ourselves reasons and to make ourselves into people who prefer country life to city life.

Choosing between comparable options allows you to do some really pretty amazing things.

We can put ourselves behind choices.

This is where I am standing.

this is me. I'm a bank man.

I'm a chocolate donut fanatic.

(Laughter) This reaction to a difficult choice is a rational one, but it is not dictated by the reasons given to us.

Rather, it is underpinned by the reasons we create.

When we create reasons for ourselves to be who we are and not who we are, we truly become who we are.

We may say that we become authors of our own lives.

So when faced with a difficult choice, you shouldn't bang your head against the wall trying to figure out which option is better.

There is no best alternative.

Instead of looking for reasons outside, we should look for reasons here. "Who am I?"

You might decide to wear pink socks and be a cereal-loving country banker, and I might decide to wear black socks and be a donut-loving artist in the city.

It is up to each of us what we do in the midst of difficult choices.

Now, those who do not exercise prescriptive force in difficult choices are drifters.

We all know people like that.

I fell in love with being a lawyer.

I didn't hire an agency to be my lawyer.

I wasn't cut out to be a lawyer.

The Drifters allow the world to write their life story.

They let reward-punishment mechanisms—head banging, fear, ease of choice, etc.—determine their behavior.

So the lesson of hard choices is to let go of your agency and reflect on what you can do, what you can be for, and through hard choices, become that person.

Far from being a source of suffering and fear, difficult choices are a rare opportunity to celebrate the uniqueness of the human condition. This means that the reasons that determine whether our choices are right or wrong are sometimes exhausted. And here, in the space of hard choices, we have the power to create reasons to be who we are.

That's why hard choices are a blessing, not a curse.

thank you.

(applause)

On November 5, 1990, a man named El Sayyid Nosaiah entered a Manhattan hotel and assassinated Jewish Defense League leader Rabbi Meir Kahane.

Nosiah was initially acquitted of the murder, but while he was serving a minor charge, he and other men began planning attacks on more than a dozen New York City landmarks, including tunnels, synagogues and the United Nations headquarters.

Thankfully, those plans were thwarted by an FBI informant.

Sadly, that was not the case with the 1993 World Trade Center bombings.

Nosiah would eventually be found guilty of involvement in the conspiracy.

El Sayed Nosail is my father.

I was born in 1983 in Pittsburgh, Pennsylvania, to an Egyptian engineer, a loving American mother, and an elementary school teacher. They did everything in their power to create a happy childhood for me.

I was seven years old when our family relationship began to change.

My father showed me a side of Islam that few people, including most Muslims, know.

In my experience, when people take the time to interact with each other, it doesn't take long for most of us to realize that we all want the same things in life.

But there are a minority of people in every religion and every population who feel obliged to pursue their beliefs zealously and to make others live as they do.

Months before his arrest, he sat me down and explained that over the past few weeks he had been traveling with friends to a shooting range on Long Island for shooting practice.

He told me that he would go with me the next morning.

We arrived at the Culverton Range, unbeknownst to our group, which was being watched by the FBI.

When it was my turn to shoot, my father helped me shoulder the rifle and showed me how to aim at a target about 30 yards away.

The last bullet I shot that day hit the little orange light that was above the target, and to everyone's surprise, especially me, the entire target burst into flames.

My uncle turned to the other men and said in Arabic, "Ibn Abu."

If the father is the father, the child is also the child.

They seemed to have a good laugh at that comment, but it wasn't until years later that I fully realized what they found so funny.

They thought they saw the same destruction in me that my father could do.

The men would eventually be found guilty of leaving a van loaded with 1,500 pounds of explosives in the underground parking lot of the World Trade Center North Tower and causing an explosion that killed six people and injured more than 1,000.

They were men I respected.

These were the men I called Ammu (meaning Uncle).

By the time I was 19, I had already moved 20 times in my life, but my childhood was insecure, so I didn't have many chances to make friends.

Every time you start feeling comfortable with someone, it's time to pack up and move to the next town.

Perpetually new to the class, I was a frequent target of bullying.

I kept my identity a secret from my classmates to avoid being targeted, but in the end, being the quiet, chubby freshman in class turned out to be more than enough.

So I spent most of my time at home reading books, watching TV, and playing video games.

For these reasons, my social skills were lacking, to say the least, and my upbringing in a stoic household unprepared me for the real world.

I was raised to judge people based on arbitrary measures, such as race and religion.

So what opened my eyes?

One of my first experiences challenging this line of thinking was during the 2000 presidential election.

Through my college prep program, I was able to attend the National Youth Convention in Philadelphia.

My group focused on youth violence. Having been a victim of bullying most of my life, this was a particularly passionate subject for me.

Our group members are people from all walks of life.

One day, near the end of the convention, I learned that one of the children I had befriended was Jewish.

Now, it took me a few days for this detail to come to light, but I realized that there was no natural animosity between the two of us.

I hadn't had any Jewish friends before, and I was frankly proud that I was able to overcome a wall that I had been led to believe was insurmountable for most of my life.

Another big turning point came when I found a summer job at the Busch Gardens amusement park.

There, I met people of all kinds of faiths and cultures, and found that the experience formed the foundation of my personality.

For most of my life, I have been taught that homosexuality is a sin and that all homosexuals are, by extension, a bad influence.

Coincidentally, I had the opportunity to work with some gay performers in a show there, and I soon found that many of them were the friendliest, least criticizing people I've ever met.

The experience of being bullied as a child instilled in me a sense of empathy for the suffering of others, and it is very unnatural for me to treat kind people in a way other than the way I would like them to treat me.

That feeling allowed me to contrast the stereotypes I was taught as a child with real-life experiences and interactions.

I don't know what it's like to be gay, but I do know that I'm judged for things I can't control.

Then there was "The Daily Show."

Every night, Jon Stewart forced me to be intellectually honest about my prejudices and helped me see that a person's race, religion, or sexual orientation had nothing to do with the quality of their character.

In many ways he was like a father figure to me when I desperately needed him.

Inspiration often comes from unexpected places, but the fact that a Jewish comedian had more of a positive impact on my worldview than my extremist father is haunting me.

One day, when I talked to my mother about how my worldview was beginning to change, she said she would cherish it as long as I lived.

She looked at me with the weary eyes of someone who had experienced a lifetime of dogmatism and said, "I'm sick of hating people."

At that moment, I realized how much negative energy it takes to build up that hatred inside me.

Zach Ebrahim is not my real name.

I changed that when my family decided to end their relationship with my father and start a new life.

So why should I risk myself?

Well, it's easy.

I do this in the hope that perhaps someday someone who is compelled to use violence may hear my story and realize that there is a better way for me to have been subject to this violent and intolerant ideology than to become a fanatic.

Instead, I chose to use my experience to fight terrorism and bigotry.

I do this for the victims of terrorism and their loved ones, for the terrible pain and loss that terrorism has inflicted on their lives.

For the victims of terrorism, I oppose these foolish acts and condemn my father's deeds.

And with that simple fact in mind, I stand here as proof that violence is not inherent to a person's religion or race, and that a son does not have to follow his father's ways.

i am not a father

thank you. (Applause.) Thank you, everyone. (Applause.) Thank you, everyone. (Applause.) Thank you very much. (applause)

I am a lifelong traveler.

From an early age, I actually thought it would be cheaper to go to a boarding school in England than to go to the best school just a stone's throw from my parents' house in California.

So, since I was nine years old, I've been flying over the North Pole by myself several times a year just to get to school.

And of course, the more I flew, the more I liked airplanes, and the week I graduated from high school, I got a job mopping and was able to spend all my 18 seasons on another continent.

And almost inevitably, I became a travel writer to combine work and pleasure.

And I really began to feel that if I was lucky enough to walk around the candlelit temples of Tibet or stroll along the coast of Havana with the music playing, I could bring those sounds, the high cobalt skies and the glow of the blue sea back home to my friends and really bring some magic and clarity to my life.

However, as we all know, one of the first things you learn when you travel is that nothing is magical unless you look at it with the right eyes.

Take an angry man to the Himalayas and he will start complaining about the food.

And, oddly enough, I've found that the best way to develop a more attentive, more appreciative eye is to go nowhere and just sit still.

And, of course, for many of us, what we crave and need most in our accelerated lives is getting a break by staying still.

But it was also the only way I could go through a slideshow of my experiences and understand the future and the past.

So, to my surprise, I found going nowhere at least as exciting as going to Tibet or Cuba.

And going nowhere is nothing scarier than sitting still long enough to spend a few minutes of every day, days of each season, or even years of your life finding what excites you most, remembering where your true happiness lies, and sometimes turning your life in the opposite direction of making a living.

And, of course, this is what wise beings have told us over the centuries, according to all traditions.

It's an old idea.

Over 2,000 years ago, the Stoics reminded us that it is not our experiences that make our lives, but what we do with them.

Imagine suddenly a hurricane hits your town and everything turns to rubble.

There is a man with lifelong trauma.

But another person, perhaps his brother, also felt almost liberated and decided that this was the perfect opportunity to start life anew.

Exactly the same event, but the reaction is radically different.

As Shakespeare said in Hamlet, there is no good or bad, but thinking makes it so.

And this is certainly my experience as a traveler.

Twenty-four years ago, I took the most daunting trip across North Korea.

However, the journey lasted several days.

What I've been doing, holding it still, coming back to it in my head, trying to understand it, finding a place to put it in my thoughts, has been going on for 24 years already, and probably for the rest of my life.

In other words, this trip has given me some amazing sights, but only sitting still can turn them into lasting insights.

And since so much of our life happens in our heads in memories and imaginations, interpretations and speculations, sometimes I wonder if if we really want to change our lives, the best place to start is by changing our minds.

Again, none of this is new. That's why Shakespeare and the Stoics told us centuries ago, but Shakespeare never had to face 200 emails a day.

(Laughter) As far as I know, the Stoics didn't use Facebook.

We all know that in our on-demand lives, one of the most on-demand things is ourselves.

No matter where we are, at any time of the day or night, bosses, spammers, and parents can contact us.

In fact, sociologists have found that while Americans are working fewer hours these days than they did 50 years ago, we still feel like we are working more.

We have more and more time-saving devices, but in some cases, time seems to be getting shorter and shorter.

We are able to communicate more and more easily with people in the farthest reaches of the earth, but sometimes we lose contact with ourselves in the process.

And, as a traveler, one of the things that surprised me the most was realizing that the people who have helped us the most to get us anywhere are often the ones who are so intent on going nowhere.

In other words, the ones who created technologies that overcome many of the old limits are the ones who are wisest about the need for limits, even when it comes to technology.

I once went to Google HQ and saw everything that many of you have heard. Indoor treehouses, trampolines, workers at the time were free to spend 20 percent of their paid time free to let their imaginations run wild.

But I was even more impressed when, as I waited for my digital ID, one Googler told me about a program he was about to start teaching many Googlers who practice yoga to become yoga trainers, another about a book he was about to write about his inner search engine, and how science empirically showed that sitting still and meditating not only lead to improved health and clarity of thought, but even emotional intelligence. That's what you did.

I have another friend in Silicon Valley. He is one of the most eloquent voices of modern technology, in fact Kevin Kelly, one of the founders of Wired magazine.

And Kevin wrote his last book on new technology without a smartphone, laptop or TV at home.

And like many in Silicon Valley, he strives to closely observe an activity called the Internet Sabbath. That means going completely offline for 24 or 48 hours each week to gather the sense of direction and balance you need when you're back online again.

One thing technology probably hasn't always given us is a sense of how to best use it.

And when talking about the Sabbath, look at the Ten Commandments. There is only one word with the adjective "holy" and that is the Sabbath.

I picked up the Jewish scripture, the Torah. The longest chapter in it is written on the Sabbath.

And we all know that it really is one of our greatest luxuries: empty space.

In many musical compositions, it is the pauses and rests that give the piece its beauty and form.

And I, as a writer, know that I often try to include a lot of empty space on the page so that my thoughts and sentences can be completed, and that there is room for the reader's imagination to breathe.

Now, in the physical realm, of course, many would seek a place in the countryside, a second home, if they had the resources.

I didn't start out with those resources, but I'm occasionally reminded that if I wanted to, I could always have a second home in time, even if it wasn't in space, just by taking a day off.

And it's never easy. Because whenever I do, I spend most of it worrying about all the extra things that will happen to me the next day.

Sometimes I think I'd rather give up meat, sex, and wine than check my email.

(Laughter) And every season I try to take a three-day vacation at a retreat, but a part of me still feels guilty for leaving my poor wife, ignoring every seemingly urgent email from my boss, and probably not attending a friend's birthday party.

But as soon as I got to a really quiet place, I realized that only going there would give me something fresh, creative, and fun to share with my wife, my boss, and my friends.

Otherwise, I'm really just pushing my fatigue and distraction onto them, and that's not a blessing at all.

So when I was 29, I decided to redo my whole life from the perspective of going nowhere.

One evening, I was returning from the office, past midnight, in a taxi driving through Times Square, when I suddenly realized that I was running around too much to keep up with my life.

And it just so happened that my life at that time was pretty much what I dreamed of when I was a little girl.

I had some really interesting friends and colleagues who lived in a nice apartment on Park Avenue and 20th Street.

For me, I had a fascinating job of writing about world affairs, but I could never separate myself from it enough to hear myself think, to understand if I was truly happy.

So I abandoned my dream life and moved into a room in a backstreet in Kyoto, Japan. It has been a place that has had a strong, truly magical attraction to me for a long time.

Even as a child, I saw a painting of Kyoto and felt I knew it. I knew it before I saw it.

However, as you all know, this city is also a beautiful city surrounded by hills, with more than 2,000 temples and shrines, and people standing quietly for over 800 years.

And soon after moving there, I still live with my wife (former kids) in a secluded two-room apartment. No bikes, no cars, no TV that I can understand. And I still have to support my loved ones as a travel writer and journalist. So it's clear that this isn't ideal for job promotion, cultural excitement, or social distraction.

But I realized that it gave me what I valued most: days and hours.

I never had to use my cell phone there.

We rarely need to look at the time, and when we wake up every morning, the whole day is truly spread out like a meadow.

And when life brings nasty surprises, more than once—when a doctor walks into a room with a serious look on his face, or when a car suddenly crosses in front of me on the highway—I know in my bones that time spent going nowhere sustains me more than time spent rushing to Bhutan or Easter Island.

I have always been a traveler -- my livelihood depends on it -- but one of the beauties of travel is that it can bring silence amidst the movement and hustle and bustle of the world.

I once took a flight in Frankfurt, Germany, and a young German woman got off and sat next to me and had a very friendly conversation with me for about half an hour, after which she just turned around and sat still for 12 hours.

She never turned on the video monitor, never took out a book, never even slept, just sat still. Something about her clarity and poise really got through to me.

Recently, I have noticed that more and more people are taking conscious steps to open up space in their lives.

Some go to black hole resorts spending hundreds of dollars a night to hand their phones and laptops to the front desk upon arrival.

Some people I know have found that just turning off the lights and listening to music before bed instead of scrolling through messages or checking YouTube helps them sleep better and wake up refreshed.

Once I was lucky enough to drive into the dark, high mountains behind Los Angeles. There, the great poet, singer, and international heartthrob Leonard Cohen lived and worked for many years as a full-time monk at the Mount Baldy Zen Center.

And it didn't surprise me at all when his 77-year-old record (which he deliberately unsexily titled "Old Ideas") topped the charts in 17 countries and reached the top five in nine others.

I think something in us craves the feeling of intimacy and depth that comes from such people.

People who take time and effort to sit still.

And I think many of us stand about two inches away from a giant screen, noisy, crowded, ever-changing, with the feeling that that screen is our life. I certainly agree.

And only by taking a step back, and still further down, can you begin to see what the canvas means and capture the bigger picture.

And some do it for us without going anywhere.

Therefore, in an age of acceleration, nothing is more exhilarating than going slow.

In a time of distraction, there is no luxury like paying attention.

And in an age of constant motion, nothing is more urgent than staying still.

So your next vacation can go to Paris, Hawaii or New Orleans. I am sure you will have a wonderful time.

But if you want to live, love the world, and come home with fresh hope, you can consider going nowhere.

thank you.

(applause)

The architecture is certainly wonderful.

It's amazing because it's art.

But you know, this is a very interesting kind of art.

It is art at the frontier between art and science.

It is fed by...

Through real life, every day.

It is driven by the forces of necessity.

pretty awesome, pretty awesome.

And the life of an architect is also wonderful.

As an architect, you have to be a poet at ten o'clock in the morning.

But if you don't become a humanist by the time you're 11, you'll be lost.

And at noon you absolutely have to be a builder.

Architecture is ultimately the art of building, so you must be able to build.

Architecture is the art of creating shelters for humans.

period.

And this is never easy.

very.

Look at this.

This is London, at the top of the Shard of Glass.

The building was completed several years ago.

They are well-trained workers, assembling the upper part of the tower.

Well, they look like rock climbers.

they are.

In other words, like a building, it defies gravity.

30 of them participated. In fact, the site attracted more than 1,400 participants from 60 different nationalities.

You know, this is a miracle. It's a miracle.

It's a miracle that 1,400 people from all over the world come together.

The site is a miracle.

This is another.

Let's talk about construction.

Adventures are physical adventures, not spiritual adventures.

This man is a deep sea diver.

From rock climbers to deep sea divers.

This is Berlin.

After the wall fell in 1989, the building was built on Potsdamer Platz, connecting East and West Berlin.

We had about 5,000 people participate in that project.

About 5,000 people.

And this is another site in Japan, building Kansai Airport.

Again, all rock climbers are Japanese.

Building together is the best way to create a sense of cooperation.

A sense of pride -- pride is essential.

But you know, architecture, of course, is one of the reasons why architecture is great.

But there's another one that's probably even better.

Because architecture is the art of creating shelter not just for individuals, but for communities and society as a whole.

And society will never be the same.

The world keeps changing.

And change is hard for people to accept.

And architecture is a mirror that reflects those changes.

Architecture is the construction and expression of those changes.

This is why it is so difficult because change creates adventure.

They create adventure, and architecture is adventure.

This is the old Georges Pompidou Center in Paris.

Time goes back to 1977.

It was a spaceship that landed in the middle of Paris.

We were young bad boys at the time, with our adventure buddy Richard Rogers.

They are young and bad.

(Laughter) It was only a few years after May '68.

So it was rebellion, pure rebellion.

The idea was to make proof that cultural buildings shouldn't be intimidating.

You have to generate curiosity.

This is how you create a cultural place.

Curiosity is the beginning of cultural attitudes.

There is a square there, you can see the square.

And the square is the beginning of city life.

A square is a place where people gather.

And they mix experiences.

And they are mixing ages.

And you know, it somehow creates the essence of the city.

Since then, we have created a lot of places for people in our office.

There is a concert hall here in Rome.

Another place for people.

You can see that the interior of this building is actually designed by sound.

I'm flirting with the sound.

And this is Kansai Airport in Japan.

Sometimes you need to make an island to make a building, and we made that island.

The building is over a mile long.

It looks like a giant glider landing on the ground.

And here is San Francisco.

Another place for people.

This building is the California Academy of Sciences.

And we've planted thousands of plants on that roof that harness the moisture in the air instead of drawing water from the water table.

In fact, the roof is a living roof.

And this building became platinum LEED.

LEED is, of course, a system for measuring the sustainability of buildings.

In other words, it was also a place for people who stayed for a long time.

And this is actually New York.

This is the new Whitney in New York's Meatpacking District.

Well, another airship.

Another place for people.

This is the Niarchos Foundation in Athens.

It's a library, an open house, a concert hall, and a big park.

This building is also a platinum LEED building.

This building actually captures the energy of the sun with its roof.

But you know, it's good to make a building a place for people.

Building a library, building a concert hall, building a university, building a museum is good. Because it creates an open and accessible place.

Indeed, it is you who create the buildings for a better world.

But there are other things that make architecture even more amazing.

And this is the fact that architecture responds not only to needs and inevitability, but also to desires, yes desires, dreams and aspirations.

This is the work of architecture.

Even the humblest hut on earth is more than just a roof.

It's more than a roof.

It tells a story. It tells a story about the identity of the people who live in that hut.

personal.

Architecture is an art that tells a story.

in this way.

London: Broken glass.

Well, this building is the tallest building in Western Europe.

Soar above 300 meters for a breath of fresh air.

The facets of this building are slanted, reflecting a London sky that will never be the same.

After a rain, everything turns bluish.

On sunny evenings, everything turns red.

It's a difficult one to explain.

That's what we call the soul of the building.

The photo on the left is the old Mesnil collection.

It's a museum.

Harvard Art Museum is on the right.

Both buildings play with light.

Light is perhaps one of the most important materials in architecture.

And here in Amsterdam.

This building is playing with water.

And here is my office on the sea.

Well, this is work cheating.

In fact, we enjoy working there.

And that cable car is a small cable car that goes up there.

It's New York's New York Times.

Well, this is for transparency considerations.

As expected, the sense of light, the sense of transparency.

To the left here is a magic lantern in Ginza, Tokyo, Japan.

And in the center of it is a monastery located in the forest.

This monastery plays with silence and forest.

And museums, science museums.

This is about levitation.

This is the heart of Paris, in the belly of a whale.

This is the Pathé Foundation in Paris.

All these buildings have something in common. It means that something is looking for a desire or a dream.

that's me

(Laughter) Well, that's me on the sailboat.

flirting with the wind

Well, there's no particular reason to show you this picture.

(laughs) I'm doing my best, I'm doing my best.

One thing is clear: I love sailing.

I also really like sailing ship designs.

But I love sailing because it has the image of being slow.

and ...

and silence.

And the feel of the suspension.

And there is one more thing that this photo wants to say.

He says he's Italian.

(Laughter) Well, there's very little I can do about that.

(laughs) I'm Italian and I love beautiful things.

i love beauty

Now go sailing, I want to take you sailing to this place in the middle of the Pacific Ocean.

This is the Jean-Marie Tjibau Center.

It's for the Kanaki tribe.

Located in Noumea, New Caledonia.

This is the place for art.

art and nature.

And those buildings actually sway in the wind and tradewinds.

Those buildings have sounds, voices.

I'll show you this because it's all about beauty.

It's about pure beauty.

And let's talk a little bit about beauty.

Beauty is like a bird of paradise. The moment you try to catch it, it will fly away.

your arms are too short

But beauty is not a frivolous thought.