So why do we remember some things and not others?

Well, there are several ways to influence the degree and effectiveness of memory retention.

For example, memories formed during times of heightened emotion or stress are better recorded because the hippocampus is linked to emotions.

But as you can imagine, one of the main factors contributing to memory consolidation is a good night's sleep.

Sleep consists of four stages, the deepest of which are known as slow-wave sleep and rapid eye movement.

EEG machines that monitor people during these stages have shown that electrical impulses travel between the brainstem, hippocampus, thalamus and cortex, which act as relay points for memory formation.

And different stages of sleep have been found to help consolidate different types of memories.

During non-REM slow-wave sleep, declarative memories are encoded to be temporarily stored in the anterior hippocampus.

Through continuous interactions between the cortex and hippocampus, the cortex is repeatedly reactivated and gradually redistributed to long-term storage within the cortex.

On the other hand, REM sleep mimics brain activity during wakefulness and is associated with consolidation of procedural memories.

Studies show that it's best to go to bed three hours after memorizing formulas and one hour after practicing scales.

You can see how skimping on sleep is not only detrimental to your long-term health, but it actually makes you less likely to retain all of your knowledge and practice the night before. All of this justifies the wiseness of the saying, "Let's just go to sleep."

Given all the internal restructuring and new connections that happen while you sleep, you could even say that proper sleep wakes you up each morning with a new and improved brain, ready to face the challenges ahead.

As 1905 dawned, Albert Einstein, who was almost 26 years old, faced life as a failed academic.

Most physicists of the time would have scoffed at the idea that this little civil servant could do much for science.

But within the next year, Einstein published not one, two, or three, but four astonishing papers, each on a different subject, destined to fundamentally change our understanding of the universe.

The myth that Einstein failed at mathematics is true.

By the age of 15, he was self-taught in calculus and had excellent grades at both the secondary school in Munich and at the Swiss Institute of Technology, where he earned teaching qualifications in mathematics and physics.

But skipping classes to spend more time in the lab and failing to show proper respect for his professors derailed his planned career path.

Even his job as a laboratory assistant was dropped, and he had no choice but to get a job at the Swiss Patent Office with the help of his friend's father.

Working six days a week as a patent clerk, Einstein managed to find time to work on physics by discussing his latest research with a few close friends and publishing a few minor papers.

It was a great surprise when in March 1905 he submitted a paper containing a shocking hypothesis.

Despite decades of evidence that light is a wave, Einstein proposed that light could actually be a particle, showing that his hypothesis could explain mysterious phenomena such as the photoelectric effect.

The idea was ridiculed for years, but Einstein was simply 20 years ahead of his time.

Wave-particle duality was to be the basis of the quantum revolution.

Two months later, in May, Einstein submitted his second paper, this time addressing the centuries-old question of whether atoms really exist.

Although certain theories were built on the idea of ​​the invisible atom, some prominent scientists still believed that the atom was a useful fiction rather than an actual physical object.

But Einstein used a seminal argument that showed that the behavior of small particles moving randomly in liquids, known as Brownian motion, could be accurately predicted by the collisions of millions of invisible atoms.

Experiments quickly confirmed Einstein's model, and atomic skeptics threw in the towel.

A third paper was published in June.

Einstein has long been troubled by a contradiction between two basic principles of physics.

The established principle of relativity, dating back to Galileo, stated that absolute motion was undefinable.

However, the equally well-established electromagnetic theory claimed that absolute motion exists.

This disagreement, and his inability to resolve it, put Einstein in a state of mental strain, he said.

But one day in May, the clouds parted after he and his friend Michele Besso pondered a puzzle.

Einstein realized that the contradiction could be resolved if both time and space were relative to the observer, while the speed of light was constant regardless of the frame of reference.

It took Einstein just a few weeks to work out the details and formulate what would come to be known as the special theory of relativity.

Not only does this theory shatter our understanding of reality so far, it paves the way for technologies ranging from particle accelerators to global positioning systems.

One might think that this is enough, but in September a fourth paper arrived as a "btw" follow-up to the special relativity paper.

Einstein thought a little more about his theory and realized that it implied that mass and energy, one which appears to be solid and the other which is supposed to be ether, are in fact equivalent.

And their relationship can be expressed in the most famous consequential equation in history, E=mc^2.

It took nearly 15 more years for Einstein to become a world-famous icon.

It wasn't until 1919 that his later general theory of relativity was confirmed by measuring the bending of starlight during an eclipse that the press made him a celebrity.

But even if he disappeared from the Patent Office after 1905 and accomplished nothing else, these four papers published in his miracle year would still have been monumental monuments of amazing and unexpected genius.

In 2008, something incredible happened. A man was cured of HIV.

Of more than 70 million people living with HIV, this was the first and so far the last.

We still don't understand exactly how he was cured.

We can treat malaria, hepatitis C, and many other diseases, so why not HIV?

First, let's look at how HIV infects humans and progresses to AIDS.

HIV is transmitted through the exchange of bodily fluids.

Unprotected sex and contaminated needles are the main sources of infection.

Fortunately, it cannot be spread through air, water, or accidental contact.

People of all ages, sexual orientations, genders and races can become infected with HIV.

When HIV enters the body, it infects cells that are part of the immune system.

Specifically, it targets helper T cells that help defend the body against bacterial and fungal infections.

HIV is a retrovirus. That is, it writes its genetic code into the genome of the infected cell, allowing it to ingest the cell and make more copies of itself.

During the first stage of HIV infection, the virus replicates in helper T cells, destroying many of them in the process.

At this stage, patients often experience flu-like symptoms, but are usually not yet in mortal danger.

However, the virus continues to replicate and destroy T cells for months to years when the patient may look and feel perfectly healthy.

If the T cell count drops too low, the patient is at great risk of contracting a deadly infection that a healthy immune system can usually handle.

This stage of HIV infection is known as AIDS.

The good news is that there are drugs that are highly effective in controlling HIV levels and preventing T-cell numbers from dropping to the point where the disease progresses to AIDS.

With antiretroviral therapy, most people living with HIV can expect to live longer and healthier lives, and their chances of infecting others are greatly reduced.

However, there are two big pitfalls.

For one, HIV-positive patients must be on medication for the rest of their lives.

Without these, the virus could make a deadly comeback.

So how do these drugs work?

The most commonly prescribed prevent the viral genome from being copied and integrated into the host cell's DNA.

Other drugs interfere with viral maturation and assembly, preventing HIV from infecting new cells in the body.

But HIV hides where current drugs cannot reach: in the DNA of healthy T cells.

Most T cells die quickly upon HIV infection.

But the instructions for making more HIV viruses have lain dormant in a tiny percentage, sometimes for years.

Therefore, even if all the HIV virus could be cleared from an infected person's body, one of those T cells could be activated and start spreading the virus again.

Another big problem is that not everyone in the world has access to potentially life-saving treatments.

In sub-Saharan Africa, which accounts for more than 70% of HIV cases worldwide, antiretroviral drugs reached only about one in three HIV-positive people in 2012.

There is no easy answer to this problem.

A mix of political, economic and cultural barriers make effective prevention and treatment difficult.

And in the United States, HIV still kills more than 10,000 people a year.

But there are good reasons for hope.

Researchers may be closer than ever to developing a true cure.

One research approach involves the use of drugs that activate all cells with HIV genetic information.

This destroys these cells and sheds the virus into the field, where our current drugs come into play.

Another is looking at using genetic tools to completely cleave HIV DNA from the cell genome.

A cure of 1 in 70 million may seem like a scary odds, but 1 is immeasurably better than zero.

We now know that treatment is possible, and it may give us what we need to beat HIV for good.

This is the story of three empty and discarded plastic bottles.

Their journey is just about to branch out into consequences that will affect the fate of the planet.

But they weren't always like this.

To understand where these bottles end up, we must first explore their origins.

The hero of our story was born in this refinery.

The plastic on their bodies was formed by chemically combining oil and gas molecules to make monomers.

These monomers were then combined into long polymer chains to make plastic in the form of millions of pellets.

These were melted at the manufacturing plant and reformed in molds to create the elastic material that made up the bodies of the triplets.

Machines filled bottles with sweet, frothy liquids, packaged, transported, purchased, opened, consumed, and disrespectfully discarded.

And now they lie here, standing on the edge of the unknown.

Bottle 1, like hundreds of millions of tons of plastic like it, ends up in landfills.

This gigantic garbage dump continues to expand and take up space every day as more garbage flows in.

When the plastic sits there compressed between layers of other junk, rainwater flows through the waste, absorbing the water-soluble compounds it contains, some of which are highly toxic.

Together these produce a noxious stew called leachate that can migrate into groundwater, soil and streams, contaminating ecosystems and harming wildlife.

It can take 1,000 years of pain before Bottle 1 breaks down.

Bottle 2's journey is strange, but unfortunately, it has never been happier.

He floats over streams that lead to streams, streams that feed into rivers, and rivers that lead to the sea.

After months of being lost at sea, he is slowly drawn into a giant eddy of garbage. It's a place known as the Pacific Garbage Patch.

Here, ocean currents trap millions of plastic debris.

This is one of five plastic-filled gyres in the world's oceans.

Where contaminants turn water into a murky plastic soup.

Some animals, such as seabirds, get caught in the mess.

They and others mistake colorful plastic shards for food.

Because plastic makes you feel full without making you feel full, you starve to death and release the toxins from the plastic into the food chain.

For example, lantern fish are eaten, lantern fish are eaten by squid, squid are eaten by tuna, and tuna is eaten by us.

And since most plastics are not biodegradable, they break down into smaller and smaller pieces called microplastics that can spin forever in the ocean.

But Bottle 3 escapes the brothers' cruel purgatory.

A truck takes him to a factory, where he and his companions are crushed flat and compressed into blocks.

Okay, this one also seems pretty awful, but wait a minute.

it gets better.

By crushing the blocks finely, washing and dissolving them, it becomes a reusable raw material.

As if by magic, Bottle 3 is about to be transformed into something completely new.

For this hunk of plastic with such humble origins, suddenly the limits are reached.

In 1978, Louise Brown became the world's first baby born by in vitro fertilization (IVF).

Her birth revolutionized the field of reproductive medicine.

Considering that about one in eight heterosexual couples have difficulty conceiving and homosexual couples and single parents often need clinical assistance to conceive a baby, the demand for IVF is growing.

IVF is so common that over 5 million babies have been born using this technology.

IVF works by mimicking the wonderful design of sexual reproduction.

To understand IVF, you must first understand the natural process of creating a baby.

Believe it or not, it all starts in the brain.

About 15 days before fertilization occurs, the anterior pituitary secretes follicle-stimulating hormone (FSH), which causes the small number of follicles in the ovary to mature and release estrogen.

Each follicle contains one egg, and on average only one follicle reaches full maturity.

As the uterus continues to grow and release estrogen, this hormone not only helps regulate the growth and preparation of the uterus, but also tells the brain how well the follicles are developing.

When estrogen levels are high enough, the anterior pituitary gland releases large amounts of the luteinizing hormone LH, which triggers ovulation, which causes the follicle to rupture and release the egg.

When the egg leaves the ovary, it is guided into the fallopian tube by the finger-like fimbriae.

If the egg is not fertilized by the sperm within 24 hours, the unfertilized egg dies and the entire system resets ready to make a new egg and uterine lining the next month.

The egg is the largest cell in the body and is protected by a thick cell outer shell made of sugars and proteins called the zona pellucida.

The zona pellucida prevents the entry and fusion of multiple sperm, the smallest cells in the body.

It takes a man two to three months to make sperm, but the process is constantly renewed.

More than 100 million sperm are released with each ejaculation during intercourse.

However, only about 100 of them end up near the egg, and only one succeeds in passing through the armor of the zona pellucida.

After successful fertilization, the fertilized egg immediately begins developing into an embryo and takes about three days to reach the uterus.

There, it takes another three days or so for it to become firmly implanted in the lining of the uterus, the endometrium.

After implantation, cells that become the placenta secrete hormones that signal the ovulated follicle that it is pregnant in the uterus.

This helps save the follicle, now called the corpus luteum, from degeneration as it normally does during that phase of the menstrual cycle.

The corpus luteum is responsible for producing the progesterone needed to maintain pregnancy until the 6th to 7th week of pregnancy, when the placenta develops and takes over, and until the baby is born after about 40 weeks.

So how do we make babies in the lab?

Patients undergoing IVF are given FSH at levels higher than naturally occurring levels to cause a controlled overstimulation of the ovaries, ultimately leading to the production of multiple eggs.

Eggs are retrieved through an ultrasound-guided aspiration needle while the woman is under anesthesia, just before ovulation occurs.

Most sperm samples are produced by masturbation.

In the lab, the identified eggs are stripped of their surrounding cells and prepared for fertilization in petri dishes.

Fertilization can be done by one of two techniques.

In the first stage, the egg is incubated with thousands of sperm and fertilization occurs spontaneously over several hours.

The second technique uses a needle to place a single sperm inside the egg, maximizing the certainty of fertilization.

This is especially helpful if you have problems with sperm quality.

After fertilization, the embryos are further screened for genetic compatibility and can be frozen or sent via catheter into the woman's uterus for subsequent pregnancy attempts.

A common practice is to transfer the embryo 3 days after fertilization, when the embryo has 8 cells, or on day 5, when the embryo is called a blastocyst and has several hundred cells.

Donor eggs may be used if a woman's eggs have deteriorated due to age or exposure to toxic substances, or if they were removed because of cancer.

If the intended mother has a problem uterus or is missing a uterus, another woman, called a pregnancy carrier or surrogate mother, can use the uterus to carry the pregnancy.

For women under 35, the chance of success is as high as 40%, but doctors sometimes transfer more than one embryo at a time. This is why IVF produces twins and triplets more often than natural pregnancies.

However, most clinics try to minimize the chances of multiple pregnancies because they are risky for mothers and babies.

Millions of babies like Louise Brown were born through IVF and lead normal, healthy lives.

The long-term health effects of ovarian stimulation with IVF drugs are less clear, but so far IVF appears to be safe for women.

It is not inconceivable that in vitro fertilization and related technologies to create artificial babies could surpass natural reproduction in the coming years, thanks to improved genetic testing, delayed births, increased accessibility, and reduced costs.

A constant thud under your feet, a confined space, and a monotony that goes nowhere fast.

It feels like hours have passed, but it's only been 11 minutes yet, and I think, "Why am I torturing myself?"

This should be considered a cruel and unusual punishment."

In fact, that's exactly what it was, or was.

In the 1800s, treadmills were built to punish British prisoners.

The British prison system at that time was the worst.

Execution or deportation were often the punishments of choice, and those imprisoned were left alone for hours in filthy cells.

Religious groups, charitable organizations, and social movements led by celebrities like Charles Dickens sought to change this dire situation and help prisoners reform.

As their exercise was successful, the entire prison was renovated and new forms of rehabilitation such as treadmills were introduced.

Here's how the original version, invented by the English engineer Sir William Cubitt in 1818, worked.

The prisoner stepped on the 24 spokes of the large paddle wheel.

As the wheels spun, prisoners had to keep stepping up or risk falling, similar to a modern stepper machine.

On the other hand, the rotation causes the gears to pump water, grind grain, or power mills, hence the name "treadmill."

These devices were seen as an excellent way of whipping prisoners of war, and the added advantage of powering factories helped rebuild the British economy, which had been ravaged by the Napoleonic Wars.

It was a win for everyone involved except the prisoners.

It is estimated that the prisoners spent an average of six hours a day on the treadmill, equivalent to climbing 5,000 to 14,000 feet.

Elevation 14,000 feet is roughly the halfway point of Everest.

Imagine doing that five days a week and eating less.

Cubitt's ideas soon spread throughout the British Empire and America.

Within 10 years of its inception, more than 50 prisons in the UK had treadmills installed, and a similar number in the US.

Naturally, malnutrition and hard work caused many prisoners to break down and get injured, but the guards didn't seem to care.

In 1824, James Hardy, a New York prison warden, wrote that the device helped tame the more boisterous inmates, writing that "not its severity, but its monotonous stability constitutes its terror," a statement many still agree with today.

And while treadmills persisted in England into the late 19th century, they were banned under the Prisons Act 1898 as being excessively cruel.

But of course, the torture device is back with vengeance, this time targeting the unsuspecting public.

A treadmill patent was registered in the United States in 1911 and by 1952 the forerunner of today's modern treadmills had been created.

When the jogging boom arrived in the United States in the 1970s, the treadmill was revived as an easy and convenient way to improve aerobic fitness and shed unwanted pounds. In all fairness, the effect is pretty good.

And this machine has maintained its popularity ever since.

So the next time you voluntarily take what was once a cruel and unusual punishment, be happy to have control over when to jump.

If you've ever watched the news or watched politics, you've heard the word Orwellianism thrown around in some context.

But have you ever stopped and wondered what it really means, or why it's used so often?

The term is named after the English writer Eric Blair, known by the pseudonym George Orwell.

His best-known novel, 1984, depicts an oppressive society under a totalitarian regime, so the term "Orwellian" is often used simply in an authoritarian sense.

But using the term in this way not only fails to fully convey Orwell's message, but also risks actually doing exactly what he intended to warn against.

Orwell certainly opposed all forms of oppression and spent much of his life fighting anti-democratic forces on both the left and the right.

But he was also deeply concerned about how such an ideology would spread.

And one of his deepest insights was the importance that language plays in shaping our thoughts and opinions.

The Oceanian government of '1984' controls the behavior and speech of its citizens in several distinct ways.

Their every move is monitored, and the threat of what might happen to those who fall out of line looms above them.

Other forms of control are less obvious.

The public is bombarded with a constant barrage of propaganda made up of historical facts and statistics fabricated by the Ministry of Truth.

The Ministry of Peace is the military.

Forced labor camps are called "Joy Camps".

Political prisoners are detained and tortured by the Ministry of Ai.

This deliberate sarcasm is an example of doublespeak where words are used to undermine meaning rather than to convey it, undermining the very idea to which the word refers.

The administration's linguistic control went even further, eliminating words from the English language to create the official dialect of Newspeak. Newspeak is a collection of loosely defined acronyms and simple concrete nouns that do not contain words complex enough to encourage nuances or critical thinking.

This affects what Orwell calls “doublethink”. This is a hypnotic state of cognitive dissonance in which individuals are forced to ignore their own perceptions in place of officially dictated events, leaving individuals completely dependent on the state's definition of reality itself.

The result is a world in which even the privacy of one's own thought processes is violated, writing in sleep is guilty of thought crime, and journaling and dating amount to destructive treason.

This may sound like something that could only happen in a totalitarian regime, but Orwell warned us that something like this could happen in a democratic society as well.

And this is why "authoritarian" alone is not "Orwellian".

In his essay "Politics and the English Language," he describes the use of bombastic language to display authority, and how to make cruelty appear acceptable by embedding euphemisms and intricate sentence structures.

But even more everyday language abuse can affect the way we think about things.

The words you see and hear in everyday advertising, like the soundbites and talking points of political campaigns that rarely offer the most nuanced perspective on an issue, are designed to speak to you and influence your actions.

And using ready-made phrases and responses gleaned from media reports or copied from the internet makes it easier to not think too much and question your assumptions.

So next time you hear someone use the word Orwellian, pay close attention.

If they are talking about deceptive and manipulative use of the word, they are on the right track.

If they are talking about massive surveillance and intrusive government, they are describing something authoritarian, but not necessarily Orwellian.

And if they're using it as a panacea for ideas they dislike, then what they're saying may be more Orwellian than what they're criticizing.

Words have the power to shape thoughts.

Language is the currency of politics and forms the basis of society, from the most common daily interactions to the highest ideals.

Orwell urged us to defend our language. For it is ultimately our ability to think and communicate clearly that stands between us and a world where war is peace and freedom is slavery.

Well, I'm working on a lot of things besides physics.

In fact, I'm mainly working on other things now.

One is the distant relationship between human languages.

And professional historical linguists in the United States also

And in Western Europe, most try to distance themselves from long-distance relationships, big groups, and groups that predate their familiar families.

they don't like it. They think it's a crank. I don't think it's the crank.

And there are good linguists working on that in the Santa Fe Institute and in Moscow, mostly Russian, and I'd be interested to see where that leads.

Does it really lead to a single ancestor some 20, 25,000 years ago?

And what happens when there's competition between perhaps many languages, tracing back to that single ancestry?

How far back does it go? How far back do modern languages ​​go?

Can we go back tens of thousands of years?

Chris Anderson: Do you have any hunch or hope about the answer to that?

Murray Gell-Mann: Well, I think the modern language must be Aurignacian or earlier, about 35,000 years ago, predating Western European cave paintings and carvings, cave carvings and soft clay dance steps.

I can't believe they did all that and didn't have a modern language.

So I think the actual origin goes back at least that far, and probably even further.

But that doesn't mean that all, or many, or most of the languages ​​attested today can't come from languages ​​perhaps much older, say, 20,000. That's what we call a bottleneck.

CA: Well, Philip Anderson may have been right.

You may know more about everything than anyone else.

I am very honored. Thank you Murray Gelman.

(applause)

This is a thought experiment.

At some point in the not-too-distant future, you're speeding down a highway in a self-driving car and find yourself surrounded by other cars on all sides.

Suddenly, a large, heavy object fell from the truck in front of me.

The car cannot stop in time to avoid a collision, so it has to make a decision to go straight ahead and hit an object, veer left into an SUV, or veer right into a motorcycle.

Should I crash into a motorcycle and put my safety first, stay on course and minimize the danger to others even if it costs my life by crashing into a large object, or should I hit the middle ground by crashing into an SUV with a high occupant safety rating?

So what should self-driving cars do?

If we were driving that boxed car in manual mode, whatever reaction we made would be understood to be just a reaction and not a deliberate decision.

It would be an act of instinctive panic, without any foresight or malice.

But if the programmer instructed the car to make the same move given the circumstances it might perceive in the future, it would look more like premeditated murder.

Now, to be fair, self-driving cars are projected to dramatically reduce traffic accidents and fatalities by removing human error from the driving equation.

In addition, there can be all sorts of other benefits, such as reducing road congestion, reducing harmful emissions, and minimizing unproductive and stressful driving hours.

But accidents can still happen, and if they do, the outcome could be decided months or years in advance by programmers and policy makers.

And they will have to make some tough decisions.

It's tempting to present general decision-making principles, such as minimizing harm, but even that quickly leads to morally ambiguous decisions.

For example, the initial settings are the same, but there is a biker with a helmet on the left and a biker without a helmet on the right.

What will your robot car crash into?

If you say that cyclists wear helmets because they are more likely to survive, isn't that punishing responsible drivers?

If instead it saves bikers who don't wear helmets because they're acting irresponsibly, then they've gone way beyond their original design principles of minimizing harm and robot cars are now doing justice to the streets.

Here the ethical considerations become even more complicated.

In both scenarios, the underlying design acts as a targeting algorithm of sorts.

In other words, it systematically favors or discriminates against certain types of objects that it collides with.

And the owners of the vehicles in question will suffer the ill effects of this algorithm through no fault of their own.

Our new technology opens up many other new ethical dilemmas.

For example, if you had to choose between a car that would always save as many lives as possible in an accident, or a car that would save you at all costs, which would you buy?

What if cars began to analyze and take into account the details of their passengers and their lives?

Is it possible that a random decision is still better than a predetermined decision to minimize harm?

And who should make all these decisions?

programmer?

enterprise?

government?

Reality may not be exactly like our thought experiment, but that's not the point.

They are designed to isolate and stress-test our intuitions about ethics, much like scientific experiments on the physical world.

Finding these moral hairpin curves now will help you navigate the unfamiliar path of tech ethics, and move you confidently, honestly, and bravely into a brave new future.

This talk contains adult language. It is advisable to exercise caution in judging your viewers. Let's stop talking about this.

I'm here because I wrote a book about civility, and that book came out right around the time of the 2016 US presidential election, so I started getting a lot of invitations to talk about civility and why American politics needs more civility.

Very great.

The only problem is that I wrote a book about politeness. Because etiquette is...

Bullshit.

(Laughter) Now, this may sound very rude, but fortunately for you and the publisher, I eventually changed my mind.

In writing that book and researching the long history of politeness and religious tolerance in the 17th century, I discovered that there is a virtue of politeness. It’s not bullshit, it’s actually absolutely essential, especially in a tolerant society, one that promises not only to protect diversity, but also the heated and sometimes hateful disagreements that diversity causes.

As for disagreement, there's a reason why "unpleasant" is synonymous with "unpleasant".

As the English philosopher Thomas Hobbes pointed out in 1642, it is because the mere act of disagreement is offensive.

And Hobbes is still right. It works like this: I mean, if you and I disagree and I'm right, how am I supposed to make sense of the fact that you're very, very wrong, because I always am?

Could it be that you have come to a different conclusion in good faith?

No, you must be up to something, you must be stupid and bigoted and intrigued.

Maybe you are crazy.

And the same applies in the other direction. right?

So the mere fact that you disagree with me is implicitly an insult not only to my views, but also to my intelligence.

And if we think that the disagreement at stake is for some reason fundamental, regardless of our worldview or identity, things get even worse.

You know what kind of disagreement I mean.

At the dinner table, we don't discuss religion or politics or, increasingly, the politics of popular culture. Because these are disagreements, things that people don't really seriously agree on, and define themselves against their controversial counterparts.

But of course, these fundamental disagreements are precisely what a tolerant society like the United States proposes to tolerate, and may perhaps explain why, at least historically, it has not been the happily applauded community of differences that tolerant societies sometimes hear.

No, they tend to be places where people have to pick their noses and rub noses together, despite their disdain for each other.

That's what I've learned from studying religious tolerance in early modern England and America.

And I've also learned that the virtue that enables that harmless coexistence is politeness. Because civility allows us to tolerate disagreements and share life together even if we don't share religious, political or other beliefs.

Still, I couldn't help but notice that when most people talk about politeness today, no, they often talk about politeness, they seem to have something else in mind.

So if politeness is a virtue that allows us to tolerate disagreements and actually interact with adversaries, speaking politeness appears to be primarily a strategy for disengaging.

It's like threatening to take the ball and go home when the game doesn't go your way.

Because the funny thing about rudeness is that it is always the enemy's fault.

It's funny.

When it comes to our own bad behavior, we seem to develop a sudden onset of amnesia. Alternatively, you can justify it as an appropriate response to recent outrage from your adversary.

"So how can I be polite to someone who is trying to destroy everything I stand for?

By the way, they started it. ”

All of them are very convenient.

Also useful is the fact that the majority of people who speak politely today tend to be very vague and vague as to what they think politeness really means.

We are told that politeness is simply synonymous with respect, good manners and politeness, but at the same time it is clear that accusing someone of being rude is much worse than calling them rude. Because being rude, unlike just being rude, can be unacceptable.

So calling someone rude or accusing them of being rude is a way of telling them that they are somehow beyond common sense and not worth getting involved with at all.

So politeness is valuable because it's not trivial, it's a virtue that makes basic disagreement not only possible, but sometimes productive.

It's precious, but it's also very, very difficult.

Talking about politeness, on the other hand, is, well, very easy, really easy. And it's also complete bullshit most of the time. As such, continuing to talk about politeness can be a bit awkward.

(Laughter) Anyway, we tend to forget that, but politicians and intellectuals have been warning us for decades that the United States is facing a civility crisis, and we tend to blame that crisis on technological developments like cable TV, talk radio, and social media.

But any historian will tell you that American politics has never had a golden age of disagreement, let alone good sentiment.

But in my book I argue that the first modern civility crisis actually started some 500 years ago. It was then that a professor of theology named Martin Luther took advantage of recent advances in communication technology, the printing press, to call the Pope the Antichrist, thus inadvertently initiating the Protestant Reformation.

So think of the press as 16th-century Twitter, Martin Luther as the original troll.

I am not exaggerating here.

He once declared that he was "anti-Christian," that is, that he could not pray to Catholics' enemies without cursing them.

And, of course, even then, the opponents of Catholicism clutched pearls and demanded politeness, all the while filling themselves with traditional slurs such as "heretic" and, at worst, "Protestant," which began as an insult in the 16th century.

To speak politely, then and now, was to reproach the other person for his low attitude, and to use that moral high ground to make it low or low. For demanding politeness both sets the speaker as a model of etiquette and implicitly marks the person who suddenly disagrees as rude.

So polite conversation in the 17th century became a highly effective method for members of religious organizations to silence, suppress, and eliminate outside opponents, especially if they raised their voices against the status quo.

Thus, Anglican ministers could preach to atheists about the aggressiveness of their discourse.

Anyone could complain about the "uncouth" practices of Quakers, such as refusing to remove or put on hats, or shaking hands.

However, accusations of such illegality soon became a pretext for persecution.

This sounds familiar, right?

We see that strategy again and again.

It has been used in the 20th century to silence civil rights protesters.

And I think it explains why partisans on both sides of the aisle, frankly, continue to reach for this outdated early-modern courtesy when they want to convey that certain people or certain views are insane, but save the trouble of actually discussing it.

No wonder, then, that skeptics like myself roll their eyes when calls for the virtues of conversation arise. Because, far from healing social and political divisions, having an overly polite conversation actually seems to exacerbate the problem.

This saves us the trouble of actually speaking to each other, and allows us to demonstrate our great virtues while passing and speaking to each other, and to let the audience know which side we are on.

In light of this, you might be forgiven for thinking, as I do, that since politeness is silly, the virtue of politeness must also be silly.

But again, I think a little historical perspective goes a long way.

Remember, the same early-modern crisis of civility that sparked the Reformation is what gave birth to tolerant societies—places like Rhode Island and Pennsylvania—and indeed, ultimately, the United States—that hoped to preserve not only diversity but also disagreement, at least, because it was the virtues of civility that made it possible.

What made disagreement tolerable, what allowed us to share our lives even if we didn't share faith, was a virtue, but I think it was perhaps less ambitious and far more confrontational than what people who often talk about politeness today tend to have in mind.

Therefore, I would like to call the virtue "mere politeness."

You, too, may know it as a virtue for getting over a relationship with an ex-spouse or a bad neighbor, let alone a member of the other party.

Because to be simply polite is to grudgingly meet a low hurdle, which also makes sense. Politeness is a virtue that serves to soften disagreements, and unpleasantness, as Hobbes told us centuries ago, means being unpleasant for a reason.

But if it's not bullshit, what is politeness, or just politeness?

What do you need?

First, respect and politeness are not the same and are not the same. Because it is precisely when you are dealing with people that it is most difficult, or perhaps impossible, to show respect.

Likewise, being polite and being kind are not the same thing. Because being kind means not telling people what you really think about them or what they think is wrong or wrong.

No, being polite means speaking your thoughts face to face, not behind their backs.

Just being polite means not throwing punches, but it also means probably not landing all the punches at once. For the point of mere politeness is to tolerate disagreements and fundamental disagreements, but to do so without denying or destroying the possibility of a common life tomorrow with those who seem to stand in our way today.

In that sense, I think politeness is actually closely related to another virtue, the virtue of courage.

So mere politeness is having the courage to make yourself uncomfortable, and to maintain that state, but to stay in the room and do so while the hostile is present.

And that also means that sometimes bullshit about people's polite talk is really the only polite thing to do.

At least I think so.

But look, if I've learned anything from studying the long history of seventeenth-century religious tolerance, it's this. If you're talking about politeness as a way to avoid arguments, if you're talking about politeness as a way to isolate yourself among like-minded, more like-minded peers who already agree with you, if you find that you've never actually spoken to someone who really fundamentally disagrees with you, then yes, you're doing something politely wrong.

thank you.

(applause)

When UV rays hit our skin, it affects each of us slightly differently.

Depending on the skin tone, some people get a beetroot pink in just a few minutes, while others take hours to feel the slightest change.

So what causes the difference, and how did our skin come to have so many different shades in the first place?

Whatever the color, our skin tells an epic tale of human bravery and adaptability, revealing that difference is a function of biology.

It all revolves around melanin, the pigment that gives skin and hair its color.

This ingredient is obtained from skin cells called melanocytes and comes in two basic forms.

There is eumelanin, which produces the various brown skin tones, black, brown, and blond, and pheomelanin, which is responsible for the reddish-brown color of freckles and red hair.

But humans weren't always like this.

Our different skin tones were shaped by the evolutionary process of the sun.

It started about 50,000 years ago when our ancestors migrated north from Africa and into Europe and Asia.

These ancient humans lived between the equator and the Tropic of Cancer, a region where the sun's ultraviolet rays could reach them.

When the skin is exposed to UV light for a long time, the UV light damages the DNA inside the cells and the skin begins to burn.

If that damage is severe enough, cell mutations can lead to melanoma, a deadly cancer that forms in melanocytes in the skin.

The sunscreens we know today didn't exist 50,000 years ago.

So how did our ancestors cope with this UV onslaught?

The key to survival lay in their own sunscreen, melanin, which is manufactured under the skin.

The type and amount of melanin in your skin determines whether you have some degree of protection from the sun.

This is due to the skin's reaction when exposed to sunlight.

Exposure to UV light triggers a special photoreceptor called rhodopsin, which stimulates the production of melanin to protect cells from damage.

In fair-skinned people, excess melanin darkens the skin and causes tanning.

Over generations, humans living in the sun-saturated latitudes of Africa have adapted to a higher melanogenesis threshold, more eumelanin, and darker skin tones.

This built-in shade helped protect against melanoma, possibly allowing them to become evolutionarily healthier and pass this useful trait on to newer generations.

But soon, some of our sun-adapted ancestors migrated north from the tropics and spread widely across the globe.

The further north you go, the less direct sunlight you get.

This was a problem because UV rays can damage the skin, but they also have important benefits.

UV light helps our bodies to produce vitamin D, a component that strengthens bones and enables the absorption of important minerals such as calcium, iron, magnesium, phosphate and zinc.

Without this, humans can experience severe fatigue and weakened bones, causing a condition known as rickets.

Vitamin D deficiency would have been a serious threat in the North, for humans whose dark skin effectively blocked out any sun's rays.

However, some of them happened to produce less melanin.

They were exposed to low enough light that melanoma was unlikely, and because of their light skin color, UV light was better absorbed.

So they benefited from vitamin D, developed strong bones, and survived long enough to have healthy offspring.

As choices were made over generations, the skin tone in those areas gradually lightened.

As a result of the adaptability of our ancestors, today the earth is filled with people of various skin colors. Typically, eumelanin-rich skin becomes darker in hot, sunny zones near the equator, and pheomelanin-rich skin becomes lighter and lighter outward as the sun fades.

Therefore, skin color is just an adaptive trait for living on rocks that revolve around the sun.

It may absorb light, but it does not reflect its properties.

Long before the first selfie, the ancient Greeks and Romans had myths about people getting a little too attached to their image.

According to one story, Narcissus was a handsome man who wandered the world in search of his beloved.

After rejecting a nymph named Echo, he caught a glimpse of himself in the river and fell in love with it.

Unable to tear himself apart, Narcissus drowned.

There is a flower where he died and we call it a daffodil.

This myth captures the basic idea of ​​narcissism, a lofty and sometimes pernicious self-involvement.

But personality types aren't the only things that pop up in advice columns.

This is actually a set of traits classified and studied by psychologists.

The psychological definition of narcissism is an exaggerated self-image.

To varying degrees, narcissists consider themselves to be better looking, smarter, more important, and more deserving of special treatment than others.

Psychologists recognize two forms of narcissism as a personality trait. These are grandiose narcissism and vulnerable narcissism.

There is also a more extreme form of Narcissistic Personality Disorder, which we will discuss later.

Grandiose narcissism is the most well-known type and is characterized by being extroverted, controlling, and attention-seeking.

Hypernarcissists seek attention and power, sometimes as politicians, celebrities, and cultural leaders.

Of course, not everyone who pursues these positions of power is a narcissist.

Many people do it for very positive reasons, such as reaching their full potential or helping to make people's lives better.

However, narcissists seek power for status and the attention that comes with it.

Vulnerable narcissists, on the other hand, can be quiet and reserved.

They have a strong sense of entitlement, but are easily threatened or slighted.

In either case, the dark side of narcissism manifests itself over time.

Because narcissists tend to act selfishly, narcissistic leaders may make risky or unethical decisions, and narcissistic partners may be dishonest or dishonest.

When their rosy view of themselves is challenged, they can become resentful and aggressive.

It's like a disease where the patient feels great, but the people around them suffer.

At its extreme, this behavior falls under the category of a mental illness called Narcissistic Personality Disorder.

It affects 1-2 percent of the population and is more commonly male.

This is also a diagnosis for adults.

Young people, especially children, can become very selfish, which can be a normal part of development.

The American Psychiatric Association's Diagnostic and Statistical Manual, 5th Edition, describes several traits associated with Narcissistic Personality Disorder.

They include a grandiose view of oneself, empathy issues, a sense of entitlement, and a need for admiration and attention.

The reason these traits are true personality disorders is that they take over people's lives and cause significant problems.

Imagine that instead of caring for your spouse or children, you used them as a source of attention and admiration.

Or, instead of asking for constructive feedback about your performance, imagine telling everyone who tried to help you that they were wrong.

So what causes narcissism?

Studies of twins show a strong genetic component, although it is unclear which genes are involved.

But the environment is also important.

Parents who put their children on a pedestal can foster exaggerated narcissism.

And ruthless and controlling parents can foster vulnerable narcissism.

Narcissism also seems to be higher in cultures that value individuality and self-promotion.

For example, in the United States, narcissism as a personality trait has increased since the 1970s. At this time, the collective focus of the sixties was replaced by the self-esteem movement and the rise of materialism.

While social media doubles the potential for self-promotion these days, it's worth noting that there is no clear evidence that social media causes narcissism.

Rather, it provides the narcissist with a means of seeking social status and attention.

So can narcissists improve those negative traits?

yes!

Anything that encourages honest reflection on one's own behavior and consideration for others can be helpful, including psychotherapy and caring for others practices.

The difficulty is that it can be difficult for people with Narcissistic Personality Disorder to keep working on self-improvement.

It is difficult for a narcissist to introspect from an unflattering angle.

I'm here today to talk about micromanagement and what I've learned about it as a micromanager over the last few years of my life.

First of all, what is micromanagement?

How do we actually define it?

Well, I'm assuming that we're actually bringing great, wonderful, imaginative people, like you, into the organization and breaking their souls (laughs). By telling them the font size to use.

Has anyone in human history ever said such a thing?

"John, we never meant to do a deal with Times New Roman, but because you insisted on Helvetica-Bahm!

Dotted line -- Millions of dollars have started to flow.

That was the missing piece! ”

No one ever said that, right?

In fact, there are physical symptoms that we probably manifest ourselves in being micromanaged.

Think about the most exhausting moment in your life.

It probably wasn't when you stayed up late at work or when you got home from a road trip, but when someone was watching your every move over your shoulder.

It's kind of like your mother-in-law when she died, right?

(Laughter) You're like, "I got it," right?

And there is actually data to back this up.

There was a recent study done in England.

They took 100 hospital workers, put them on activity trackers, and left them alone for the next 12 hours. This is a normal 12 hour shift.

At the end of the shift they asked, "Are you tired?"

And what they found was really interesting.

Those feeling the most fatigue were not necessarily those who traveled the most, but those who had less control over their work.

So why micromanage when we know that micromanaging is not really effective?

Are you saying the definition is wrong?

I assumed that micromanagement was just bringing in great, brilliant, imaginative talent and then shattering their souls. So, do we really, deep down, want to hire people who are dull and unimaginative?

It's one of those questions you probably don't even need to ask.

Like, "Would you like your luggage stolen at the airport?"

Probably not, but you've never been asked, right?

So, who asked you, the manager, "Would you like to hire someone dull and unimaginative?"

So, I don't know, this is TED. Better to back it up with data.

We actually asked hundreds of people across the country, hundreds of managers across the country, would you want to hire dull, unimaginative people?

Well, that's an interesting question.

Well, this is also an interesting result.

So 94% said no -- (laughter) we don't want to hire dull, unimaginative people.

Six percent probably didn't understand the question -- (Laughter) but fortunately maybe they just want to hire dull, unimaginative people.

But 94% said otherwise, so why are we still doing this?

Well, I think it's a very, very simple thing that we all know deep down and really feel.

So when we are hired by an organization, it could be a club, it could be a law firm. It may be a school organization. It doesn't matter what. No one jumps to the top of a totem pole, right?

Start at the bottom.

what are you doing

I'm working

You're the one doing the actual work, right?

And if you're really good at the job, what kind of reward will you get?

Do you get more work?

Yes, you guys are great micro-managers.

(Laughter) As soon as you do more work, you still do a little bit more work if you're really good at it, but you really start managing the people doing the work.

And if you're really good at it, what happens after that?

Once you start managing the people who manage the people who do the work, at that point you start losing control over the deliverables of your work.

I actually witnessed this firsthand.

So I started a company called Boxed in my garage. this was this. I know it doesn't seem like a big deal, but there is a pressure washer in the back. This is what it means to live the dream.

And when we started doing this, my wife was really proud of me, or she said so, she was really proud of me -- so she gave me a hug, and I'm sure she picked up the phone and was thinking, 'Oh, John from Harvard, is he still single?

It was like a failed lemonade stand at first, but we really stood up and said mobile commerce was big and consumer packaged goods were going to change over time. So take home a big, bulky pack that's a hassle to carry home. That is, 24 packs instead of 2 packs of Oreo cookies, 48 ​​packs instead of 24 packs of toilet paper. And we'll ship it to you just like the Warehouse Club does. don't ship to you

That's what we basically did.

We had a very slow printer, and what we actually did was say, 'OK, this printer is taking forever.

Doodle something your customers will love on the back of this bill. ”

That's why we say, "Hey, keep smiling," right?

"Hey you are the best" or "Hey enjoy your Doritos" or "We love Gatorade too".

Something like that.

And since I was picking and packing all the boxes, the monotony of the job began to disappear as well. When I'm sitting in my garage, I basically do that for 8, 9, 10, 12 hours a day.

And then something interesting happened.

So we really started growing.

So, you know, during this time, actually just 36 months after that, we ended up selling hundreds of millions of dollars worth of merchandise, and we grew really fast.

But in the meantime my role started to change too.

Yes, I was the Garage CEO. I was doing the picking and packing and doing all the work, and then I started really managing the people doing the picking and packing, and soon I started managing the people doing the picking and packing.

And even now, I manage the C staff who manage the department that manages the people who do the picking and packing.

And at that point, I lost control.

So I was like, 'Okay, we're pleasing all these customers with these notes.

They loved them but I can't write this note anymore so you know what I do?

I'm going to teach these people how to write these notes.

What pen to use, what color to use, what to write, what font to use, this has to be this big, this has to be this big so it doesn't smudge the margins.

And soon, this goal of breaking the monotony and boosting morale in fulfillment centers actually became micromanagement, and people started complaining to HR.

"Hey, this CEO guy has to get out of my hair, huh?

I know how to write notes. ”

(Laughter) At that point, we said, 'Okay, do you understand?'

We have hired these great and wonderful people. Give them a mission to "delight customers". Give us the tools to make it happen. That is this memo. I wish you the best. ”

What we found there was actually pretty amazing.

Some actually took notes and started drawing really ornate miniatures on top of them.

When you order diapers, you'll receive a super fun note that reads: "Say hello to the baby for us!"

And in the next size, if you buy an even larger size, it will say "fast growing".

And people really, really embraced it.

But then there were times when it veered off track.

So there are always people who just write "Thx, thx" and I was like, "Okay, dude, my boss used to write that to me," so stop writing "Thx" anymore.

But there was also something interesting on the other side.

People got a little too creative.

So, like I said before, we sell big packs of diapers, big packs of toilet paper, big packs of Doritos and Oreo cookies, all in bulk.

They also sell big packs of birth control pills, so I've grown a little hair.

(Laughter) So you sell a pack of 40 condoms, right?

We are all adults in this room - a pack of 40 condoms.

So someone ordered four 40-pack condoms -- (laughter) that's all they ordered, 160 condoms, and the packer was like, "I know how to please a customer."

(laughs) "This person is..."

They wrote: [Everyone loves an optimist] (Laughter) (Applause) We didn't know whether to fire him or promote him, but he's still there.

So, "everyone loves an optimist."

But this is where the story got a little off track, and I found this whole thing a bit contradictory.

And -- oh, there's a really bad typo -- so even if there's only a red T-E-D on stage where you expected me to be here, it's not a typo, is it?

(Laughter) (Applause) I promised I had a really bad sense of humor, and now I'm happy with it.

So I told you But were you really struggling?

At this point we started doing things that weren't really part of our core mission and people started failing at it.

So I thought I should let them fail.

Should we let them continue to do this?

I don't know -- I didn't know it then, but I thought, Is failure really a bad thing?

I'm not saying you should celebrate failure.

In Silicon Valley, it's often said, "Celebrate your failures."

No, I don't know if I will go that far. Because at a board meeting or something, a board member would never say, "Hey Chie, you messed up last quarter. Keep going, okay?"

No one ever said that.

If you are part of such an organization, please call me. I want to participate in that meeting.

In private, I don't think many people enjoy failure, but I think failure is actually quite necessary for smart, imaginative people who really want to take the long-term view and truly fulfill the mission they have in front of them.

So failure can actually be seen as a milestone along that mission towards success.

And if the downside of not micromanaging can be the realization that you might make more mistakes, and it's actually not that bad, what's the upside?

Well, we're seeing the positive side, and that's pretty cool.

We tasked our engineers with saying, "Some of our fulfillment centers cost millions of dollars to build and have miles of conveyors, so can you do the same? Can you do it efficiently without spending millions of dollars?"

So they got to work. they actually did this. This is not photoshopped, the man is really sharp.

They have developed autonomous vehicles.

We didn't tell them what to build or what form it should take.

In 90 days, they built the first prototypes of a powered-down Tesla battery, a stereoscopic camera, a lidar system, and more.

Essentially, it replicates the efficiency of a conveyor belt without the actual capital investment of the conveyor belt.

So it's really not just for engineers.

Our marketing department -- we said to them, "Spread the word. Do the right thing."

There is an amazing lady on the marketing team named Nitasha.

In the morning she stopped me and said, "Chie, what are you going to do about the pink tax?"

I went to get my coffee, sat down and said, "Okay, Nitasha, what's this pink tax?"

So she told me it was really interesting.

As some of you may know, 32 states across the United States impose a luxury goods tax on feminine products such as sanitary napkins, and tampons and pads are taxed in the same manner as luxury goods.

So I definitely don't have the courage to call my wife. Or if my wife called me and said, "Hey, bring me some napkins on the way home," I would say, "Hey, there's a trade war going on and the economy isn't that great, so no luxuries this month, but I promise next month (laughs) I'll see."

I'll be single soon, won't I?

But what's very interesting is that we didn't tell them what to do, but now they're working with finance to refund the taxes we unfairly had to collect to customers across the country.

So at this point you might be thinking: “What are the real, real benefits of not micromanaging?”

And here it is: I didn't do any of these projects.

AGV was not made by me.

I didn't do a "rethink the pink tax" campaign.

I'm not doing anything, but I'm standing on the TED stage, taking full credit for it.

(Laughter) "This guy does nothing and takes all the credit for himself.

He's a real CEO, this guy. he really did it ”

(Laughter) But that's the reality.

I don't understand CEOs 100% of the time, but I actually learned the most fundamentally difficult lesson I've ever had to learn. It is this.

There is only one solution to micromanagement...

And it is to trust.

thank you.

(applause)

In the third act of "Swan Lake," the black swan performs an endless series of turns, bobbing up and down on one pointed leg and spinning in circles 32 times.

It's one of the most difficult sequences in ballet, and for about 30 seconds she's like a human top in perpetual motion.

These brilliant turns are called fet. It's French for "whip" and refers to the dancer's incredible ability to whip without stopping.

But while we marvel at Fett, can we figure out its physics?

Dancers initiate the fet by stepping with their feet to create torque.

But the hard part is maintaining the rotation.

As she turns, her momentum is reduced due to some friction between her pointe shoes and the floor and between her body and the air.

So how does she keep turning?

Between each turn, the dancers pause for a moment and turn to face the audience.

Her supporting foot flattens and twists as she returns to the pointe, pushing against the floor and generating a small amount of new torque.

At the same time, spread your arms wide apart to maintain balance.

Turns are most effective when the center of gravity is kept constant, and a skilled dancer can keep the axis of rotation vertical.

Both the extended arm and the torque-producing foot help drive the Fett.

But the real secret, and why you barely notice the stop, is that her other leg never stops moving.

During the pause, the dancer's raised leg is straightened and moved from front to side, then folded into the knee.

By continuing to move, that leg stores some of the momentum of the turn.

As the leg returns toward the body, that stored momentum is returned to the dancer's body, propelling her as she returns to the pointe.

As the ballerina extends and retracts her legs with each turn, momentum is transferred back and forth between her legs and body to keep her in motion.

A really good ballerina can do one or more rotations per leg extension in one of two ways.

First, you can stretch your legs faster.

The longer the leg is extended, the more momentum it stores and the more momentum it can give back to your body when you pull it back.

More angular momentum means more rotations can be made before it has to replenish what was lost through friction.

Another option is for the dancers to bring their arms or legs closer to their bodies after returning to pointe.

Why does this work?

Like other turns in ballet, the fet is governed by angular momentum. Angular momentum is equal to the product of the dancer's angular velocity and rotational inertia.

And that angular momentum must remain constant while the dancer is on pointe, except for what is lost through friction.

This is called conservation of angular momentum.

Now, rotational inertia can be thought of as a body's resistance to rotational motion.

It increases when more mass is distributed farther from the axis of rotation and decreases when more mass is distributed closer to the axis of rotation.

Therefore, the closer the arm is to the body, the smaller the rotational inertia.

In order to conserve angular momentum, we need to increase her angular velocity, or speed of rotation, so that we can carry her in multiple rotations with the same amount of conserved momentum.

You've probably seen ice skaters doing the same thing, pulling their arms and legs together to spin faster and faster.

In Tchaikovsky's ballets, the black swan is the magician, and her 32 enchanting fetishes seem almost supernatural.

But it's not magic that makes it possible.

It's physics.

He was a powerful king whose break with the Roman Church would forever change the course of British history.

But was he a charismatic reformer or a bullying tyrant?

Find out about history vs. Henry VIII.

Judge: Order, order. Now, who are we here? You seem like a pretty brave person.

Defense Counsel: Certainly, Your Excellency. This is Henry VIII, the acclaimed king who reformed England's religion and government, paving the way for a modern nation.

Prosecutor: I don't think so. He was a cruel, impulsive, extravagant king who cared as little for his people as he did for his six wives.

Judge: Six wives?

Attorney: Your Excellency, Henry's first marriage took place when he was still a child.

He only married Catherine of Aragon to strengthen the alliance between England and Spain.

Prosecutor: He was going to give up the alliance without considering the nation.

Defense Attorney: Henry had every concern for the state.

It was essential to stabilize the Tudor dynasty by producing a male heir, but Catherine failed to do so after more than twenty years of marriage.

Prosecutor: It takes two heirs, sir.

Defense: Right. In any case, England needed a new queen to ensure stability, but the Pope refused to annul the marriage and allow the king to remarry.

Judge: That's quite a hassle. You cannot argue with the Pope.

Prosecutor: But that's what the King decided.

He eradicated the country's religious foundations, separated the Church of England from Rome, and sparked centuries of strife.

Defense Attorney: All Henry did was give the Church honest leadership in the country.

He freed his subjects from the corrupt Roman Catholic regime.

And by rejecting the more radical changes of the Protestant Reformation, he allowed the nation to preserve most of its religious traditions.

Prosecutor: Objection! The church was a beloved and popular institution that brought comfort and charity to the masses.

Thanks to Henry, church property was seized. Hospitals were closed, precious monastery libraries were lost forever, all to enrich the royal family.

Attorney: Part of the funds were used to build a new cathedral and open a secular school.

And England needed to keep her affairs under her own control, not Rome's.

Prosecutor: So it's under Henry's control.

Defense Attorney: It's not. All the king's major reforms passed parliament.

At the time, no other country gave its people such a say in government.

Prosecutor: He used Congress as a rubber stamp for his personal will.

Meanwhile, he ruled like a tyrant, executing those suspected of rebellion.

Among his victims were the great statesman and philosopher Thomas More, once his close friend and adviser, and Henry's new Queen, Anne Boleyn, who had torn the country apart for marriage.

Judge: Did he execute his own wife?

Defense Counsel: It wasn't… King Henry's initiative.

She was accused of treason in a power struggle with the King's Minister, Thomas Cromwell.

Prosecutor: The trial was a sham and without Henry's approval she would never have been convicted.

Moreover, he was less upset by the outcome. He married Jane Seymour just 11 days later.

Defense Counsel: I point out that this marriage succeeded in producing a male heir and insuring a stable heir…although the new Queen died tragically in childbirth.

Prosecutor: This tragedy did not deter Henry from marrying Anne of Cleves for a mischievous fourth time, which he later annulled on a whim and used as a pretext for Cromwell's execution.

As if that wasn't enough, he married Anne Boleyn's cousin, Catherine Howard, and then executed her as well.

Attorney: She confessed to having an affair!

Either way, Henry's last marriage to Katherine Parr was actually a huge success.

Prosecutor: Sixth! It only shows that he was a disrespectful king who let factions and intrigues rule his court, and was concerned only with his own pleasures and grandeur.

Defense Counsel: That magnificence was part of the king's role as a role model for his people.

He was a learned scholar and musician, a generous patron of the arts, and a proud warrior and sportsman.

And the lavish tournaments he hosted enhanced England's reputation on the world stage.

Prosecutor: Nevertheless, both his foreign and domestic policies have been disastrous.

His French campaigns and brutal invasions of Scotland depleted the treasury, and his attempts to pay it off by devaluing money resulted in constant inflation.

Lords and landowners countered by eliminating access to communal pastures and turning peasants into beggars.

Defense: Beggars who would eventually become Yeoman farmers.

Enclosures made agriculture more efficient and created a surplus labor force that laid the foundation for the Industrial Revolution.

Without them, and without Henry, England would never have been a great power.

Judge: Well, anyway, I think we can all agree that he looks great in that portrait.

A devout believer who broke up with the church.

A scholar who executed a scholar.

A king who brought stability to the throne but used it to further his own glory, Henry VIII embodied all the contradictions of a monarchy on the brink of modernity.

But separating rulers from mythology is all part of putting history on trial.

Light, bright and full of energy.

This is one of the best known pieces of early 18th century music.

It's been featured in countless movies and TV commercials, but what is it and why does it sound like it?

This is the beginning of "Spring" from "The Four Seasons" by Italian composer Antonio Vivaldi.

One of the reasons why "Four Seasons" is famous is because it is pleasing to the ear.

But even more remarkable is the fact that they have a story to tell.

When it was published in Amsterdam in 1725, it was accompanied by a poem describing exactly what characteristics Vivaldi intended to capture in musical terms for the seasons.

In giving instrumental music concrete plot content, Vivaldi was generations ahead of his time.

If you read the poem while listening to music, you will find that the scene of the poem is well synchronized with the imagery of the music.

Birds are said to welcome spring with joyful calls, and that is exactly the case here.

But soon a thunderstorm hits.

Not only are there musical thunder and lightning, but there are more wet, frightened and unhappy birds.

In "Summer", a turtledove sings its name in Italian as "tortorella" before a hailstorm flattens the fields.

In the "autumn" avid hunters rush out in pursuit of prey.

The "Winter" concerto opens with the clatter of teeth in the cold before taking refuge by a crackling fire.

Then you'll be back in the storm again, slipping and tumbling on the ice.

In the first few weeks of winter, the old year comes to an end and so does Vivaldi's musical exploration of the seasons.

It was not until the early 19th century that such expressive instrumental program music became known.

By that time, larger and more diverse ensembles, using woodwinds, brass and percussion to tell stories, had become mainstream.

But Vivaldi did it with just one violin, strings and harpsichord.

Unlike his contemporary Bach, Vivaldi was not very interested in complex fugues.

He preferred to provide easily accessible entertainment for the listener with a melody that pops up later in the song to remind us where we were.

The first movement of the "Spring" concerto therefore begins with a spring theme and is slightly different from the last time we heard it.

It was an inspiring way to engage an audience, and Vivaldi, considered one of the most exciting violinists of the early 18th century, understood the value of engaging an audience.

At such concerts he himself may appear as the star violinist.

There was also an introduction to the young musicians of the Pieta, a school for girls in Venice, where Vivaldi was the music director.

Most of the students were orphans.

Musical training was intended not only as a social skill suitable for young women, but also as a potential career for women who might fail to have a good marriage.

Even in the composer's own time, Vivaldi's music served as a pastime for everyone, not just the wealthy aristocrats.

Three hundred years later, this approach still works, and Vivaldi's music still sounds like a trotting horse.

Communication underwater is difficult.

It is difficult for animals to see and smell because light and smell are difficult to transmit.

However, sound travels about four times faster in water than in air, so in this dark environment, marine mammals often rely on vocalizations to communicate.

That is why the ocean is filled with a chorus of sounds.

Clicks, pulses, whistles, moans, boos, screams, trills to name a few.

But the most famous part of this underwater symphony is the evocative melody, or song, composed by the world's largest mammal, the whale.

Whale song is one of the most sophisticated communication systems in the animal kingdom.

Only a few species are known to sing.

Blue Whales, Fin Whales, Bowhead Whales and of course Humpback Whales.

These are all baleen whales, which use hairy baleen plates instead of teeth to catch their prey.

Toothed whales, on the other hand, use echolocation, and toothed whales and other species of baleen whales emit social sounds such as vocalizations and whistles for communication.

However, their vocalizations lack the complexity of singing.

So how do they do it?

Land mammals like us produce sound by moving air over our vocal cords when we exhale, causing them to vibrate.

Baleen whales have U-shaped folds of tissue between their lungs and a large inflatable organ called the laryngeal sac.

Since it is basically impossible to observe the internal organs of a living singing whale, it is not known for sure, but it is believed that when the whale sings, contractions of the throat and chest muscles move air from the lungs through the U-folds into the laryngeal sac, causing the U-folds to vibrate.

The resulting sound resonates within the sac like a choir singing in a cathedral, creating a song so loud it can travel thousands of kilometers.

Whales don't have to exhale to sing.

Instead, the air is recirculated to the lungs and produces sound again.

One of the reasons whale songs are so fascinating is their patterns.

Units such as moans, screams, and barks are arranged as phrases.

Repeated phrases are grouped into themes.

Multiple themes are repeated in predictable patterns to create songs.

This hierarchical structure is a kind of grammar.

Whale songs are very variable in length, and whales can repeat them over and over again.

In one recorded session, a humpback whale sang for 22 hours.

And why would they do that?

We don't yet know the exact purpose, but we can speculate.

Given that the singers are males and sing mainly during estrus, singing may be used to attract females.

Alternatively, they may be territorial and used to deter other males.

Whales return to the same feeding and breeding grounds each year, with individual populations having different songs.

Songs evolve over time as units and phrases are added, changed, or removed.

And when males from different populations feed within earshot, phrases are frequently exchanged, perhaps because new songs become more appealing to breeding females.

This is one of the fastest examples of cultural transmission, in which learned behaviors are passed on between unrelated individuals of the same species.

We can eavesdrop on these songs using underwater microphones called hydrophones.

These are useful for tracking species when sightings or genetic samples are rare.

For example, scientists have successfully distinguished the elusive population of blue whales around the world based on their calls.

However, as a result of human activity, ocean noise is increasing.

Boating, military sonar, underwater construction, and seismic exploration for oil are frequent activities that can interfere with whale communication.

Too much human noise can cause some whales to avoid important feeding and breeding grounds.

Humpback whales have also been observed to lower their vocalizations in response to noise 200 kilometers away.

Restricting human activity along migration routes and other critical habitats and reducing noise pollution across the ocean will help ensure the continued survival of whales.

If whales can keep singing and we can keep listening, maybe one day we'll really understand what they're saying.

Imagine a runaway trolley driving straight down a railroad track towards five workers who cannot escape.

You happen to be standing next to the switch that diverts the trolley to the second track.

Here is the problem.

This truck also has workers, but only one.

What is your occupation?

Sacrifice one to save five?

This is the trolley problem, a type of ethical dilemma devised by philosopher Philippa Foot in 1967.

It's popular because it forces you to think about how to choose when there are no good options.

Do we choose actions that yield the best results, or do we stick to moral codes that forbid letting someone die?

In one survey, about 90% of respondents said they were okay with flipping a switch and letting one worker die to save five, and other studies involving virtual reality simulations of Dilemma have found similar results.

These decisions are consistent with the philosophical principle of utilitarianism, which states that morally correct decisions are those that maximize the well-being of the greatest number of people.

Five lives are more than one, even if achieving that result would require someone to be sentenced to death.

But people don't always take a utilitarian view, and you can see that by changing the trolley problem a bit.

This time, when you are standing on a bridge over a railroad track, a runaway trolley is approaching.

Platform 2 is gone now, but there is a very large man on the next bridge.

If you push him down, his body will stop the trolley and save the five workers, but he will die.

For a utilitarian, the decision is exactly the same: lose one life to save five lives.

But in this case, only about 10% of respondents said it was okay to throw men on the tracks.

Our instincts tell us the difference between intentionally causing someone to die and collateral damage.

For reasons that are hard to explain, it just feels wrong.

This intersection of ethics and psychology is what makes the trolley problem so interesting.

The dilemma in its many variations reveals that what we think is right or wrong is governed by factors other than a logical weighing of merits and demerits.

For example, men are more likely than women to say it's okay to push a man over a bridge.

So are people watching comedy clips before doing thought experiments.

And in one virtual reality study, people were more willing to sacrifice men than women.

Researchers studied the brain activity of people thinking in the classic and bridge versions.

Both scenarios activate areas of the brain involved in conscious decision-making and emotional response.

But in the bridge version the emotional response is much stronger.

So does activity in brain regions associated with processing internal conflicts.

Why the difference?

One explanation is that letting someone die feels more personal and triggers an emotional aversion to killing someone, yet we feel conflicted because we know it's a logical choice.

"Trolleyology" has been criticized by some philosophers and psychologists.

They argue that they reveal nothing because the premise is so unrealistic that study participants do not take it seriously.

But new technologies make this kind of ethical analysis more important than ever.

For example, a self-driving car might have to deal with choices such as causing a minor accident to prevent a bigger one.

Meanwhile, governments are researching autonomous military drones and may decide whether to risk civilian casualties by attacking high-value targets.

If we want these actions to be ethical, we must decide in advance how we value human life and judge the greater good.

Researchers studying autonomous systems are therefore working with philosophers to tackle the complex problem of programming ethics into machines. This shows that even hypothetical dilemmas can eventually collide with the real world.

What is Bipolar Disorder?

The word bipolar has two extremes.

The lives of millions of people with bipolar disorder around the world are divided into two distinct realities: elation and depression.

There are many different types of bipolar disorder, let's consider a few examples.

In Type 1, extreme highs and extreme highs occur alongside extreme extreme depressions, whereas in Type 2, shorter, less extreme highs occur interspersed with long periods of depression.

For those who vacillate between emotional states, finding the balance needed to lead a healthy life can seem impossible.

Type 1 extreme highs are known as mania and can make a person irritable or invincible.

However, these euphoric episodes go beyond ordinary feelings of joy and cause distressing symptoms such as elevated thoughts, insomnia, rapid speech, impulsive behavior, and risky behavior.

Without treatment, these symptoms become more frequent, more intense, and take longer to subside.

Depression in bipolar disorder manifests in many ways, including low mood, loss of interest in hobbies, changes in appetite, feelings of worthlessness and excessive guilt, too much or too little sleep, restlessness or slowness, and persistent suicidal thoughts.

Worldwide, approximately 1-3% of adults experience a wide range of symptoms indicative of bipolar disorder.

While most of these people are functional and contributing to society, and their lives, choices, and relationships are not dictated by disability, the impact is nonetheless severe for many.

The disease can impair academic and professional performance, relationships, financial security, and personal safety.

So what causes bipolar disorder?

Researchers believe the key is the intricate wiring of the brain.

A healthy brain maintains strong connections between neurons, thanks to the brain's continuous efforts to prune itself and remove unused or defective neural connections.

This process is important because our neural pathways act as maps for everything we do.

Scientists have used functional magnetic resonance imaging to find that the brain's ability to prune is impaired in people with bipolar disorder.

That means their neurons are confused, creating a network that is unnavigable.

Guided solely by confusing signals, people with bipolar disorder develop abnormal thoughts and behaviors.

In the extreme stages of bipolar disorder, psychotic symptoms such as incoherent behavior, paranoid thinking, persecutory delusions, and hallucinations may occur.

This is thought to be due to an excess of a neurotransmitter called dopamine.

However, despite these insights, bipolar disorder cannot be attributed to a single cause.

In reality, it's a complicated issue.

For example, the brain's amygdala is involved in thinking, long-term memory, and emotional processing.

A variety of factors, including genetics and social trauma, can cause abnormalities in this brain region, leading to symptoms of bipolar disorder.

Genetics are known to play a large role, as the condition tends to run in families.

But that doesn't mean there's only one bipolar gene.

In fact, the likelihood of developing bipolar disorder is driven by interactions between many genes involved in a complex recipe that we are still trying to understand.

Bipolar disorder is difficult to diagnose and live with because of its complex causes.

Nevertheless, this disorder is controllable.

Certain drugs, such as lithium, help manage dangerous thoughts and behaviors by stabilizing mood.

These mood stabilizers work by decreasing abnormal activity in the brain, thereby strengthening viable neural connections.

Other frequently used drugs include antipsychotic drugs that alter the action of dopamine, and electroconvulsive therapy, which acts like a carefully controlled seizure in the brain, is sometimes used as an emergency treatment.

Some people with bipolar disorder refuse treatment, fearing it will dull their emotions and impair their creativity.

But modern psychiatry actively tries to avoid it.

Today, doctors work with patients on a case-by-case basis, combining treatments and therapies to help them reach their full potential.

And beyond treatment, people with bipolar disorder can benefit from even simpler changes.

That includes regular exercise, good sleep habits, and abstinence from drugs and alcohol, as well as the acceptance and empathy of family and friends.

Remember, bipolar disorder is a medical condition, not the person's fault or the person's entire identity. Bipolar disorder can also be controlled through a combination of internal therapy, external acceptance and understanding by friends and family, and empowering individuals with bipolar disorder to find balance in their lives.

From being chained to burning wheels, to being turned into spiders, to having livers eaten by eagles, Greek mythology is full of tales of gods who inflicted terrifying terrors on angry mortals.

But one of their most famous punishments is not remembered for its outrageous cruelty, but for its disturbing friendliness.

Sisyphus was the first king of Ephyra, now known as Corinth.

He was a clever ruler who made his city prosperous, but he was also an evil tyrant who seduced his nieces and murdered visitors to demonstrate his power.

This violation of sacred hospitality traditions greatly angered the gods.

But if Sisyphus had not possessed a reckless confidence, he might still have avoided punishment.

Trouble began when Zeus kidnapped the nymph Aegina and took her away in the form of a giant eagle.

Aegina's father, the river god Asopus, followed their tracks to Ephyra, where they met Sisyphus.

Instead of the god creating a spring in the city, the king told Asopus which way Zeus had taken the girl.

When Zeus learned of this, he was furious and ordered Thanatos, the god of death, to chain Sisyphus to the underworld to prevent further trouble.

But Sisyphus lived up to his cunning reputation.

When he was about to be imprisoned, the king asked Thanatos to show him how the chains worked, and instead quickly tied him up and fled back among the living.

With Thanatos trapped, no one died and the world fell into chaos.

Things finally returned to normal when Ares, the god of war, angry that the battle was no longer fun, freed Thanatos from his chains.

Sisyphus knew that his reckoning was near.

But he had another trick.

Before he died, he asked his wife Merope to dump his body in a public square, from where it eventually washed up on the banks of the River Styx.

Returning among the dead, Sisyphus approached Persephone, queen of the underworld, and complained that his wife disrespected him for not giving him a proper burial.

Persephone gave permission to return to the land of the living to punish Merope on the condition that she would return when she was no longer needed.

Of course, Sisyphus refused to keep his promise and twice escaped death by tricking the gods.

The messenger Hermes dragged Sisyphus into the underworld, and there will be no third time.

The king thought he was wiser than the gods, but Zeus had the last laugh.

Sisyphus' punishment was a simple task of rolling a huge boulder up a hill.

But the moment he got close to the top, the rock rolled away, forcing him to start over…and forever, over and over again.

Historians suggest that the story of Sisyphus may derive from ancient myths about sunrises and sunsets, or other cycles of nature.

But the vivid image of someone condemned to endless repetition of futile work resonated as an allegory about the human condition.

The existentialist philosopher Albert Camus, in his classic essay The Myth of Sisyphus, compared this punishment to mankind's futile search for meaning and truth in a senseless and indifferent universe.

Instead of despairing, Camus imagined Sisyphus challenging his fate as he descended the hill and began rolling the rock again.

And even though the daily struggles of our lives can seem equally repetitive and absurd, we still give them meaning and value by accepting them as our own.

In 1965, 17-year-old high school student Randy Gardner stayed awake 264 hours a day.

It takes eleven days to see how he copes without sleep.

On the second day his eyes were out of focus.

Next, he lost the ability to identify objects by touch.

By the third day, Gardner was sullen and uncoordinated.

By the end of the experiment, he had trouble concentrating, had short-term memory problems, was paranoid, and started seeing hallucinations.

Gardner recovered without long-term mental and physical damage, but for others, sleep loss can lead to hormonal imbalances, illness and, in extreme cases, death.

We're just beginning to understand why we sleep in the first place, but we know it's essential.

Adults need 7-8 hours of sleep per night, and adolescents need about 10 hours of sleep.

We are made sleepy by signals from our bodies that we are tired and signals from our environment that it is dark outside.

Increased sleep-inducing chemicals such as adenosine and melatonin put us into a light slumber that deepens, slowing our breathing and heart rate and relaxing our muscles.

This non-REM sleep is when our DNA repairs and our bodies refuel for the day ahead.

In the United States, it is estimated that 30% of adults and 66% of adolescents are regularly sleep deprived.

This is no mere minor inconvenience.

If left awake, it can cause serious bodily harm.

Loss of sleep affects learning, memory, mood and reaction time.

Insomnia can cause inflammation, hallucinations, and high blood pressure, and has been linked to diabetes and obesity.

In 2014, an avid soccer fan died after staying up for 48 hours to watch the World Cup.

His untimely death was due to a stroke, but studies have shown that people who chronically sleep less than six hours each night have a 4.5-fold increased risk of stroke compared to those who consistently sleep seven to eight hours.

For the few people on earth with rare genetic mutations, insomnia is a daily reality.

Known as fatal familial insomnia, the body goes into a nightmarish state of wakefulness and is unable to enter the sanctuary of sleep.

Within months or years, the condition gradually worsens, leading to dementia and death.

How can lack of sleep cause such immense suffering?

Scientists believe the answer lies in the accumulation of waste products in the brain.

While we are awake, our cells are busy consuming the energy source of the day, which is broken down into various byproducts such as adenosine.

Accumulation of adenosine increases the urge to sleep, also called sleep pressure.

In fact, caffeine works by blocking the adenosine receptor pathway.

Other waste products also accumulate in the brain, and if they are not removed, they collectively overload the brain and are thought to cause many of the negative symptoms of sleep deprivation.

So what is happening in our brains during sleep to prevent this?

Scientists have discovered something called the glymphatic system, a cleansing mechanism that removes this buildup and activates it even more during sleep.

It works by using cerebrospinal fluid to wash away toxic byproducts that build up between cells.

Lymphatic vessels were recently discovered in the brain that serve as conduits for immune cells, and they may also play a role in removing the brain's daily waste products.

Scientists continue to study the restorative mechanisms behind sleep, but there's no question that falling asleep is essential if you want to stay healthy and sane.

I am here with you today to talk about liars, lawsuits, and laughter.

The first time I heard about Holocaust denial, I laughed.

Holocaust denial?

A Holocaust with the dubious character of being the world's best-documented genocide?

Who would believe it didn't happen?

please think about it.

Who must be wrong for the deniers to be right?

First and foremost are the victims, the survivors who have told us their harrowing stories.

Who else could be wrong?

bystanders.

People who lived in countless towns, villages and cities on the Eastern Front watched their neighbors, men, women, children, young and old, being rounded up, marched to the outskirts of town, shot dead and left in ditches.

Or the Poles who lived in the towns and villages surrounding the concentration camps watched trains come in full and come back empty every day.

But above all, who could be wrong?

perpetrators.

People who say "We did it".

Now, maybe a warning is added.

They say, 'I had no choice, I had to do it.'

Nevertheless, they say "I did".

please think about it.

Since World War II, no perpetrator, regardless of nationality, has ever stated in a war crimes trial that "it never happened."

Again, they may have said "forced" but never without it.

After pondering it, I decided that denial was not on my agenda. I had more things to worry about, more things to write about, more things to research, so I moved on.

A little over a decade later, two senior scholars, two of the most prominent historians of the Holocaust, approached me and said, 'Deborah, let's have coffee.

We have research ideas that we think are perfect for you. ”

Intrigued and delighted that they approached me with the idea and thought I was a good fit for it, I asked, "What is it?"

And they said "Holocaust Denial".

and laughed a second time.

Holocaust denial?

Flat Earth people?

Are Elvis people alive?

Should I study?

Then they said, "Yes, I'm interested.

what are they about?

what is their purpose?

How can they make people believe what they say? ”

So if they think it's worth it, I'll have a temporary diversion--maybe a year, maybe two years, maybe three years, maybe even four years--from an academic point of view, it's temporary.

(Laughter) We work very slowly.

(Laughter) And I observed them.

So I did.

I did some research and found a few things, two of which I'd like to share with you today.

One: Denier is a wolf in sheep's clothing.

Nazis and neo-Nazis are the same. You can decide whether or not to put "neo" there.

But when I looked at them, I didn't see any SS-like uniforms, no symbols like swastikas on the walls, no Sieg Heil salutes.

What I found instead were people parading as respectable scholars.

what did they have?

They had laboratories.

"Historical Research Institute".

They had a journal--a respectable journal--"The Historical Review Journal."

One is full of papers and full of footnotes.

And they got new names.

Not neo-Nazi or anti-Semite, revisionist.

They said, 'We are revisionists.

We have only one thing left to do: correct the wrongs of history. ”

But all you had to do was go an inch below the surface. What did you find there?

Equally admiration for Hitler, admiration for the Third Reich, anti-Semitism, racism, prejudice.

Here's what intrigued me.

It was a parade of anti-Semitism, racism, bigotry and rational discourse.

Another thing I've learned is that many of us have been taught to think that there are facts and there are opinions, but after studying the naysayers, I changed my mind.

There are facts, opinions, and lies.

And what the naysayers want to do is take their lies for granted and make them look like opinions, maybe edgy, unconventional, but if they are opinions, they should be part of the conversation.

And they step into the facts.

I have published my work. The book was published as Holocaust Denial: A Growing Assault on Truth and Memory and has been published in many different countries, including here at Penguin UK. And I was done hanging out with those people and ready to move on.

Then I got a letter from Penguin UK.

And laughed for the third time...

by mistake.

When I opened the letter, I was informed that David Irving had filed a defamation lawsuit against me in England for calling me a Holocaust denier.

Will David Irving sue me?

Who Was David Irving?

David Irving was a writer of historical works, most of them about World War II, and virtually all of those works took the position that the Nazis weren't really that bad and the Allies weren't really that good either.

And the Jews, in a way, deserved whatever happened to them.

He knew the document, knew the facts, but somehow twisted the document to get this opinion.

Although he was not always a Holocaust denier, he embraced the Holocaust very vigorously in the late 80's.

I laughed because not only was this man a Holocaust denier, but he seemed very proud of the Holocaust.

There was a man here who said, "I'm going to sink the battleship Auschwitz."

One man pointed to a number tattooed on a survivor's arm and asked, "How much did you make with that number tattooed on your arm?"

"More people died in Senator Kennedy's car at Chappaquiddick than in the gas chambers at Auschwitz," said one man.

This is an American reference, but check it out.

This man was not one to be ashamed or shy of being a Holocaust denier.

Well, many academic colleagues have advised me. "Uh, Deborah, just ignore it."

When I explained that I could not ignore the defamation lawsuit, they said, "Who would believe him in the first place?"

However, there was a problem here. English law put the burden and burden of proof on me to prove the truth of what I said, as opposed to him to prove false in the United States and many other countries.

what does that mean?

This meant that if I didn't fight, he would win by default.

And if he wins by default, he can legally say, "My David Irving version of the Holocaust is legal."

Turns out Deborah Lipstadt slandered me by calling me a Holocaust denier.

In fact, I, David Irving, am not a Holocaust denier. ”

and what version is it?

There was no plan to kill the Jews, no gas chambers, no mass shootings, Hitler had nothing to do with the suffering that ensued, and the Jews concocted this to get money from Germany and take the state, and they did so with the aid and instigation of the Allies - they drafted documents and fabricated evidence.

I couldn't leave it alone and face survivors and survivor children.

I couldn't let it go and I couldn't consider myself a responsible historian.

That's how we fought.

And for those who haven't seen "Denial" yet, spoiler alert: we won.

(Laughter) (Applause) The judge found David Irving a liar, a racist, and an anti-Semite.

His view of history was biased, lied and distorted. And most importantly, he did it on purpose.

We showed patterns in over 25 different key cases.

It's no small thing. Many of this audience have written and are writing books. we make mistakes all the time. That is why we are happy to publish a second edition to correct the mistakes.

(Laughter.) But these always went in the same direction: condemning the Jews and acquitting the Nazis.

But how did we win?

What we did is follow his footnote back to the source.

And what did you find?

In every case where he made some reference to the Holocaust, though not most, but not many, his supposed evidence was distorted, half-true, dates changed, order changed, and someone who wasn't there was forced to attend the meeting.

In other words, he had no proof.

His evidence did not prove it.

We didn't prove what happened.

We have proven that what he said is not true. And by extension all the naysayers either because he quotes them or gets an argument from him.

What they claim -- they have no evidence to prove it.

So why isn't my story just a strange, long, six-year difficult case about an American professor who was dragged into court by a man the court declared a neo-Nazi polemicist in his judgment?

What kind of message does it contain?

In the context of the question of truth, I think this contains a very important message.

Because today, as we all know, truth and facts are under attack.

Social media has given us many gifts, but it has also allowed us to level the line between facts – established facts and lies.

Third is extremism.

You may not see the robes of the Ku Klux Klan, you may not see a burning cross, you may not even hear the words of blatant white supremacy.

It has been given various names such as 'Alternate Right', 'National Front', etc., but choose the name that you prefer.

But underneath it all is the same extremism I discovered in the Holocaust denial parade as rational discourse.

We live in a time when truth is on the defensive.

It reminded me of the New Yorker cartoon.

A quiz show recently aired on "The New Yorker," where the quiz show host asked one of the contestants, "Yes, ma'am, you got it right.

But your opponent shouted louder than you, so he gets a point. ”

what can we do

First of all, we can't be fooled by reasonable looks.

We have to look underneath, and there we will find extremism.

Second, we must understand that truth is not relative.

Third, we must be offensive, not defensive.

When someone makes an exorbitant claim, even if he or she holds the highest position in the world or in the world, we must say to them, "Where's the evidence?

where's the evidence? ”

We have to keep their feet close to the fire.

Don't treat their lies as if they were facts.

And, as I said earlier, truth is not relative.

Many of us grew up in a world of academies and enlightened liberal thought, where we were taught that everything was up for debate.

But it's not.

There are some truths.

There are indisputable facts - objective truths.

Galileo taught us that many centuries ago.

Even after being forced to recant from the Vatican that the earth revolves around the sun, what is he reportedly saying when he came out?

Yet it still works.

The earth is not flat.

The climate is changing.

Elvis is not alive.

(Laughter.) (Applause.) And most importantly, truth and facts are under attack.

The task in front of us, the task in front of us, the challenge in front of us is great.

Fight time is short.

We must act now.

Later it will be too late.

thank you very much.

(applause)

The giant family you work for is throwing a lavish dinner party and they all want to look their best.

But there is a problem. The Old Giant's favorite shirt is wrinkled.

To fix it, you need to power up the giant iron.

The iron requires 2 huge batteries to work.

The four working ones and the four dead ones were placed in separate piles, but the baby giant seems to have mixed them all up.

If you don't iron your huge shirt fast, it will be your main course tonight!

How can I test the battery so that it is guaranteed to work properly in 7 attempts or less?

Pause the video now if you want to figure it out yourself. Please answer with 3. Please answer with 2. Please answer with 1. Of course, you could have all 8 batteries and start testing 28 different combinations.

You may get lucky on your first few tries.

But otherwise it would take too long to move the huge battery multiple times.

You can't count on luck. You have to assume the worst and plan accordingly.

However, in practice, you don't need to test every possible combination.

Remember. There are a total of 4 good batteries. So if you select 6 piles, you have at least 2 good batteries.

Testing all 6 batteries can take up to 15 attempts, so this isn't immediately useful.

But it gives a clue to the solution. Dividing the battery into smaller subsets narrows down the possible results.

So use 3 batteries instead of 6.

There are a total of 3 possible combinations in this group.

Both batteries must be working to power the iron, so a single failure cannot determine if both batteries are dead or just one is dead.

But if all three combinations fail, we know that this group either has one good battery or no batteries at all.

Now you can set these three aside and repeat the process for the other three batteries.

You might get a match, but if all combinations fail again, you know this set contains only one good battery.

That leaves only two unused batteries.

There are a total of 4 good batteries and only 2 have been described so far, so the remaining 2 should both be good.

Splitting the batteries into sets of 3, 3, 2 guarantees a successful result within 7 attempts, regardless of the stacking order.

In no time, the iron came to life and I was able to iron my shirts perfectly.

Satisfied elders and their families show up at the party in full dress...well, mostly.

How many people here want to live to be at least 80?

yes.

I think we all have hopeful expectations of being able to live to old age.

Let's project into the future, into your future "you," and imagine that we're all 85 years old.

Now, everyone, look at the two of us.

Some of you probably have Alzheimer's disease.

(Laughter) Okay, okay.

And maybe you're thinking, "Well, that wouldn't be me."

Okay then. you are a caregiver

So -- (laughter) one way or another, this terrible disease can affect us all.

Part of the fear of Alzheimer's disease stems from the feeling that there is nothing we can do about it.

Despite decades of research, there is still no cure or cure for the disease.

So if we're lucky enough to live long enough, Alzheimer's seems to be our brain's destiny.

But it may not have to be.

What if we told you that we could change these statistics and literally change the fate of our brains without resorting to cures or medical advances?

Let's take a look at what we know today about the neuroscience of Alzheimer's disease.

Here is a diagram of two neurons connected.

The connection point of the part surrounded by this red circle is called a synapse.

Synapses are where neurotransmitters are released.

This is where signals are sent and communications take place.

This is where we think, feel, see, hear, and desire...

and remember.

And it is at the synapses that Alzheimer's disease occurs.

Let's zoom in on Synapse and cartoonize what's going on.

When transmitting information, neurons release neurotransmitters such as glutamate into synapses, as well as a small peptide called amyloid beta.

Amyloid-beta is normally metabolized and cleared by microglia, the control cells of our brain.

Although the molecular causes of Alzheimer's disease are still being debated, most neuroscientists believe that Alzheimer's disease begins when amyloid beta begins to accumulate.

When released in excess or not cleared sufficiently, amyloid beta begins to accumulate at synapses.

When this happens, they bind together to form sticky aggregates called amyloid plaques.

How many people here are over 40?

You are afraid to admit it now.

The first step towards this disease, the presence of accumulating amyloid plaques, is already seen in the brain.

The only way you can be sure of this is by doing a PET scan. Because at this point, fortunately you are unaware.

No deficits in memory, language, cognition...

not yet.

It is believed that it takes at least 15–20 years for the accumulation of amyloid plaques to reach a tipping point and subsequently trigger the molecular cascade that leads to the clinical manifestations of the disease.

Before the tipping point, amnesia can include things like "Why did I come to this room?"

or "Oh... what's his name?"

or "Where did you put the key?"

Now, before you start panicking again, I know half of you have done at least one of these in the last 24 hours, so these are all normal kinds of forgetfulness.

In fact, I would argue that these examples might not even be relevant to your memory because you didn't pay attention to where you put the keys in the first place.

After the tipping point, deficits in memory, language, and cognition change.

After all, you don't find your keys in your coat pocket or on the table by the door, you find them in your refrigerator, or you find them and think, "What is this going to be used for?"

So what happens when amyloid plaques accumulate to this tipping point?

Our microglia control cells become hyperactive and release chemicals that cause inflammation and cell damage.

We suspect they may actually start wiping out the synapses themselves.

A key neurotransport protein called 'tau' becomes hyperphosphorylated, twisting itself into something called a 'tangle', suffocating neurons from the inside.

By mid-AD, massive inflammation and tangles occur, leading to all-out warfare and cell death at synapses.

So if you were a scientist trying to cure this disease, at what point would you ideally want to intervene?

Many scientists are betting heavily on the simplest solution to keep amyloid plaques from reaching that tipping point. This means that drug discovery is primarily focused on developing compounds that prevent, clear, or reduce the accumulation of amyloid plaques.

Therefore, treatments for Alzheimer's disease are likely to be prophylactic.

We need to take this drug before we reach that tipping point, before the cascade is triggered, before we leave the keys in the fridge.

We believe this is why drugs of this class have failed in clinical trials so far. Not because the science is unsound, but because people in these trials already had symptoms.

it was too late.

Think of an amyloid plaque as a lit match.

At the tipping point, a match sets the forest on fire.

There is no point in blowing out matches when the forest is on fire.

You must blow out the matches before the forest catches fire.

Even before scientists figure this out, this information is really good news for us. Because we know that our lifestyle can affect the accumulation of amyloid plaques.

So there are things we can do to avoid reaching that tipping point.

Draw your Alzheimer's risk on a seesaw scale.

Alzheimer's disease is diagnosed when risk factors accumulate in one arm and the arm hits the floor.

Imagine you are 50 years old.

You're no longer a spring chicken, so you're building up amyloid plaques with age.

The scale is slightly tilted.

Let's take a look at your DNA.

We all inherit genes from our mothers and fathers.

Some of these genes increase risk, while others decrease risk.

If you're like Alice in Still Alice, you've inherited a rare genetic mutation that churns out amyloid-beta, and that alone will tip your scales to the ground.

But for most of us, the genes we inherit have only a small impact.

For example, APOE4 is a genetic variant that increases amyloid, but inheriting a copy of APOE4 from a father or mother may not result in Alzheimer's disease. So for most people, DNA alone doesn't determine whether or not you get Alzheimer's disease.

So what happens?

We can't do anything about aging or inherited genes.

So far, we haven't changed the fate of our brains.

How's your sleep?

In deep slow-wave sleep, glial cells flush cerebrospinal fluid throughout the brain, removing metabolic waste products that have accumulated at synapses during waking hours.

Deep sleep is like a power cleansing for your brain.

But what happens when you sleep less?

Many scientists believe that poor sleep hygiene may actually be a predictor of Alzheimer's disease.

One night of sleep deprivation increases amyloid beta.

And we know that amyloid build-up interferes with sleep, which causes even more amyloid build-up.

And now we have a positive feedback loop that accelerates the slope of that scale.

what else?

cardiovascular health.

High blood pressure, diabetes, obesity, smoking, and high cholesterol have all been shown to increase the risk of developing Alzheimer's disease.

Several autopsy studies have shown that 80% of Alzheimer's patients also had cardiovascular disease.

A number of studies have shown that aerobic exercise reduces amyloid-beta in animal models of disease.

Therefore, a heart-healthy Mediterranean lifestyle and diet can help counteract a tilt of this magnitude.

So there are many things we can do to prevent or delay the onset of Alzheimer's disease.

But let's say none of those have done.

Let's say you are 65 years old. Someone in your family has Alzheimer's disease. So you may have inherited one or two of the genes that make the arms of the scale tilt slightly. You have been burning both ends of the candle for years. you love bacon And they don't run away unless someone chases them.

(Laughter) Imagine your amyloid plaques have reached that tipping point.

The scale arm hit the floor.

You tripped a cascade and set the forest on fire, causing inflammation, tangles, and cell death.

You should be having symptoms of Alzheimer's disease.

You must be having trouble finding words, keys, and remembering what I said at the beginning of this talk.

But maybe not.

There is one more thing you can do to protect yourself from experiencing Alzheimer's symptoms, even if full-blown disease pathology is blazing in your brain.

It has to do with neural plasticity and cognitive reserve.

Remember, the experience of getting Alzheimer's disease is ultimately the result of synaptic loss.

The average brain has over 100 trillion synapses, which is great. we have a lot to do.

And this is not a static number.

We are constantly gaining and losing synapses through a process called neuroplasticity.

Every time we learn something new, we are creating and strengthening new neural connections, new synapses.

In the Nuns Study, 678 nuns, all aged 75 or older at the start of the study, were followed for more than 20 years.

They underwent regular physical and cognitive tests, and when they died their entire brains were donated for autopsy.

In some of these brains, scientists have discovered something amazing.

Despite the presence of plaques, tangles, and brain atrophy, which appeared to be unquestionable Alzheimer's disease, the nuns who belonged to these brains showed no signs of Alzheimer's disease during their lifetimes.

What should I do?

We believe it was because these nuns had a high level of cognitive reserve. This could be translated as they had more functional synapses.

People who have had more formal education, who are highly literate, and who regularly engage in mentally stimulating activities all have more cognitive reserves.

They are rich in neural connections and redundant.

So even if a disease like Alzheimer's disease has damaged some of your synapses, you won't notice anything wrong because there are so many spare connections.

Let's imagine a simplified example.

Suppose you know only one thing about a subject.

Let's say it's about me.

You know Lisa Genova wrote Still Alice, and that's the only thing you know about me.

There is a single neural connection, that one synapse.

Now imagine that you have Alzheimer's disease.

There are plaques, tangles, inflammation, and microglia eating away at synapses.

Now, if someone asks you, "Hey, who wrote 'Still Alice'?"

you forgot me forever

But what if you knew more about me?

Let's say you learned four things about me.

Now imagine you have Alzheimer's disease and 3 of those synapses are damaged or destroyed.

There are still ways to bypass the wreckage.

you will still remember my name

Replenishing pathways that are not yet damaged can therefore be resilient to the presence of Alzheimer's disease.

And we build these pathways, our cognitive reserves, by learning new things.

Ideally, we want these new things to be as meaningful as possible, evoke sight and sound, associations and emotions.

So this doesn't really mean doing crossword puzzles.

You don't want to simply search for information you've already learned. Because this is like traveling through old and familiar streets and patroling neighborhoods you already know.

We want to pave a new nerve road.

Building an Alzheimer's brain means learning to speak Italian, meeting new friends, reading books and listening to great TED talks.

And despite all this, should one day be diagnosed with Alzheimer's, there are three lessons I learned from my grandmother and dozens of people I know who live with the disease.

Just because you've been diagnosed doesn't mean you're going to die tomorrow.

stay alive

You will never lose your emotional memory.

You will still be able to understand love and joy.

You may not remember what I said five minutes ago, but you will remember how I made you feel.

And you are more than you remember.

thank you.

(applause)

Let's say you despise Western democracy.

Endless debates about democracy, traps of all kinds, free elections, city halls, the proper role of government.

Too messy, too unpredictable, too restrictive to your tastes.

And the way these democracies come together to preach to others about individual rights and liberties is deeply ingrained.

So what should be done about it?

You can denounce the hypocrisy and failure of Western democracy and explain how good your methods are, but it never works.

What if we could force those who are at the very heart of these democracies to question the system?

They conjure in their own minds the idea that democracy and its institutions have failed them, that their elite are corrupt puppet masters, and that the country they knew is on the brink of collapse.

To do that, we need to penetrate the intelligence realm of these democracies.

Their most powerful asset, an open mind, must be turned into their greatest weakness.

We need people who ask the truth.

Well, you know about the hacks and leaks that happened in 2016.

One, the personal email accounts of the Democratic National Committee network and its staff, was later published on WikiLeaks.

Various individuals online, including an alleged non-Romanian-speaking Romanian cybercriminal, have since aggressively pushed news about these leaks to journalists.

The media took the bait.

They were blown away by how much the DNC hated Bernie.

At the time, the reports far outweighed the news that the Russian government-backed hacker group, which we called Advanced Persistent Threat 28, or APT28 for short, was carrying out such operations against the United States.

And there was no shortage of evidence.

This Russian government hacker group didn't pop up in 2016.

And the tools APT28 used to compromise victims' networks proved a thoughtful and well-resourced effort that has been going on for over a decade from 9 a.m. to about 6 p.m. in the Moscow time zone.

APT28 likes to prey on emails and contacts of Chechen journalists, the Georgian government, and Eastern European defense officers, all targets of unquestionable interest in the Russian government.

We weren't the only ones to notice this.

Governments and research teams around the world came to similar conclusions and were observing the same kinds of operations.

But what Russia was doing in 2016 was far more than espionage.

The DNC hack is just one of many incidents where stolen data was posted online with sensational narratives, amplified on social media, and lightning-quickly adopted by the media.

This did not ring alarm bells that nation-states were interfering in the credibility of other countries' internal affairs.

So why couldn't we have expected this to happen?

Why has it taken months for the American public to understand that they are under state-sponsored information attack?

The short answer is politics.

The Obama administration is stuck in a perfect catch-22.

By fueling fears that the Russian government was interfering in the US presidential election, the administration risked appearing to be interfering in the election itself.

But a better answer, I believe, is that the United States and the West were simply ill-equipped to recognize and respond to modern intelligence operations, despite the fact that the United States used intelligence with devastating success not so long ago.

So while the United States and the West have spent the last two decades preoccupied with cybersecurity—what networks to fortify, what infrastructure to deem critical, and how to set up an army of cyberwarriors and cybercommands—Russia has been thinking in a far more serious light.

Even before the first iPhone hit stores, the Russian government understood the risks and opportunities that technology presented, and the intercommunication and instant communication it offered us.

As our reality is increasingly based on the information we consume in the palm of our hands, the news feeds we scan, the hashtags and stories trending, the Russian government was the first to realize how this evolution has turned the human mind into the most exploitable device on the planet.

And when you are now accustomed to an unfettered flow of information, increasingly curated to your liking, your mind is especially vulnerable to exploitation.

A panorama of information that is of great interest to you gives a nation, or someone for that matter, the perfect backdoor into your mind.

This new brand of state-sponsored information operations can be more successful, more insidious, and more difficult for target audiences (including the media) to decipher and characterize.

Being able to get hashtags trending on Twitter, spreading fake news to audiences ready to receive it, or having journalists analyze terabytes of email for one-cent cheating are all tactics used in Russian operations. You get the chance to effectively camouflage your operations in your target's mind.

This is what Russia has long called “reflex control.”

It is the ability to use information about others to make decisions in their favor.

This is national level image control and perception management and is implemented using any means, network-based or other tools, to achieve it.

Take this as another example.

A phone call was posted on YouTube in early February 2014, weeks before Russia invaded Crimea.

Among them are two American diplomats.

They sound like they are playing kings in Ukraine and, worse, cursing the EU for its lack of speed and leadership in resolving the crisis.

The media reported the call, but the ensuing diplomatic backlash rocked Washington and Europe.

And it has created a cracked reaction and reckless attitude to Russia's land grab in Ukraine.

Mission accomplished.

So while hacked phones, emails, and networks always make the headlines, the actual activity is influencing the decisions people make and the opinions of people for the strategic interests of the nation-state.

This is the power of the information age.

And the more real this information is, the more compelling and easier it is to take and convey at face value.

Who wouldn't be interested in the truth being told by phone or email that was never intended for public viewing?

But how much does that truth matter if you don't know why it was revealed?

We need to recognize that this place we increasingly live in, what we archaically call “cyberspace,” is not defined by the 1s and 0s, but by the information and the people behind it.

This is much more than just a network of computers and devices.

It is a network made up of minds that interact with computers and devices.

And this network has no encryption, no firewall, no two-factor authentication, no passwords complex enough to protect its users.

The defensive one is much stronger, more adaptive and always running the latest version.

It is the ability to think critically. Point out falsehoods and assert facts.

And above all, we must have the courage to pursue the truth without flinching.

(applause)

Chris Anderson: Hi Elon, welcome to TED.

I am glad that you are here.

Elon Musk: Thank you for welcoming me.

CA: So, in the next half hour or so, I'd like to explore your vision of what an exciting future might look like. So I think the first question is a bit ironic. "Why are you bored?"

EM: Yes.

I ask myself that frequently.

We are digging a hole under Los Angeles. This is to create the beginning of a 3D tunnel network to hopefully ease congestion.

So one of the most disruptive things right now is traffic.

It affects people in all parts of the world.

It takes a lot of your life.

It's terrible.

LA is especially bad.

(Laughter) CA: I think you brought the first visualization shown of this.

can i show you this

EM: Yes, of course. This is the first time -- just to show what we're talking about.

There are several important things in building a 3D tunnel network.

First and foremost, tunnel entrances and exits must be seamlessly integrated into the urban fabric.

Therefore, by installing elevators like car skates on elevators, entrance and exit to the tunnel network can be integrated using only two parking spaces.

And the car rides on skates.

There is no speed limit here, so we designed it to run at 200 kilometers per hour.

K: How much?

EM: 200 kilometers per hour, or about 130 miles per hour.

So, for example, you should be able to get from Westwood to LAX in 6 minutes, or 5-6 minutes.

(Applause) CA: I think it's probably going to be some kind of toll road base at first.

EM: Yes.

CA: I think this will also reduce some of the traffic from surface roads.

EM: So, I don't know if people noticed in the video, but there is no real limit to the number of levels in the tunnel.

You can go much deeper than you can climb to the top.

Since the deepest mines are much deeper than the height of the tallest buildings, 3D tunnel networks can be used to alleviate any level of urban congestion.

This is a very important point.

So the key argument against tunnels is that adding a layer of tunnels simply relieves congestion, exhausts the tunnels, and then puts them back in place, causing congestion.

However, you can go through any number of tunnels and any level.

CA: But people, traditionally thought, drilling would be incredibly expensive and that would hinder this idea.

EM: Yes.

Well they are right.

For example, the Los Angeles subway extension, which I think is a $2 billion, 2.5 mile extension that was just completed.

That means the Los Angeles subway extension will cost about $1 billion per mile.

And this isn't the world's most practical subway.

Well, it's pretty hard to dig tunnels normally.

I think we need at least a 10x improvement in the cost per mile of tunneling.

CA: So how were we able to achieve that?

EM: Actually, I think you can get about an order of magnitude improvement and even more by doing just two things.

So the first thing to do is reduce the diameter of the tunnel by more than half.

Therefore, according to regulations, single-lane tunnels must be 26 feet, perhaps 28 feet, in diameter to allow for adequate ventilation for crashes, emergency vehicles, and internal combustion engine vehicles.

But if we shrink that diameter down to what we're trying to do (12 feet, enough to fit an electric skate), the diameter will drop by a factor of 2, the cross-sectional area will drop by a factor of 4, and the cost of tunneling will increase with the cross-sectional area.

That's an improvement of about half an order of magnitude.

Then the tunnel excavator is now drilling half the time before stopping and the remaining time putting in reinforcements for the tunnel walls.

So if you design the machine to do continuous tunneling and reinforcement instead, you get a 2x improvement.

Combine that and you get 8x.

Also, these machines are far from power or thermal limits, so you can significantly increase the power of the machine.

I'd say at least a 2x improvement, maybe a 4-5x improvement.

So I think there's a fairly simple set of steps to improve cost per mile over an order of magnitude. My actual goal is to have a pet snail named Gary. It comes from Gary the snail in "South Park," or, sorry, "SpongeBob."

(Laughter) So what Gary's ability is now is that he can go 14 times faster than a tunnel boring machine.

(laughs) CA: You want to beat Gary.

EM: We want Gary to win.

(Laughter) He's not a patient guy, and that's going to be a win.

Victory is to beat the snail.

CA: But a lot of people imagine, dream about cities of the future, and imagine that the real solutions are things like flying cars and drones.

you go to the ground

Why isn't that a better solution?

You save all tunneling costs.

EM: Yes. I am for flying.

Of course, I'm doing rockets, so I like things that fly.

While this is not an inherent prejudice against flying objects, there is a challenge in that flying cars produce considerable noise and generate very high wind forces.

Let's just say that if you have something flying over your head or lots of flying cars, it's not an anxiety-reducing situation.

(Laughter) I don't think, 'I feel better today.

You're thinking, "Did they service the hubcaps or are they going to guillotine me with the hubcaps off?"

That kind of thing.

CA: You have a vision of a future city with a rich 3D network of tunnels underground.

Is there a connection with hyperloop?

Can you apply these tunnels to this hyperloop idea we released a few years ago?

EM: Yeah, so we've been thinking about Hyperloop for a while.

We built a Hyperloop test track next to SpaceX to encourage innovative ideas in transportation. This was just for a student contest.

In fact, it will be the world's largest vacuum chamber by volume, second only to the Large Hadron Collider.

So it was a lot of fun doing it, but it was kind of a hobby thing. So we built a little pusher car to push the student pods. But I'm going to try and see how fast I can make the pusher run if I'm not pushing anything.

So we're cautiously optimistic that even a 0.8-mile stretch will be faster than the world's fastest bullet train.

CA: Wow. good brakes.

EM: Yeah, I mean, it's -- yes.

It either shatters into small pieces, or it travels at great speed.

CA: But imagine a hyperloop running pretty long in a tunnel.

EM: That's right.

And when I turned to tunneling technology, I found that to make a tunnel I had to: Sealing the water table usually requires that the tunnel walls be designed to withstand about 5-6 atmospheres.

So going into a vacuum is just 1 atmosphere, or near-vacuum.

So, in practice, it turns out that if you build enough tunnels to withstand the water table, you can automatically maintain a vacuum.

CA: Hmm.

EM: Yes.

CA: So can you imagine how long the tunnel would actually be when Elon runs his hyperloop?

EM: I don't think there is a real length limit.

You can dig as much as you like.

If you're going to do something like a hyperloop from Washington, DC to New York, you'll probably want to go underground the entire way because it's such a dense area.

You'll be going under a lot of buildings and houses, but if you go deep enough, you won't be able to detect the tunnels.

Sometimes people think that having a tunnel dug under their house would be quite a hassle.

For example, if you have more than about 3-4 diameter tunnels dug under your house, you won't be able to detect any digging at all.

In fact, if any device can detect tunnels being dug, the Israeli military trying to detect Hamas tunnels, and the US Customs and Border Patrol agents trying to detect drug tunnels, will get a lot of money for it.

So the reality is that the Earth is very good at absorbing vibrations, and once the tunnel depth is below a certain level, vibrations become undetectable.

Perhaps if you have a very sensitive seismometer you might be able to detect it.

CA: So you started a new company called The Boring Company to do this?

very nice. very funny.

(laughs) EM: What's funny?

(laughs) CA: How much time?

EM: It's probably...

CA: You said it's a hobby.

This is what Elon Musk's hobby is like.

(laughter) EM: So it really is, so this is basically interns and people working part-time.

We bought some used machines.

It feels like we're on track, but we're on track -- CA: So that means a lot more of your time is going into electrifying cars and transportation through Tesla.

Could one of the motivations for the tunneling project really be the realization that in a world where cars are electric and self-driving, there may eventually be more cars on the road at any given time than there are today?

EM: Yes, that's right.

Many believe that self-driving cars will make them go faster and reduce traffic congestion.

That would be true to some extent, but once the shared autonomy to travel from point to point is established, it will be much cheaper to go by car, and it will become more affordable than the bus.

Cheaper than bus tickets.

Therefore, the amount of driving that is generated when autonomous driving is shared will be even higher, making the actual traffic situation even worse.

CA: You founded Tesla with the goal of convincing the world that electrification is the future of the car, but a few years ago people were mocking you.

Not so much now.

EM: Okay.

(laughs) I don't know. don't know.

CA: But isn't it true that almost every automaker has announced serious electrification plans for the short to medium term future?

EM: Yes. yes.

I think almost every automaker has some kind of electric vehicle program.

There are varying degrees of severity.

Some companies are serious about moving to fully electric vehicles, while others are making a small move.

And, surprisingly, some people are still pursuing fuel cells, but I don't think it will last very long.

CA: But Elon, don't you have the feeling now that you can just declare victory and say, "We did it."

Exciting the world, do you focus on other things?

EM: Yes.

I look forward to working with Tesla as far into the future as I can imagine, and there are many exciting things ahead.

It's clear that the Model 3 is coming soon.

Announcing the Tesla Semi truck.

CA: Okay, let's move on to this.

The Model 3 is expected to arrive around July.

EM: Well, it looks pretty good to start production in July.

CA: Wow.

One of the things people are really excited about is the fact that it has autopilot.

And you released this video a while ago showing what that technology could look like.

EM: Yes.

CA: Now the Model S obviously has an autopilot.

What do you see here?

EM: Well, this uses just the camera and GPS.

So no LIDAR or radar is used here.

This is just using passive optics, essentially what people use.

The entire road system is designed to be navigated using passive optical cameras or cameras, so if you solve for cameras or vision, you also solve for autonomy.

If you don't solve your vision, you won't solve it.

That's why we focus on visual neural networks that are very effective in road conditions.

CA: Yes. Many others are on the LIDAR path.

All you need is a camera and a radar.

EM: There's no question that a camera alone can make you superhuman.

If it's just a camera, it's probably 10 times better than a human being.

CA: So you're saying that every new car that's being sold today has eight cameras?

They still can't do what it says.

When will it be possible?

EM: I think we're still on track to have fully self-driving cross-country travel from Los Angeles to New York by the end of the year.

CA: Okay. So you're saying that by the end of the year someone will get into a Tesla without touching the steering wheel, tap "New York" and leave.

EM: Yes.

CA: By the end of 2017, you won't have to touch the steering wheel.

EM: Yes. Basically, in November or December of this year, you should be able to go from a parking lot in California to a parking lot in New York without touching the controls at any point during the trip.

(Applause) CA: Great.

But part of it is possible because Tesla vehicles are already driving all these roads.

So you're accumulating a huge amount of data on the national highway network.

EM: Yes, but what's interesting is that we're actually pretty confident that even if we change the route dynamically, we'll still be able to do that route.

I mean, it's pretty straightforward -- if you're going to say it's going to work really well on one particular route, that's another thing, but once you're on the highway, you can go anywhere on the highway network in the country, it should really work very well.

So it's not limited to Los Angeles to New York.

You can even change it to change Seattle-Florida for the day in real time.

You were planning to go from LA to New York.

I am going from LA to Toronto.

CA: So, regulatory aside for a moment, just from a technology standpoint, there will come a time when someone will buy your car, literally put your hands off the wheel and go to sleep, and wake up to find you've arrived, how far are you going to be to do it safely?

EM: About two years, I think.

So the real trick isn't how to make it work 99.9 percent of the time. Because, say, if you were hit by a car 1 in 1,000 times, you probably wouldn't be able to sleep comfortably.

Certainly not.

(Laughter) You'll never be perfect.

No system is perfect, but perhaps perfection means that a car is unlikely to crash 100 or 1,000 times in its lifetime. Then people will say, "Okay, great, if I live 1000 lives, I'll probably never have a conflict. Then maybe I'll be okay."

CA: Sleep.

I think your biggest concern is that people will think it's safe too soon and something terrible will happen and they'll turn back.

EM: Well, I think autonomous systems are likely to at least mitigate collisions, except in rare circumstances.

The thing to appreciate about vehicle safety is that it is probabilistic.

That means that whenever a human driver gets into a car, an accident can happen because of the driver.

never zero.

So the key criterion for autonomy is how much autonomy must be superior to humans before it can be relied upon.

CA: But the power to disrupt an entire industry seems enormous once you can literally have hands-free driving. Because at that point, we were talking about people buying cars, dropping them off at work, and then letting go of their cars and doing some sort of Uber-like service to other people and making money, and maybe even covering the leasing of that car, so they could get cars for free, so to speak.

Is it really possible?

EM: Yes. This will definitely happen.

So when you buy a car, there is a shared autonomous vehicle that you can choose to use that car exclusively, either only by your friends and family, or only by other drivers with 5-star ratings, sometimes you can choose to share it, other times you can choose not to share it.

That's what happens 100 percent of the time.

It's just a question of when.

CA: Wow.

So, you mentioned the Semi, and I think we're going to announce this in September, and I'd like to know if you have anything to show us today.

EM: I'll show you a teaser shot of the track.

(laughs) I'm alive.

CA: Okay.

EM: It's definitely a tricky case for autonomous functions.

(Laughter) CA: It doesn't look like much, but it doesn't look like just a neighborhood friendly truck.

It's kind of like a villain.

what cicada is this?

EM: So this is a heavy-duty long-haul semi-truck.

That means it has the best weight capacity and long range.

So, essentially, it's meant to offload heavy trucking.

And this is something people today don't think possible.

They think the truck doesn't have enough power or enough range, but with the Tesla Semi they want to prove that an electric truck can actually deliver more torque than any diesel semi.

And if it were a tug-of-war, the Tesla Semi would be pulling the Diesel Semi uphill.

(Laughter) (Applause) CA: That's great. And in the short term, these aren't driverless.

It will be a truck that truck drivers will want to ride.

EM: Yes. What's really interesting about this is that electric motors give a flat torque RPM curve, whereas diesel motors and all kinds of internal combustion engine cars give a torque RPM curve that looks like a hill.

So this is going to be a very lively track.

You can drive around like a sports car.

No gear. It's called single speed.

CA: There's going to be a great movie made somewhere here.

I don't know what it is or how it ended, but it's a great movie.

(laughs) EM: Quite a strange test drive.

I was driving the first truck prototype.

It's really weird because you're driving around so agile and you're in this huge truck.

CA: Wait, have you driven the prototype yet?

EM: Yeah, I drove in a parking lot and I thought this was crazy.

CA: Wow. This is not vaporware.

EM: It's just like driving this giant truck and doing some crazy maneuvers.

CA: This is cool. OK, from really bad pictures to not-so-bad pictures.

This is a cute house from "Desperate Housewives" or something.

What on earth is going on here?

EM: Well, this is a picture of the future I think how things will evolve.

An electric car is running on the driveway.

Looking between the electric car and the house, there are actually three powerwalls stacked on the side of the house, and the roof of the house is a solar roof.

This is the actual solar glass roof.

CA: Okay.

EM: It's a real photo -- well, it's a photo of a real fake house.

It's a real fake house.

(Laughter) CA: So some of these roof tiles basically have solar power built into them, and they're capable of -- EM: Right. With solar glass tiles, the texture and color can be adjusted at a very fine level, the glass has something like microlouvers, and when looking at the roof from road level or near road level, all tiles look the same whether or not they have solar cells behind them.

So you get a uniform color from the ground.

If you look at it from a helicopter, you can actually look inside and see that some have solar cells behind the glass tiles and some don't.

You can't tell from street level.

CA: We put it in a sunny spot, so this roof is very affordable.

It's not much more expensive than just roofing.

EM: Yes.

We believe that the cost of the roof plus electricity will make the cost of the solar glass roof cheaper than the cost of the normal roof plus electricity.

In other words, we think this is economically easy, looks great, and lasts a long time. I even thought about doing a lifetime warranty, but people thought that, while that might sound like bullshit, it's actually tempered glass.

Even after the house collapses and there is nothing left, the glass tiles will still be there.

(Applause) CA: I mean, this is cool.

So I think we will be rolling out four types of roofing materials in the next few weeks.

EM: Well, we'll start with the first two, but the second two will be introduced early next year.

CA: So what is the scale of your ambitions here?

How many houses do you think will end up with this type of roof?

EM: I think almost every home will eventually have a solar roof.

The problem is that I think the time scale here is probably on the order of 40 or 50 years.

Therefore, on average, roofs are replaced every 20-25 years.

However, we are not going to start replacing all roofs right away.

Ultimately, though, fast forward 15 years from now and having a roof without solar power will be a rarity.

CA: Is there a mental model here that people don't understand? Due to the changing costs and economics of solar power, most homes have enough sunlight reaching their roofs to provide all of their practical power needs.

If we could get power, we would be able to meet all their needs.

You can also go off-grid.

EM: It depends on where you are and the size of the house relative to the roof area, but it's safe to say that most homes in the US have enough roof area to power all the needs of the home.

CA: So the key to the economics of these residential cars, semis, is the falling price of lithium-ion batteries that you've been betting big on as Tesla.

In many ways it's almost a core competency.

And I decided that to really own that capability, I needed to work with this guy to build the world's largest manufacturing plant that would double the world's supply of lithium-ion batteries. What is this?

EM: Yes, that's the Gigafactory. Gigafactory's progress so far.

In the end, you can roughly see the overall diamond-like shape. When fully completed, it looks like a giant diamond. That's the idea behind it, aligned due north.

It's a small detail.

CA: And eventually we'll be able to produce around 100 gigawatt hours of batteries per year.

EM: 100 gigawatt hours. Probably more, but yes.

CA: And they're actually being produced right now.

EM: Already in production. CA: You guys released this video.

EM: It's a slowed down version.

(laughter) CA: How fast does it actually go?

EM: Well, when running at full speed you can't really see the cells without a strobe light.

It's just blurry.

(laughs) CA: Elon, one of your core ideas about what makes for an exciting future is a future where we don't feel guilty about energy.

Please help me image this.

If you don't mind, how many gigafactories do we need to get there?

EM: Roughly 100.

Not 10, not 1000.

probably a hundred.

CA: I see, I think this is great.

You can imagine what it would take to get the world off of this vast amount of fossil fuels.

Like it takes $5 billion to build, or whatever, $5 billion to $10 billion.

It's kind of cool to be able to imagine that project.

And Tesla plans to announce two more this year.

EM: We expect to announce two to four Gigafactory locations later this year.

Well, maybe four.

CA: Wow.

(Applause) Can we stop teasing now?

For example, where on the continent?

I can say no.

EM: We have to address the global market.

CA: Okay.

(laughs) This is cool.

I think we should really talk about the world market.

Let me ask you one question about politics.

I'm tired of talking politics, but I want to ask you this.

Now you're in the body of giving advice to a guy -- EM: Who are you?

CA: Who said I don't really believe in climate change?

They want you to stay away from such things.

what would you say to them?

EM: Well, first of all, I think I'm only on two advisory boards. Its format consists of going around the room and asking people for their opinion on things, with meetings held every month or two.

That's my total contribution.

But I think there are some people in this room who are arguing in favor of doing something about climate change and social issues, and I have used previous conferences to argue in favor of immigration and climate change.

(Applause.) If I didn't do that, it wasn't on the agenda before.

So nothing may have happened, but at least the words were spoken.

CA: Okay.

(Applause) So let's talk about SpaceX and Mars.

Last time you were here, you talked about what seemed like some kind of incredibly ambitious dream of actually developing a reusable rocket.

And you just went and did it.

EM: Finally. It took a long time.

CA: Talk about this. what are we looking at here?

EM: So this is one of those rocket boosters coming back from very high in space at high speed.

So I delivered the upper part at high speed.

I'm guessing this was an upper stage delivery of Mach 7 or so.

(Applause) CA: It was a speeded up version -- EM: It was a slowed down version.

(laughs) CA: I thought it was a speeded up version.

But it's amazing. Have you done this 5-6 times now, with some failing before you finally figured out how to do it?

EM: Eight or nine o'clock.

CA: And for the first time, you actually reflowed one of the rockets that landed.

EM: Well, so we landed the rocket booster, got it ready to fly again, and flew it again, so that reflight is the first reflight of the orbital booster involved.

So it's important to understand that reusability only makes sense if it's quick and complete.

Reuse is therefore quick and complete, much like aircraft and automobiles.

We do not send aircraft to Boeing between flights.

CA: Yes. This has allowed us to dream of really ambitious ideas of sending lots of people to Mars in 10 or 20 years.

EM: Yes.

CA: And you designed this crazy rocket to make that happen.

Please help me understand the scale of this thing.

EM: Well, visually you can tell it's human.

Yes, that's the vehicle.

(Laughter) CA: So if it's a skyscraper, have you read about a 40-story skyscraper?

EM: Probably a little more, yes.

This thrust level is actually about four times the thrust of the Saturn V lunar rocket in this configuration.

CA: Four times the thrust of the largest rocket mankind has ever built.

EM: Yes. yes.

CA: So do some people. EM: Yes.

(Laughter) In 747 units, the 747's thrust is only about 250,000 pounds, so there are 40 747s for every 10 million pounds of thrust.

So this is the equivalent thrust of 120 747s with all engines firing.

CA: So I think you said last time that this could actually put a fully loaded 747 into orbit, people, cargo, everything, even though it's a machine designed to escape Earth's gravity.

EM: That's right. It can receive a fully loaded 747 with maximum fuel, maximum passengers and maximum cargo on the 747 as cargo.

CA: Based on this, you recently announced an interplanetary transportation system visualized like this.

This is the scene you envision, 30 years from now? 20years later?

People walking towards this rocket.

EM: I hope it's a period of 8 to 10 years.

Ambitious, that is our goal.

Our internal goals are more aggressive, but I think -- (laughter) CA: OK.

EM: The vehicle is pretty big, and it looks big compared to other rockets, but I think future spacecraft will make this look like a rowboat.

Future spacecraft will be truly gigantic.

CA: How come, Elon?

Why should we build a city of 1 million people on Mars in your lifetime? I think that's kind of what you said you wanted to do.

EM: I think it's important to have an exciting and attractive future.

I think there must be a reason why you wake up in the morning and want to live.

For example, why do you want to live?

what's the point? What inspires you?

what do you like about the future?

And if we're not there, if that future doesn't involve being in the stars and being a multiplanetary race, if that's not the future we have, then I think that's incredibly depressing.

(Applause) CA: People like to put this in an either/or situation where there are so many desperate things happening on the planet right now, from climate change to poverty, or you choose the problem.

And this feels distracting.

You shouldn't think about this.

I need to work out what's here now.

And to be fair, you've put a lot of effort into actually making it happen with your sustainable energy efforts.

But why not do it?

EM: I think it is -- I look at the future in terms of probabilities.

It's like a branching stream of probabilities, and there are actions you can take to influence those probabilities, speed up one thing, delay another.

It might introduce something new to the stream of probabilities.

Sustainable energy is possible no matter what.

If Tesla didn't exist, it would inevitably happen even if Tesla didn't exist.

It is tautological.

If there is no sustainable energy, that means there is unsustainable energy.

Eventually, energy will run out, and economic laws will force civilization to move toward sustainable energy.

A fundamental value of a company like Tesla is the degree to which it accelerates the emergence of sustainable energy faster than others.

So when you think about what the underlying interests of a company like Tesla are, if it accelerates by a decade, possibly a decade or more, I think it's going to be very good.

I think that's the good thing about Tesla's basic aspirations.

And there are races on multiple planets, and a civilization that travels through space is being born.

This is not inevitable.

It is very important to understand that this is inevitable.

A sustainable energy future seems almost inevitable, but a space-faring civilization is by no means inevitable.

Looking at space progress, in 1969 we were able to send a man to the moon.

1969.

Then there was the space shuttle.

The space shuttle can only take people to low earth orbit.

After that, the Space Shuttle was retired and the United States could no longer send anyone into orbit.

That's the trend.

The trend is to become nothing.

Those who think technology automatically improves are mistaken.

It doesn't automatically improve.

It only gets better if a lot of people try hard to make it better, but I think it actually gets worse on its own.

Look at great civilizations like ancient Egypt, they could build pyramids but forgot how to build them.

And the Romans built these wonderful aqueducts.

They forgot how to do it.

CA: Elon, listening to you and seeing all the different things you've done, it seems to me that you have this unique dual motive for all the things that I find very interesting.

One is the desire to work for the long-term good of mankind.

Another is the desire to do something interesting.

And often times one feels the need to drive the other.

At Tesla, we want to make sustainable energy a reality, and that's why we've created these very sexy and exciting cars.

Solar energy, we need to get there, so we need to make these beautiful roofs.

We're not even talking about your latest, we don't have time to do that, but you want to save humanity from bad AI, and you're trying to create this really cool brain machine interface that will give us all infinite memory, telepathy, and more.

And on Mars, it feels like what you're saying is that you need to save humanity and have a backup plan, but you also need to uplift humanity and this is the way to inspire.

EM: I think the value of beauty and inspiration is greatly underestimated, no doubt.

But let me be clear.

I'm not trying to be anyone's savior.

It is different. I'm just thinking about the future and trying not to grieve.

(Applause) CA: That's a great statement.

I think everyone here would agree that they don't. None of this happens out of necessity.

The fact that in your heart you dream these things, or dream things that no one else dares to dream, or that no one else can dream on a level as complex as you.

Elon Musk, the fact that you do that is truly amazing.

Thank you for helping us all dream a little bigger.

EM: But you'll let me know when it starts to go really crazy, right?

(laughs) CA: Thank you, Elon Musk. It was really, really great.

It was really great.

(applause)

A college education is an investment that takes 20 years.

When you grow up in a poor environment, you are not used to thinking that far ahead.

Instead, think about where you'll buy your next meal or how your family will pay for the month's rent.

Besides, my parents and my friends' parents seemed to be doing well as taxi drivers and cleaners.

It wasn't until my teenage years that I realized I didn't want to do those things.

By then I had completed two-thirds of my education and it was almost too late to turn things around.

When you grow up poor, you want to be rich.

I was no exception.

I am the second oldest of seven children and was raised by a government-assisted single mother in Queens, New York.

Growing up on a low income meant my siblings and I attended some of New York City's most difficult public schools.

In 7th grade, I missed over 60 times because I didn't want to go to class.

My high school graduation rate was 55 percent, and to make matters worse, only 20 percent of the students who graduated made it to college.

When I actually went to college, I told my friend Brennan that my teachers always told me to raise my hand if I went to college.

I was taken aback when Brennan said, "Karim, you've never asked me that question."

"Which university are you going to?"

The mere phrasing of the question made it unacceptable that he didn't go to college.

Recently, I have been asked a different question.

"How were you able to get out?"

Over the years I've been saying I'm lucky, but it's not just luck.

When my brother and I graduated from high school at the same time and then he dropped out of two-year college, I continued my studies to find out why he dropped out.

It wasn't until I arrived at Cornell University as a Presidential Research Scholar that I began to learn about the very real educational implications of being raised by a government-sponsored single mother and attending the school I went to.

That's when my brother's trajectory became completely understandable to me.

I also learned that our most admired educational reformers, like former U.S. Secretary of Education Arne Duncan and Teach for America founder Wendy Kopp, had never attended inner-city public schools like I had.

Much of our education reform is driven by an empathetic approach where people say, "Let's go help the poor kids in the city, or the poor black and Latino kids," rather than an empathetic approach where someone like me who grew up in that environment can say, "I know the adversity you're facing and I want to help you overcome it."

Now, when people ask me how I got out of there, one of my biggest reasons is that I wasn't shy about asking for help.

In a typical middle-class or wealthy family, if a child is in trouble, parents and teachers are likely to come to their rescue, even if they don't ask for it.

But if the same child was growing up poorly and didn't ask for help, it's more likely that no one will help.

The available social safety nets are virtually non-existent.

So seven years ago, I started reforming the public education system from my first-hand perspective.

And I started with summer school.

Studies show that two-thirds of the academic achievement gap, the gap in educational attainment between rich and poor children, or between black and white children, can be directly attributed to summer learning losses.

In low-income areas, children forget what they learned during the school year for nearly three months in the summer.

They return to school in the fall and teachers spend another two months re-teaching the old content.

That's 5 months.

The school year in America is only 10 months.

If children lose 5 months of learning each year, that's half of their education.

half.

If children are in school during the summer, they will not regress, but traditional summer schools are poorly designed.

It feels like punishment for children and like babysitting for teachers.

But when the school year ends in the last week of June and summer school begins just a week later, how can you expect a principal to run an effective summer program?

We don't have enough time to find the right people, get things organized, and design a compelling curriculum that excites kids and teachers.

But what if, during the summer, teachers created a program that enabled them to become aspiring educators as educational coaches?

What if we supported college-educated role models as educational fellows to help children realize their college ambitions?

What if we gave high-achieving kids the power to mentor their younger peers and encourage them to invest in their education?

What if every child was empowered as a scholar, asked where they went to college, and organized the summer school they wanted to go to, eliminating summer learning losses entirely and closing the academic achievement gap by two-thirds?

By this summer, my team will serve over 4,000 low-income children, train over 300 aspiring teachers, and create over 1,000 seasonal jobs in some of New York City's most disadvantaged neighborhoods.

(Applause.) And our kids are successful.

Two years of independent evaluation shows that children have eliminated summer learning losses, gaining one month in math and two months in reading.

So instead of returning to school three months late in the fall, they now return four months early in math and five months early in reading.

(Applause.) Ten years ago, if you had told me you had the opportunity to make an impact in the public education system by graduating from an Ivy League institution in the top 10 percent of your class and working just two months of the calendar year, I would have thought, "No, no."

Even more interesting, if you could have saved 5 months of lost time just by redesigning 2 months, imagine what you could free up by working on the rest of the calendar year.

thank you.

(applause)

Hello everyone.

It's nice to meet you all today.

This is actually what I tell people who visit the La Crosse Public Library.

And I say it because I think so.

Children who come to our library are my friends in that we care about their needs and their future.

I want them to be happy and successful.

I hope they can find great books and movies.

Or solutions to difficult problems.

Libraries in general have a great reputation for really caring about their communities.

We publish a mission and purpose statement to connect our community to the wider world.

We move minds and create lifelong learners.

And these ideals are very important to us libraries because we know their power to create a better world.

A more connected world, a more positive and empathetic world.

Books have power, information has power.

And being able to connect there is even more important for the helpless in our community.

In 1995, Betty Hart and Todd Risley published a study that found that working-class families and people on welfare experienced what is now called the "30 million word gap."

Essentially, what they have learned is that the children in these households hear very few words each day, and by the time they are three years old, there is a large gap in language learning.

And that language gap persists after enrollment, resulting in slow reading, poor reading comprehension, and overall failure to achieve success.

Children need to hear words every day, not only in our everyday conversations, but also in unusual words, words that are outside the approximately 10,000 common vocabularies we share.

Read a short excerpt from a children's book by Eric Carle, one of your favorite authors in your child's room.

Some of you may know his work "The Very Hungry Caterpillar".

But this is from "'Slowly, slowly, slowly' said the sloth."

"Finally, the sloth replied, 'Sure, I'm slow, quiet, and bored.

I am lazy and spend my time lazing around.

I'm also unfazed, languid, stoic, deadpan, dull, lethargic, calm, gentle, calm, laid-back and, well, lazy!

I like to relax, quiet and live in peace.

But I'm not lazy. ' Then the sloth yawned and said, 'That's me.'

I like to do things slowly, slowly, slowly. ” From a very short example in a book in our library, you can see how Eric Carle used 20 different words to convey the same idea to children.

Now I know that many of the family members and friends who visit the library are struggling financially.

We know that some of them live in poverty, without enough to eat and without a safe place to live.

We know that our friend James, who comes over after school and stays at the local shelter, has not read at the grade level, and probably has never read at the grade level.

We know that by the time children enter third grade, there are 30 million word count gaps and corresponding academic achievement gaps. Both of these are directly correlated with income level.

So what is the library's responsibility to address these gaps?

How can we help our friends become more successful, more educated, and one day better citizens of the planet?

It starts with ensuring free and equitable access to everything the library has to offer.

Books provide a level playing field by reaching children of all socioeconomic backgrounds.

The library offers programs based on the five components of early literacy: playing, singing, speaking, reading and writing.

It offers programs such as computer classes and vocational training for adults.

business launch.

We do all this great work for our community members, but at the same time we counter it by charging our patrons with fines and fees.

Currently, Lacrosse has 10,000 users unable to check out library materials due to fines and fees.

Narrowing down to the districts that experience the most poverty, where 82 percent of students are considered economically disadvantaged, that number rises to 23 percent of districts.

Admittedly these are local figures, but they are also true nationally.

In libraries across the country that impose fines, the most people are banned from the poorest neighborhoods.

In fact, the Colorado State Library is so concerned about this that it released a white paper stating that fear of fines is keeping poor families away from libraries.

Last year, a colleague of mine took a Lyft ride in Atlanta and started chatting about the driver and the library as we did.

And she told him that she grew up visiting the local library and loved it.

But now that she's a parent of three, she can't allow them to get library cards because of the strict deadlines the library imposes.

"It's like having another credit card that can't pay," she said.

Meanwhile, other libraries experimenting with eliminating fines, like San Rafael's, saw a 126 percent increase in children's card applications in the first few months.

When people aren't afraid of fines, they queue up to access what we offer.

So what are we telling people?

We have these two different ideas.

On the one hand, we claim to be champions of democracy and exist to enable all citizens to educate themselves.

We advocate the power of early literacy to reduce achievement gaps and eliminate word gaps.

We tell people, "We are here to help you."

On the other hand, if you're struggling financially and you've made a mistake that anyone in this room could make, if your tote in the library sits in the back door for weeks longer than it should, or you lose a CD, or spill coffee on a book, all of a sudden we can't come here anymore. Because if it does, we will make you pay for it.

And if you can't pay for it, you're out of luck.

I have been a librarian for many years.

And over the last few years, I myself have paid over $500 in late payment penalties.

Now, you may wonder why I am there every day and know for sure how the system works.

But like my friends in the library, I am busy and forget things. My house is a mess at times and I have lost a DVD or two under the sofa.

And fortunately, I've been able to pay that $500 over the past few years.

At least I had the means to do it, if not happy.

So if some of us can pay the fines and continue doing business as usual, while others make a mistake once and are no longer welcome, is the service fair and just?

it simply isn't.

So why do we continue to operate under a model that hurts the most vulnerable users the most?

There is a reason.

There are also reasons such as liability.

Some libraries really feel that it's our job to teach people responsibility.

And they don't understand that there might be a way to do it that doesn't amount to a dollar.

There is also the idea of ​​jointly sharing resources within the community, so it is necessary to take turns.

If I keep a My Little Pony movie for too long and other people want to see it, it's unfair.

And there is also money.

Community members often love their libraries and don't want us to be unable to maintain the services we provide.

Fortunately, we can deal with all this in many ways without scaring the most vulnerable.

Some libraries have moved to the Netflix model.

As you may know, I check things and return them when I'm done using them.

If you don't return it, you can't investigate further, but it's okay because once you return it, everything is allowed.

You can check out again.

Some continue to charge fines, but hope to offer alternatives to library patrons, including initiatives such as bring in canned food fine meals and read fines aloud.

Another library in Wisconsin also offers scratch tickets at the counter so you can scratch and get 10-20 percent off the fine for the day.

And there is also a pardon day.

Once a year, when I bring back the late material, everything is forgiven.

San Francisco has a library that held an amnesty day last year, welcoming 5,000 blocked patrons.

On the same day, they received more than 700,000 overdue items.

Among them was a book that was 100 years too late.

It may sound silly, but I know from experience that when there is late material, people stay away from the library instead of facing the authority of the librarian.

As Michael may have said, I've been a librarian for 15 years, but my mom lost her books when she was a little girl, so she hadn't been to the library in decades.

So these are great baby steps.

However, they are not effective enough as they make people jump through hoops.

They have to come on the right day, at the right time.

Additional food may need to be shared.

They want to read the fines out loud, so they need to be literate.

If we want people to use libraries again, fines should be abolished altogether.

Now, you might think you forgot about the money you need to fund your library, right?

However, when considering how fines work within a library budget, there are a few things to consider.

First, fines have never been a stable source of income.

These are constantly fluctuating and, in fact, have been declining over the last few decades.

People's ability to pay has also taken a hit, especially when recessions hit.

So many of our 10,000 friends without library access may not be able to pay us.

When we talk about eliminating their fines, what we are losing is money rather than the concept of money.

And third, you might be surprised to learn that the national average fine is about 1.5 percent of the library's operating budget.

Even now it can be a lot of money.

If you are considering a large library or large library system, the amount can be high.

But this is an achievable cut that most libraries can absorb.

And finally, and perhaps most importantly, collecting fines comes at a cost.

All methods of collecting fines, supplies such as mailings sent to remind people of fines, services such as inventory management services, and even phone and email notifications can cost libraries.

And staff time is a huge cost to libraries.

So our front line staff are standing there talking to people about fines, sometimes arguing with people about fines.

Removing all of these pieces and eliminating fines may actually save the library money.

Or at least it will allow us to reallocate staff time to pursuits that are better suited to the missions we talked about.

The other thing I want everyone to understand is that fines don't actually do what we think they do.

The debate over fines – whether to fine and how much to fine – is nothing new.

We've been talking about it for almost 100 years.

As long as the book is overdue.

Research after research has shown that the reason libraries are okay is because they have a strong, unsubstantiated belief in the effectiveness of returning materials on time.

Basically, we've always been fined so we're fine.

Therefore, the best option for libraries is to put their mission first.

And if asked by members of the community, they will.

When you leave here, I hope you will visit the public library and talk to librarians, neighbors, and community members who serve on the library committee.

Tell them you know how important literacy is to everyone in your community.

That if our library is really for everyone, we have to get rid of the fines and embrace the whole community.

thank you.

(applause)

In 1956, a documentary about Jacques Cousteau won both the Palme d'Or and the Oscar.

The film was called "Le Monde Du Silence" or "The World of Silence".

The premise of the title was that the underwater world is a quiet world.

Sixty years later, we know the underwater world is never silent.

Depending on the location and season, no sound is heard above water, but underwater soundscapes can be as loud as jungles and rainforests.

Invertebrates, fish, and marine mammals, such as rumbling shrimp, all use sounds.

They use sound to explore their habitats, communicate with each other, navigate, and spot predators and prey.

They also listen and use sounds to learn something about their environment.

Consider the North Pole, for example.

It is considered a vast and inhospitable place and is sometimes called a desert because it is very cold, remote and covered in ice for most of the year.

Nonetheless, there is no place on earth I would rather visit than the North Pole, especially when the days are longer and spring arrives.

For me, the North Pole really embodies the disconnect between what we see on land and what happens underwater.

Looking across the ice, everything is white and blue and cold, but I see nothing.

But if you can hear a sound underwater, it will surprise you at first, and then please you.

And while your eyes see nothing but ice for miles, your ears tell you that bowheads, beluga whales, walruses and bearded seals are out there.

Even ice makes noise.

It creaks, cracks, crackles and moans as it bumps and rubs against changes in temperature, currents and wind.

And bowhead whales sing under 100 percent sea ice in the dead of winter.

And no one would have expected that, as we humans tend to be very visual animals.

For most, if not all, people, vision is how they navigate the world.

For marine mammals that live in water, where chemical cues and light are poor, sound is the sense they see.

And because sound travels much better in water than in air, signals can be heard over great distances.

In the Arctic, this is especially important. This is because Arctic marine mammals not only need to hear each other, but also environmental cues that may indicate thick ice or open water ahead.

They spend most of their lives underwater, but remember that they are mammals and need to surface to breathe.

So they may have thin or no ice, or hear echoes from nearby ice.

Arctic marine mammals live in a rich and varied underwater soundscape.

In spring, you can sometimes hear a cacophony.

(Marine Mammal Cries) However, when the ice is frozen solid and there are no significant temperature or current changes, ambient noise levels in Arctic waters are among the lowest in the world's oceans.

But this is changing.

This is largely due to seasonal sea ice loss, a direct result of human emissions of greenhouse gases.

In effect, we are conducting a completely uncontrolled experiment on our planet with climate change.

Over the past 30 years, seasonal sea ice has decreased in Arctic regions between six weeks and four months.

This decrease in sea ice is sometimes called an increase in the open sea season.

That's when ships can navigate in the Arctic.

And not only the extent of the ice, but also the age and width of the ice changes.

Now, you may have heard that seasonal sea ice loss is causing habitat loss for sea ice dependent animals such as ice seals, walruses and polar bears.

Declining sea ice is causing increased erosion along coastal villages, altering the prey available to seabirds and mammals.

Climate change and loss of sea ice are also changing the underwater soundscape of the Arctic.

What does soundscape mean?

Those of us who make a living as eavesdroppers at sea use a device called a hydrophone, which is an underwater microphone, to record ambient noise, that is, ambient noise.

And the soundscape explains the various sources of this noise field.

What we are hearing with hydrophones is the real sound of climate change.

We hear these changes from three planes: air, water and land.

Air first.

Waves are created when wind blows over water.

These waves create bubbles. When the bubbles pop, they make a sound.

And this noise is like hiss or hum in the background.

In the Arctic, when covered with ice, most of the wind noise does not enter the water column because the ice acts as a buffer between the atmosphere and the water.

This is one reason why ambient noise levels in the Arctic are so low.

However, seasonal sea ice reductions are not only exposing the Arctic to the sound of these waves, but are also increasing the number and intensity of storms in the Arctic.

All of this is increasing noise levels in the previously quiet ocean.

Second: water.

As sea ice decreases seasonally, subarctic species migrate northward to take advantage of new habitats created by wider bodies of water.

Arctic whales, like this bowhead, do not have dorsal fins. Because they have evolved to live and swim in icy waters. Having something sticking out of your back doesn't help you much in navigating through the ice and may in fact keep the animal out of the ice.

But now, wherever we listened, the calls of fin whales, humpback whales and killer whales can be heard increasingly north and later in the season.

We are essentially hearing of Arctic invasions by subarctic species.

And I have no idea what this means.

Will there be competition for food between arctic and subarctic animals?

Could these subarctic species bring disease and parasites to the Arctic?

And how are the new sounds they're producing affecting the underwater soundscape?

And the third is land.

And by land...

I mean people.

Opening up more water means more human use of the Arctic.

Just this summer, a giant cruise ship passed through the Northwest Passage, once a legendary sea route between Europe and the Pacific.

Due to the reduction of sea ice, more and more humans are living in the Arctic.

This has allowed for increased oil and gas exploration and extraction, commercial shipping potential, and even increased tourism.

And now we know that ship noise can increase stress hormone levels in whales and disrupt feeding behavior.

An air gun that emits a loud, low-pitched "boo" every 10 to 20 seconds changed the whales' swimming and vocal behavior.

And all of these sources reduce the acoustic space in which Arctic marine mammals can communicate.

Arctic marine mammals are now accustomed to very high levels of noise at certain times of the year.

But this is mostly sounds from other animals and sea ice, and these are the sounds they have evolved through and are essential to their very survival.

These new sounds are loud and alien.

They can affect the environment not only in ways we think we understand, but also in ways we don't.

Remember that sound is the most important sense for these animals.

And not only the Arctic's physical habitat but also its acoustic habitat is rapidly changing.

It's like we pulled these animals out of the quiet countryside and threw them into the big city in the middle of rush hour.

And they cannot escape it.

So what can we do now?

We can't reduce wind speeds or stop the northward migration of subarctic animals, but we can work on local solutions to reduce anthropogenic underwater noise.

One of these solutions is to slow down Arctic ships. Because a slow ship is a quiet ship.

Access can be restricted to seasons and areas important for mating, foraging and migration.

We can get smarter about quieting our ships and find better ways to explore the ocean floor.

And the good news is that there are people working on this right now.

Ultimately, though, we humans have the hard work of undoing, or at least slowing down, human-induced atmospheric changes.

So let's get back to this idea of ​​the quiet underwater world.

It's entirely possible that many of the whales currently swimming in the Arctic were alive in 1956, when Jacques Cousteau made the film, especially long-lived species such as the bowhead, which the Inuit claim can live twice as long as a human.

And in retrospect, given all the noise we are making at sea today, it might just have been a world of silence.

thank you.

(applause)

A few days after my husband Paul was diagnosed with stage IV lung cancer, we were lying in bed at home and he said,

And I remember answering, "Yes."

Paul and I met as freshman medical students at Yale University.

He was smart, kind, and very funny.

He kept a gorilla suit in the trunk of his car and said it was for emergencies only.

(Laughter) I fell in love with Paul as I watched him take care of his patients.

He would talk to them late into the night, trying to understand their experience of being sick, not just professionally.

Later he said he fell in love with me when he saw me crying on an electrocardiogram of a stopped beating heart.

We didn't realize it yet, but even in the whirlwind days of young love, we were learning how to deal with suffering together.

We got married and became doctors.

I was working as a physician and Paul had just completed his training as a neurosurgeon when he started losing weight.

He had excruciating back pain and an unstoppable cough.

When he was admitted to hospital, a CT scan revealed tumors in Paul's lungs and bones.

We were both caring for a patient with a serious diagnosis. Now it's our turn.

We lived with Paul's illness for 22 months.

He wrote a memoir about facing mortality.

I gave birth to my daughter Caddy and we loved her and each other.

We learned firsthand how to navigate really difficult medical decisions.

The last time I took Paul to the hospital was the hardest day of my life.

When he finally turned to me and said, "I'm ready," I knew it wasn't just a courageous decision.

it was right.

Paul didn't want a ventilator or CPR.

At that moment, the most important thing for Paul was to hold our baby daughter.

Nine hours later, Paul died.

I've always thought of myself as a caregiver, and most doctors think so, but caring for Paul made that even more meaningful.

Watching him reshape his identity during his illness, learning to witness and accept his pain, and talking through his choices together. These experiences have taught me that resilience does not mean getting back on track or pretending that hard things aren't hard.

It is very difficult.

It's painful and annoying.

But it's content.

And I've learned that when we work on it together, we can decide what success looks like.

One of the first words Paul said to me after his diagnosis was, "I want you to remarry."

And I thought, oops, we can say anything out loud.

(laughs) I was so shocked and sad...

It was so sincere, generous and truly comforting because that sincerity turned out to be exactly what we needed.

In the early days of Paul's illness, we agreed to just keep saying it out loud.

Tasks like drafting wills and completing advance directives are tasks I've always avoided, but they're not as difficult as they once seemed.

I realized that completing an advance directive was an act of love, like a marriage vow.

A pact to take care of someone. A codified promise that I will be there until death do us part.

I will speak for you if necessary.

I respect your wishes.

That paperwork became a tangible part of our love story.

As doctors, Paul and I were in a good position to understand and even accept his diagnosis.

Luckily we weren't upset about it. Because we have seen many patients in dire situations and we know that death is part of life.

But knowing that is another thing. It was a completely different experience to actually live with the sadness and anxiety caused by a serious illness.

Although lung cancer has come a long way, we knew that Paul's life expectancy was likely to be months or years.

During that time, Paul wrote about transitioning from doctor to patient.

He spoke of how he suddenly felt at a crossroads and how he thought he could see the way and how he had treated so many patients that he might be able to follow in their footsteps.

But he was completely disoriented.

Paul wrote, "I saw no road, but only a desolate, deserted, bright white desert.

As if a sandstorm wiped out all familiarity.

I needed the help of a medical oncologist because I had to face my mortality and try to understand what made my life worth living. ”

The clinicians who treat Paul have further deepened their gratitude to their colleagues in the medical field.

we have a tough job.

We have a responsibility to help patients define their prognosis and treatment options. It's never easy, especially when dealing with potentially terminal illnesses like cancer.

Some people don't want to know how much time they have left, others don't.

Either way, we never have those answers.

In some cases, hope can be displaced by emphasizing the best-case scenario.

In a survey of physicians, 55% said they presented an optimistic image rather than an honest opinion when describing a patient's prognosis.

It is an instinct born of kindness.

But researchers found that when people had a better understanding of the possible consequences of illness, they had less anxiety, increased ability to plan, and reduced family trauma.

Families may struggle with these conversations, but we've also found the information to be very helpful in making big decisions.

The most notable is whether or not to have children.

For months and years, Paul didn't seem to be able to see her grow.

But he had a good chance of being present at her birth and beginning of life.

I remember asking Paul if he thought having to say goodbye to a child would make dying even more painful.

And his answer surprised me.

He said, "Wouldn't it be great if that happened?"

And we did it.

Not because we were suffering from cancer, but because we had learned that living to the fullest means accepting suffering.

Paul's medical oncologist adjusted his chemotherapy to allow him to continue working as a neurosurgeon, but at first we thought that was simply not possible.

As the cancer progressed and Paul moved from surgery to writing, the palliative care doctor prescribed stimulants to help him focus more.

They asked Paul about his priorities and concerns.

They asked him what tradeoffs he was willing to make.

These conversations are the best way to ensure that your health care aligns with your values.

Paul joked that it wasn't like "birds and bees" with his parents, where he wanted to finish it as soon as possible and pretend it hadn't happened.

If the situation changes, review the conversation again.

You keep saying things out loud.

I am eternally grateful because Paul's clinicians felt it was their job to counsel Paul through painful choices, rather than trying to give us the answers they didn't have, rather than simply trying to work things out for us...

When his body was failing, but his will to live was not.

Later, after Paul passed away, I received a dozen or so bouquets, but I sent only one.

Because she supported Paul's goals and helped him consider his choices.

She knew that living meant more than just staying alive.

A few weeks ago a patient came to my clinic.

A woman with a serious chronic illness.

And when we talked about her life and health care, she said, "I love my palliative care team.

They taught me that it's okay to say 'no'. ”

I thought it was obvious.

However, many patients do not feel it.

Compassion and Choices conducted a survey asking people about their health care preferences.

And many began their answers with the words "If I had a choice...".

If only I had a choice.

And when I read that "what if," it made me understand why 1 in 4 people are receiving excessive or unnecessary medical care, or seeing family members receiving excessive or unnecessary medical care.

It's not because doctors don't understand.

that's right.

We understand the real psychological impact on patients and their families.

The problem is that we are dealing with them too.

Half of critical care nurses and a quarter of ICU doctors have considered quitting their jobs because they were distressed by the feeling that they were providing care to some patients that did not align with their values.

However, doctors cannot be sure your wishes will be honored until they know what your wishes are.

If you had the chance to live a little longer, would you want to be on life support?

Are you more concerned about the quality than the quantity of that time?

Both choices are thoughtful and courageous, but for all of us, it's our choice.

That also applies to end-of-life and lifelong medical care.

If you are pregnant, would you like to have a genetic test?

Is Knee Replacement Right or Wrong?

Would you like to receive dialysis in a clinic or at home?

The answer is "it depends".

What is medical care that can help you live the way you want?

I hope you remember this question the next time you face a decision in the medical field.

Remember that you always have a choice. It's okay to say no to treatments that aren't right for you.

There is a poem by W.S. Merwin -- it's only two sentences long -- that's how I feel right now.

"Your absence struck me like threading a needle.

Everything I do is sewn in that color. ”

For me, the poem evokes a love for Paul and a renewed fortitude that comes from loving and losing him.

When Paul said, "I'm sure he'll be fine," he didn't mean we could cure him.

Instead, we have learned to accept joy and sorrow at the same time. We all reveal beauty and purpose despite being born and dying.

And even in the midst of sorrow and sleepless nights, I found joy.

I lay flowers on Paul's grave and watch my two-year-old run around the lawn.

Have a bonfire on the beach with your friends and watch the sunset.

Exercise and mindfulness meditation have helped a lot.

And I would like to remarry someday.

Most importantly, I can watch my daughter grow up.

I thought a lot about what I would say to her when she grew up.

"Caddy is what we're supposed to do, engaging in all experiences of life and death, love and loss.

Suffering does not make one human.

it happens in it.

When we choose to tackle our suffering together and not hide from it, our lives expand, not shrink. ”

I learned that cancer is not always a battle.

Or, if so, it may be a fight for something different than we thought.

Our job is not to fight fate, but to help each other.

Not as a soldier, but as a shepherd.

By doing so, you can make it okay, even if it's not.

By saying it out loud, by helping each other...

A gorilla suit never hurts either.

thank you.

(applause)

Chris Anderson: So Robert has spent the last few years thinking about how bizarre human behavior is, and how inadequate most of our languages ​​are to try to explain it.

And it's very exciting to hear him explain some of the thinking behind it publicly for the first time.

So, Robert Sapolsky, please.

(Applause) Robert Sapolsky: Thank you.

Fantasy always goes like this.

I overwhelmed his elite guards and charged my machine gun into his secret bunker.

He lunges at Ruger.

I knocked it out of his hand.

He rushes for the cyanide pill.

I knock it out of his hand.

He roars and attacks me with otherworldly strength.

We wrestled, fought, and managed to hold him down and handcuff him.

“Adolf Hitler, I arrest you for crimes against humanity,” I say.

This is where the Medal of Honor version of the fantasy ends and the footage cuts to black.

What if there was Hitler?

If you allow yourself, it's not hard to imagine.

Cut the spine at the neck.

Gouge out the eyes with a blunt instrument.

Punch a hole in your eardrum. cut out his tongue

He is kept alive on a respirator and tube-fed, unable to speak, move, see or hear, only feel, and then injected with a cancerous substance that suppurates and forms pustules, causing every cell in his body to scream in agony until every second feels like eternal hell.

That's what I do to Hitler.

I've had this daydream since I was a kid, and I still do it sometimes, and then my heart races - all these plans for the most evil, evil souls in history.

But the problem is that I don't really believe in souls or evil, and I think evil belongs in musicals.

Some people want to be killed, but I am against the death penalty.

But I like flimsy violent movies, but I'm in favor of strict gun control.

But there was one time when I was at a laser tag spot, hiding in a corner and shooting people, and I had a really good time.

In other words, I'm basically a confused person when it comes to violence.

Now, as a species, we clearly have a problem with violence.

We use showerheads to deliver poison gas, we send letters containing anthrax, we use airplanes as weapons, and we use gang rape as a military strategy.

We are a disastrously violent race.

But there are complications. It's not that we hate violence, we hate the wrong kind of violence.

And if it's the right kind, we'll root for it, give away medals, vote for it, and befriend that champion.

We love it when it's the right kind of violence.

And there is another complication. It's that in addition to being this disastrously violent race, we are also a very altruistic and compassionate race.

So how do we make sense of the biology of our best, worst, and all the ambiguity in between?

Well, first of all, what is utterly boring is understanding the athletic side of behavior.

The brain tells the spine and tells the muscles to do something. And hurray, you acted.

The hard part is understanding the meaning of that behavior. Because in some situations, pulling the trigger is a terrifying act. In some cases, it is heroically self-sacrificing.

In some situations, putting one's hand in another's hand means deep compassion.

In other cases it is a deep betrayal.

The challenge is to understand the biology behind our behavior, which is really difficult.

But one thing is clear: even if we think that brain regions, hormones, genes, childhood experiences and evolutionary mechanisms explain everything, we get nowhere.

Instead, every action has multiple levels of causality.

Let's look at an example.

you have a gun

There is a crisis going on: riots, violence, people running around.

An unfamiliar man runs towards you excitedly with what appears to be a pistol. I'm not sure if that expression is frightened, threatening, or angry.

I'm confused.

A stranger runs towards you and you pull the trigger.

And it turned out that this person had a cell phone in his hand.

So we asked a biological question. What is happening that caused this behavior?

What causes this behavior?

And this raises a lot of questions.

start.

What was going on in your brain one second before you pulled the trigger?

And this leads us to an area of ​​the brain region called the amygdala.

The center of violence and fear, the amygdala sets off a chain of triggers.

What was your amygdala activity level 1 second ago?

But to understand it, we have to step back a little.

What was happening in the environment seconds or minutes before it affected the amygdala?

Now, obviously, the sights and sounds of the riot, it was an appropriate one.

However, if the stranger is male, large, and of a different race, they are more likely to mistake their mobile phone for a handgun.

In addition, the frontal cortex does not work well when it is in pain, when it is hungry, when it is exhausted. The frontal cortex's job is to get to the amygdala in time to say, "Are you sure there's a gun there?"

But we have to step back further.

Now I have to look up hours to days ago and this has gotten me into hormonal territory.

For testosterone, for example, regardless of gender, if you have high testosterone levels in your blood, you're more likely to think that a blank face looks rather threatening.

Increased levels of testosterone and elevated levels of stress hormones make the amygdala more active and the frontal cortex less sluggish.

And going back a few weeks or months, where is the relevance?

This is an area of ​​neuroplasticity, the fact that the brain can change in response to experience, and if the past few months have been filled with stress and trauma, the amygdala will be enlarged.

Neurons will become more excitable and the frontal cortex will atrophy. These are all related to what is happening in that one second.

But we also go back many years, for example, to your youth.

Now, the central fact of the adolescent brain is that everything is in full swing except the frontal cortex, which is still halfway there.

They don't mature until they're about 25.

Thus, adolescence and early adulthood are times when environment and experience shape the frontal lobe into the adult version it has at that critical moment.

But it goes back even further, to infancy and prenatal times and all the different versions it can happen.

Now, obviously, it's a time when your brain is being built, and that's important, but in addition, experiences during that time create so-called epigenetic changes that permanently, in some cases, permanently activate certain genes and turn off others.

As an example of this, if the fetus was exposed to high levels of stress hormones through the mother, epigenetics would produce a more excitable form of the amygdala in adulthood, resulting in increased levels of stress hormones.

But it goes even further back to when you were still a fetus, a collection of genes.

Now, genes are very important to all of this, but importantly they don't determine anything because they work differently in different environments.

A key example here: If you have a mutation in a gene called MAO-A and you carry that mutation, you are much more likely to commit antisocial violence, but only if you were abused as a child.

Genes and environment interact, and what happens in the second before you pull the trigger reflects the lifetime of that gene-environment interaction.

Now, surprisingly, we have to go back several centuries.

what did your ancestors do?

And if, for example, they were nomads, pastoralists, people living in the deserts and steppes with herds of camels, cows and goats, it is likely that they would have invented a warrior class, retaliatory violence, clan vengeance, and, amazingly, centuries later, what is called a culture of honor, which still influences the values ​​you were raised with.

But we have to go back millions of years more. Because if we are talking about genes, we are implicitly talking about genetic evolution.

And what you're seeing are patterns across different primate species, for example.

Some of them evolved towards very low levels of aggression, some evolved in the opposite direction, and in every way floating in between is humans, again this confused, largely undefined species, with all the potential to go either way.

So what has this got us?

Essentially, what we're seeing here is that if we want to understand an action, whether it's terrifying action, or startling action, or confusing action in between, we need to consider what happened one second to a million years ago, and everything in between.

So what can we conclude at this point?

Formally, it's complicated.

Wow, really helpful.

It's complicated, and it's better to be really careful, careful, before concluding that we know the cause of the behavior, especially if it's a highly judging behavior.

Now, for me, the most important point about all of this is that it has to do with change.

Every part of the biology I have mentioned here can change in different circumstances.

For example, ecosystems change.

Thousands of years ago, the Sahara Desert was a lush grassland.

Culture changes.

In the 17th century, the most feared race in Europe was the Swedes, who were rampaging everywhere.

This is what the Swedish military is doing now.

They haven't been at war for 200 years.

Most importantly, the brain changes.

Neurons grow new processes.

The circuit will be cut.

Everything in the brain changes, and from there comes an example of amazing human change.

The first is a man named John Newton. He was an English theologian who played a central role in the abolition of slavery from the British Empire in the early 1800s.

And amazingly, this man spent decades as a slave ship captain in his youth, then as an investor in slavery, and got rich from there.

And something changed.

something changed in him. That's what Newton himself celebrated in his most famous work, the hymn he wrote, "Amazing Grace."

This is a man named Yoshiharu Abe, who was leading a Japanese bomber squadron to attack Pearl Harbor on the morning of December 6, 1941.

And this is the same man embracing a man who survived a ground attack that day, 50 years later.

Then, as an old man, Yoshiharu Abe gathered at a ceremony for survivors of the attack on Pearl Harbor and apologized in broken English for what he had done when he was younger.

Now it doesn't necessarily take decades.

In some cases, amazing changes can occur in just a few hours.

Consider the Christmas truce of World War I in 1914.

The powers signed a short-term truce to allow their soldiers to come out and retrieve the bodies from the no man's land between the trench lines.

And soon British and German soldiers were doing it, then helping each other carry bodies, helping dig graves in the frozen ground, then praying together, spending Christmas together exchanging presents, playing soccer together the next day, and exchanging addresses so they could meet after the war.

This truce lasted until police arrived and said, "If you don't go back to killing each other, I'll shoot you."

And all the time it took for them to develop a whole new category of "us" here, all of us here in the trenches on both sides, dead for no reason, and who are "they", the faceless power behind the front lines who used them as pawns.

And in some cases, changes can occur in seconds.

The My Lai Massacre is perhaps the most horrifying event of the Vietnam War.

A brigade of American soldiers stormed a defenseless village filled with civilians, killed 350 to 500 people, gang-raped women and children, and dismembered their bodies.

It was appalling.

It was appalling that it happened, that the government denied it, that in the end it was just a slap on the wrist by the US government, and that it was almost certainly not an anomalous event.

This man, Hugh Thompson, this is the man who stopped the Mirai massacre.

He was piloting a helicopter gunship, landed there, got off, watched American soldiers shoot babies and old women, figured out what was going on, then got in the helicopter and did an action that broke the lifelong conditioning of who was "us" and who was "them."

He landed a helicopter between the surviving villagers and American soldiers, trained them to point machine guns at his fellow Americans, and said, "If you don't stop killing, I will mow down you."

Well, these people aren't as special as we are.

Same neurons, same neurochemistry, same biology.

What we are left with here is the inevitable cliché: "Those who do not study history are doomed to repeat it."

Here we have the opposite.

Anyone who does not study the history of human extraordinary change, who does not study the biology that can change us from the worst to the best, who does not do this, is doomed to never be able to repeat these incandescent and wonderful moments.

thank you.

(Applause) CA: A talk that really gives you a new mental model of something. These are some of my favorite TED talks and I just got one.

Robert, thank you very much. Good luck with the book.

It was amazing. We will try to get you here in person for a year.

Thank you very much.

RS: Thank you. Thank you everyone.

If you break a mundane thing, like a coffee cup, in half, then in half again, and so on, where do you end up?

Can you go on forever?

Or will we find an indivisible set of building blocks from which everything is made?

Physicists have discovered the latter, that matter is made up of elementary particles, the smallest substances in the universe.

Particles interact according to a theory called the "Standard Model".

The Standard Model is a very elegant encapsulation of the strange quantum world of indivisible, infinitely small particles.

It also describes the forces that govern how particles move, interact, and combine to give shape to the world around us.

So how does it work?

If you zoom in on the cup fragment, you can see the molecules that are made up of bonded atoms.

A molecule is the smallest unit of any chemical compound.

An atom is the smallest unit of an element in the periodic table.

But atoms are not the smallest unit of matter.

Experiments show that each atom has a small, dense nucleus surrounded by a cloud of even smaller electrons.

As far as we know, electrons are one of the fundamental, indivisible building blocks of the universe.

This was the first Standard Model particle ever discovered.

Electrons are bound to the nucleus by electromagnetism.

They are attracted to each other by exchanging particles called photons, which are quanta of light that carry electromagnetic forces, one of the fundamental forces in the standard model.

Since the nucleus contains protons and neutrons, there are more secrets to unravel.

Once thought to be elementary particles themselves, physicists discovered in 1968 that protons and neutrons are actually made up of indivisible quarks.

A proton contains two "up" quarks and one "down" quark.

A neutron contains two down quarks and one up quark.

The nuclei are held together by strong forces, another fundamental force in the standard model.

Just as photons carry electromagnetic forces, particles called gluons carry strong forces.

Electrons, along with up and down quarks, appear to be all that is needed to build atoms and thus describe ordinary matter.

However, high-energy experiments revealed that there are actually six down quarks and quark quarks. Up, Strange & Charm, Bottom & Bottom Stop - and they come in a wide range of chunks.

The same is true for electrons, which have heavier siblings called muons and tau.

Why are there three (and only three) different versions of each of these particles?

This remains a mystery.

These heavy particles are produced only momentarily during high-energy collisions and cannot be seen in everyday life.

This is because they disintegrate very quickly into lighter particles.

Such decay involves the exchange of force-carrying particles called W and Z, which have masses unlike photons.

They are responsible for the final force of the standard model, the weak force.

This same force allows protons and neutrons to change into each other. This is a key part of the nuclear fusion interactions that drive the Sun.

Direct observation of W and Z required high-energy collisions provided by particle accelerators.

There is another class of Standard Model particles called neutrinos.

They interact with other particles only by weak forces.

Trillions of neutrinos (many of which are produced by the sun) whirl through us every second.

Weak interaction measurements have revealed that there are different types of neutrinos related to electrons, muons and tau.

All of these particles also have antimatter versions and have opposite charges, but are otherwise identical.

Matter and antimatter particles are created in pairs by high-energy collisions and annihilate each other when they meet.

The final particle in the standard model is the Higgs boson, a quantum ripple in the cosmic background energy field.

According to the Standard Model, all elementary matter particles acquire mass through interaction with this field.

The ATLAS experiment at the Large Hadron Collider is a thorough study of the Standard Model.

By accurately measuring the particles and forces that make up the universe, ATLAS physicists can find answers to mysteries that the Standard Model cannot explain.

For example, how does gravity affect us?

What is the actual relationship between force carriers and matter particles?

How can we explain the still unknown "dark matter" that accounts for most of the mass of the universe?

While the Standard Model provides a beautiful description of the world around us, the universe still leaves many mysteries to explore.

Last year, I told the story of Project Orion in 7 minutes. This project is a highly implausible piece of technology that technically could have worked, but there was a year of political grace in which it could come to fruition.

So it didn't happen. It was a dream that didn't come true.

This year, we tell the story of the birth of digital computing.

This was the perfect introduction.

And it worked. It really happens and machines are all around us.

And it was an inevitable technique.

The people I'm about to talk to about this, if they didn't do it, someone else would have.

So it was the right idea at the right time.

This is Barrichelli's world. This is the universe we live in now.

It is in this universe that these machines are now doing everything, including changing biology.

I start with the first atomic bomb on Trinity, the Manhattan Project. It was a little like TED. A lot of very smart people have gathered.

And the smartest three were Stan Ulam, Richard Feynman and John von Neumann.

And it was von Neumann who said after the bomb that he was working on something far more important than the bomb: thinking about computers.

I mean, he wasn't just thinking about them. he built it This is the machine he made.

(Laughter) He built this machine, and we used these little parts to give a beautiful demonstration of how this really works. And it's an idea that goes back a long time.

The first person to actually explain this was Thomas Hobbes, in 1651, who explained how arithmetic and logic were one and the same, and that if you wanted to do artificial thinking and artificial logic, you could do it all with arithmetic.

He said he needed addition and subtraction.

Leibniz, who came a little later (this is in 1679), showed that even subtraction is not necessary.

Everything can be done with addition.

Here you'll find all the binary arithmetic and logic that drove the computer revolution.

And Leibniz was the first to speak seriously about building such a machine.

He talked about doing it with marbles, using gates and what we now call shift registers to move the gates and drop the marbles onto the railroad tracks.

And that's what all these machines do, except instead of doing it with marbles, they're doing it with electrons.

Then fly to von Neumann in 1945. It's like he reinvented the exact same thing.

And in 1945, after the war, there was electronics trying to actually build such a machine.

June 1945--no bombs have actually been dropped yet--and von Neumann has put together a theory for actually building this. This goes back to Turing. Before that, Turing gave the idea that you could do all this with a very stupid little finite state machine, just by reading the tape and reading the tape.

Another origin of von Neumann's behavior was the difficulty of predicting the weather.

Lewis Richardson wondered how this could be done by taking cellular array people and giving them little chunks and integrating them.

Here we have an electric model that shows a mind that has a will but can only carry out two ideas.

(Laughter) It's really the simplest computer.

The reason we need qubits, basically, is that qubits only have two ideas.

Combining many of these, you get the essence of a modern computer: computing unit, central controller, memory, storage media, input and output.

However, there is one catch. This is deadly. You know, I checked that when launching these programs.

The instructions governing this operation should be thoroughly detailed.

Therefore programming must be perfect to work.

Looking at this origin, the classical history traces everything back to ENIAC.

But really, the machine I'm about to talk about, the machine in the Institute for Advanced Study, is way up there, but it really should be down there. So I'm going to revise history and give some of them more credit.

Such a computer would open up a universe that is currently unreachable by any device.

So a whole new world opened up for these people to see.

It was the man in the middle, Vladimir Zworykin of RCA, who was supposed to build this machine.

RCA decided not to get into computers in perhaps one of the most terrible business decisions of all time.

However, the first meeting took place in November 1945 at the RCA offices.

RCA started it all and said the future is TV, not computers.

We had everything we needed. We had everything to run these machines.

Von Neumann and military logicians and mathematicians put this together. Next, I needed a place to build it.

When RCA said no, they decided to build it in Princeton, where Freeman works at the lab.

There I grew up as a child.

That's me, my sister Esther, who I spoke to you before. So we both go back to the birth of this thing.

It was the old Freeman and that was me.

And this is von Neumann and Morgenstern, who wrote "Game Theory".

All these forces converged on Princeton.

Oppenheimer made the bomb.

This machine was actually used mainly for bomb calculations.

And Julian Bigelow, who replaced Zworkiekin as engineer, actually figured out how to build this with electronics. The first programmers were all the people who came together to work on this and the lead women who actually did most of the coding.

They were prototype geeks, or geeks.

They were unfamiliar with the laboratory.

This is a letter from the director concerned that it is "especially unfair with regard to sugar".

(Laughs) I can read the letters.

(Laughter) Hackers got into trouble for the first time.

(laughter).

They were not theoretical physicists.

These guys are like real soldering guns and they actually built this.

And we now take for granted that each of these machines contains billions of transistors and performs billions of cycles per second without failing.

They used vacuum tubes, a very narrow and sloppy technology, to actually achieve binary operation from radio tubes.

They actually used a common radio tube, the 6J6, because they found it to be more reliable than the more expensive tubes.

And what they did in the institute was publish every step of the way.

Since the report was published, this machine has been cloned in 15 other locations around the world.

And it really was. It was the original microprocessor.

Now every computer is a copy of that machine.

The memory was in a cathode ray tube, and the surface of the cathode ray tube had many specks and was very sensitive to electromagnetic interference.

So there are 40 of these tubes, like a V-40 engine driving memory.

(Laughter) At first it was input and output on teletype tape.

It is a wire drive using a bicycle wheel.

This is the original hard disk that is installed in machines today.

Then I switched to magnetic drums.

This is the modification of IBM equipment that later became the origin of the entire data processing industry at IBM.

And this is the beginning of computer graphics.

"Turn on graph beam". This next slide is, as far as I know, the first digital bitmap display from 1954.

So von Neumann was already in a theoretical cloud, doing abstract research on how to build reliable machines out of unreliable components.

Longtime sugary tea drinkers were journaling about trying to make this work with 2,600 tubes that failed half the time.

That's what I've been doing for the last six months: looking at logs.

"run time: 2 minutes, input, output: 90 minutes"

This involves a large amount of human error.

So they are always trying to understand what a machine error is. What is Human Error?

What is code and what is hardware?

This is an engineer staring at tube number 36, trying to figure out why memory is out of focus.

He had to concentrate his memory, but he seems to be fine.

So I had to focus on each tube just to keep the memory running, not to mention the software issues.

"No, I'm home." (Laughter) "I can't follow this. Where's the directory?"

So they're already complaining about the manual: "Before you get sick of it and close it..." "General Arithmetic: Operations Log".

Burn a lot of late night oil.

"MANIAC", which became an acronym for the machine Mathematical and Numerical Integrator and Calculator, "lost memory."

"MANIAC regained its memory when the power was turned off." "Machine or human?"

"Oh!" So they decided it was a code problem.

"I think I found a problem with the code."

"Code error, machine is innocent."

"Damn, I can be as stubborn as this too."

(Laughter.) "And then dawn came." So they ran all night.

It ran 24 hours a day, primarily bomb calculations.

"Everything so far is a waste of time." "What good is it? Good night."

"The master control is off. Oh my god, don't do it."

"It's short -- don't turn on the machine."

"The IBM machine is applying a tar-like substance to the cards. The tar is falling from the roof."

So they were working under really tough conditions.

(Laughter) Here it says, "a rat has invaded the blower behind the regulator rack. I set the blower to vibrate. Result: no more rats."

(Laughter) "Here's a mouse. Born: ?. Died: May 1953, 4:50 AM."

(Laughter) There's an inside joke someone wrote. "Here lies Marston Mouse."

Mathematicians know this because Marston was a mathematician who opposed the existence of computers.

"I picked up a thunderbug from a drum."

This corresponds to 2,000 cycles per second. "Yes, I am a chicken." So 2 kilocycles is a slow rate.

The high speed was 16 kilocycles.

I don't know if you remember Macs were 16 megahertz, but that's slow.

"We replicated both results.

Assuming one result is correct, how do we determine which is correct?

This is the third different output.

I know when you lick me ”

(Laughter) "I've reproduced the error before."

"Machine can run. No problem. Code is fine."

"It only happens when the machine is running."

And sometimes things work out.

"Making beautiful things with machines, forever joy." "Perfect run."

"The parting thought was that when there was a bigger and better mistake, we were going to make a mistake."

So no one could know that they were actually designing the bomb.

They are designing a hydrogen bomb. But late one night someone in the logbook finally drew a bomb.

So that was the result. It was Mike who developed the first thermonuclear bomb in 1952.

It was designed by that machine in the woods behind the lab.

So von Neumann called on freaks from all over the world to tackle all these problems.

Barrichelli, he came in to do what we now call artificial life, to see if he was a viral geneticist far ahead of his time in this artificial universe.

He's still ahead of some things that are currently being done.

I'm trying to launch an artificial genetic system that runs inside a computer.

It Began -- His world began on March 3, 1953.

So that's almost exactly what next Tuesday was 50 years ago.

And he saw everything from this point of view - he could read the binary code directly from the machine.

He had a great relationship.

Others were unable to get the machine up and running. It always worked for him.

I have duplicated the error.

(Laughter) "Dr. Barrichelli claims the machine is wrong and the code is right."

There he designed and operated this world.

When the bomber got home, he was allowed into the house.

If anyone remembers Stephen Wolfram who reinvented this, he was running it all night and running these things.

and he published it. It disappeared without being locked up.

published in the literature.

"If you can make creatures so easily, why don't you make some yourself?"

So he decided to try and implement this artificial biology in a machine.

And he discovered all this. It was like a naturalist coming in and observing this tiny 5,000-byte universe and seeing all the things that we see happening in the outside world and in biology.

This is part of his world generation.

But they will remain just numbers. They don't become living things.

they should have something

There must be a genotype, and there must also be a phenotype.

They have to go out and do something. And he started doing that, giving these little numerical creatures something they could play with other machines like playing chess.

And they started evolving.

And after that he traveled around the country.

Whenever a new fast machine came along, he started using it to see exactly what was going on.

He envisioned programs not turning off, but continuing to run when you quit them, and basically doing all sorts of things like Windows does, running as multicellular organisms on many machines.

And he understood that evolution itself is an intellectual process.

It was nothing like the intelligence of its creators, but a huge parallel computation that would have had some intelligence of its own.

And he bothered to say that he wasn't saying this was lifelike or a new kind of life.

It was another version of the same thing happening.

And there really is no difference between what he was doing inside the computer and what nature was doing billions of years ago.

And can you do it again now?

So when I went into these archives looking for these materials, oh my God, one day an archivist came in and said, 'I think I found another box that had been thrown away'.

And it was his world on punch cards.

Fifty years later, it's still sitting there. It's a kind of suspended animation.

Here are the steps to follow: This is actually the source code for one of those universes, with a note from an engineer saying there are some issues.

"There must be something in this code that I haven't explained yet."

And I think that's really true. We still don't understand how these very simple instructions can become so complex.

What is the line between when it is alive and when it is truly alive?

These cards are now saved thanks to my showing up.

And the question is, should we do them?

Look, can I run them?

Would you like to publish it on the Internet?

These machines will think there is a universe whether or not they--if these creatures are alive now--whether or not they died and went to heaven.

My laptop is 100 million times larger than the universe they lived in when Barrichelli quit the project.

He was thinking way ahead of how this would really grow into a new kind of life.

And it is happening!

Barriselli imagined it when Juan Enriquez told us about these 12 trillion bits going back and forth, all these genomics data being sent to proteomics labs. I suspect that this digital code within these machines is actually beginning to encode, that is, already encoded from nucleic acids.

We started doing PCR and small strand synthesis of DNA and have been doing it ever since.

And soon we will actually be synthesizing proteins, which opens up a whole new world, as Steve showed.

It is the world that von Neumann himself envisioned.

This was published after his death and is like his unfinished memo on self-replicating machines, about what it takes to jump-start them to the point where they start reproducing.

We actually needed three people. Barrichelli had the concept of code as a living thing. Von Neumann wondered how a machine could be built. Today, by final count, 4 million von Neumann machines are built every 24 hours. And Julian Bigelow, who died 10 days ago – this is the obituary of John Markov – was the key missing link, the engineer who joined the company and knew how to build tubes and make them work.

And all our computers have a copy of the architecture he had to design with paper and pencil one day.

And we are very grateful for that.

And he described, in a very generous way, the ethos that, in the 40s, brought together various people into the Institute for Advanced Study to carry out this project, and made it freely available worldwide, without patents, restrictions, or intellectual property disputes.

This is the last entry in the logbook when the machine was shut down in July 1958.

And it's Julian Bigelow who was running it until midnight when the machine was officially off.

That's it.

thank you very much.

(applause)

Install namaskar.

I'm a movie star, 51 years old and haven't used botox yet.

(Laughter) I mean, I'm clean, but I act like the 21-year-old you see in the movies.

yes i will.

I sell dreams and love to millions back home in India who think I'm the best lover in the world.

(laughter) If you don't tell anyone, I'll say no, but I never let go of that assumption.

(Laughs) I know there are a lot of people here who haven't seen my work, and I'm really sorry.

(Laughter.) (Applause.) The fact that I'm completely self-centered, as a movie star should be, doesn't go away.

(Laughter) Then my friends Chris and Juliet called me here to talk about the future "you."

Naturally, I will be talking about who I am now.

(Laughter.) Because I truly believe that humans are a lot like me.

(laughs) Yes. that's right.

It's an aging movie star, struggling with all the newness that surrounds him, wondering if it was the right thing to do in the first place, but still trying to find a way to shine.

I was born in a refugee colony in New Delhi, the capital of India.

And my father was a freedom fighter.

My mother, well, was just a combatant, just like her mother.

And just like the original Homo sapiens, we struggled to survive.

I lost my parents when I was in my early 20's. I have to admit I was a little careless now, but (laughter) I remember the night my father died. I also remember a local driver who drove us to the hospital.

"Dead people don't get tips very well," he muttered something, and left into the darkness.

I was just 14 years old at the time, and I put my father's body in the back seat of the car and drove home from the hospital next to my mother.

And my mother looked at me while I was crying quietly and said, "Son, when did you learn to drive?"

So, after thinking about it, I realized that I said to my mother, "Now, mother."

(Laughter.) From that night on, I learned the crude tools of survival, much like adolescent humans.

To be honest, my life framework was very simple back then.

I just ate what I was given and did whatever I was told.

I thought celiac was a vegetable, and of course vegans were Mr. Spock's lost comrades-in-arms in "Star Trek."

(Laughter) You married the first woman you dated, who was a technician who could fix car carburetors.

I really thought gay was a sophisticated English word meaning happiness.

And, as we all know, lesbians were the capital of Portugal.

(Laughter) Where have I been?

We depended on systems created by the hard work and sacrifices of previous generations to protect us, and we felt that governments were actually working for our betterment.

The science was simple and logical, and Apple at that time was still just a fruit, first owned by Eve, then Newton, and not previously owned by Steve Jobs.

And "Eureka!" I yelled when I wanted to run naked on the streets.

You went everywhere for work and people mostly welcomed you.

At the time, the term migration was still limited to Siberian cranes, not humans.

Most importantly, you were who you are and said what you think.

And in my late twenties, I moved to the sprawling metropolis of Mumbai, and my paradigm began to change, as did my newly industrialized and ambitious humanity.

Things started to look a little different in the urban hustle and bustle that demanded a new, more decorated survival.

I met people, faces, races, genders, moneylenders from all over the world.

Definitions have become increasingly fluid.

At that time, work began to define me in an overwhelmingly egalitarian way, and to me it began to make all systems less reliable and felt too thick to hold the diversity of humanity and its need for progress and growth.

Ideas flow more freely and faster.

And I have experienced the miracle of human innovation and cooperation, and my own creativity fueled by the resourcefulness of this collective effort has catapulted me to superstardom.

I started feeling like I had arrived, and generally, by the time I turned 40, I was really, really flapping my wings.

I was all over the place.

Look? By that time I had made 50 films and 200 songs and had been knighted by the Malaysians.

I was given the highest civilian honor by the French government, a title that I cannot pronounce for the rest of my life.

(laughter) I'm sorry, France, and thank you, France, for doing that.

But much bigger than that was meeting Angelina Jolie -- (Laughter) two and a half seconds.

(Laughs) And I'm sure she also remembers that encounter somewhere.

Ok, maybe not.

And I sat next to Hannah Montana at the round dinner table, with her back to me most of the time.

Like I said, I was flying from Miley to Jolie and humanity was soaring with me.

In fact, we both nearly flew off the steering wheel.

And we all know what happened after that.

Internet happened.

I'm in my late 40s and started tweeting like a canary in a birdcage. I assumed that people who looked into my world would admire the miracles that I believed in.

But something else was waiting for me and humanity.

As you know, we expected ideas and dreams to expand as the world became more connected.

We never negotiated a village-like enclosure of ideas, judgments and definitions that flowed from the same place where freedom and revolution took place.

Everything I said took on new meaning.

Everything I did, good, bad, ugly, was for the world to comment on and judge.

In fact, everything I didn't say or do met the same fate.

Four years ago my dear wife Gauri and I decided to have our third child.

Online, he was claimed to be the 15-year-old first child, Aiko.

Apparently, he sowed wild oats with her while driving her car in Romania.

And yes, there was a fake video to accompany it.

And we were so upset as a family.

My son is 19 now and still when you say hello to him he turns around and says "But, brother, I didn't even have a European driver's license."

(Laughter) Right.

Slowly in this new world, reality became virtual, virtual became real, and I felt like I couldn't be who I wanted to be or say what I really thought, and at this point humanity completely identified with me.

I think we were both going through a midlife crisis and humanity was becoming an overexposed prima donna like me.

It started selling everything from hair oil to diesel generators.

Humanity was buying everything from crude oil to nuclear reactors.

You know, I even tried to wear a tight-fitting superhero suit to reinvent myself.

I have to admit I failed miserably.

As an aside, I'd like to say on behalf of Batman, Spider-Man, and Superman all over the world, that superhero suit really hurts my groin, and I have to commend them.

(Laughter) Yes, I'll be honest. I have to tell you this here.

TRUE.

Coincidentally, I even invented a new form of dance that I hadn't noticed before, and it caused a big fuss.

So, if you don't mind, and if you've seen me a little bit, and I'm totally shameless, I'll show you.

It was called lungi dance.

If it's okay with you, I'll show you. Other than that, he's talented.

(Cheers) So this is how it turned out.

long dance. long dance. long dance. long dance.

long dance. long dance. long dance. long dance.

long dance. long dance. long dance. length.

that's it. It turned into a rage.

(cheers) It really was.

As you can see, no one but me could understand what was going on. And I didn't mind at all. For the whole world, and all mankind, seemed as confused and lost as I was.

I didn't give up then.

I, like many others, have even tried to reconstruct my identity on social media.

I thought that if I made philosophical tweets, people would think I was on board, but among the reactions I got from those tweets were some very confusing acronyms that I didn't understand. Look?

Roffle, lol.

“Adidas,” someone replied to my thought-provoking tweet, and I wondered why I would mention the name of the sneaker. I mean, why are you replying to me with the name of the sneaker?

And when I asked my 16 year old daughter, she told me.

'Adidas' now means 'I dream of sex all day long'.

(laughs) Really.

I didn't know if you knew that.

So I replied to Adidas in bold, "Oh my God," and secretly thanked him for not changing some abbreviations and such.

Oh my God

But here we are.

As I said earlier, I am 51 years old and all I want to say, albeit a daunting abbreviation, is that if ever there was a critical moment in human existence, it is now. Because you are brave now.

You are full of hope today.

You are innovative and resourceful, but of course, you are tediously inexplicable.

And in this moment of enchanting, imperfect existence, feeling a little courage just before coming here, I decided to take a closer look at my face.

I found myself looking more and more like a wax figure from Madame Tussauds.

(laughter) Yes, and the moment I realized that, I asked the most central and pertinent question to humanity and to me. "Do you need to fix your face?"

TRUE. As I said earlier, I am an actor, a modern expression of human creativity.

Where I come from is an inexplicable but very simple source of spirituality.

India in its immense generosity somehow decided that I, the Muslim son of a disenfranchised warrior who happened to be in the dream-selling business, should become the king of Indian romance, the greatest lover this country has ever seen, the "Badshah of Bollywood"...

with this face.

yes.

(Laughter) It's been described as ugly, unconventional, and oddly lacking in chocolate.

(Laughter) The people of this ancient land have embraced me with boundless love, and I have learned from them that neither power nor poverty can make life more magical or more twisted.

I have learned from the people of my country that the dignity of life, human beings, cultures, religions and nations really lies in the capacity for grace and compassion.

I have learned that what moves you, what inspires you to create and build, what prevents you from failing, what helps you survive, is perhaps the oldest and simplest emotion known to mankind, and that is love.

My country's mystical poet famously wrote, (Reciting poem in Hindi) (End of poem) Rough translation of this is whatever -- yes, if you know Hindi, clap your hands, yes.

(Applause) It's very hard to remember.

This roughly translates to saying that while we may read every book of knowledge and pass it on through innovation, creativity and technology, humanity will never be wiser about the future unless it is combined with love and compassion for our fellow man.

The two and a half letters that make up the word प्रेम, which means 'love', if one can understand and practice them, that alone is enough to enlighten mankind.

That's why I truly believe that the future "you" must be the one you love.

Otherwise, prosperity will stop.

It perishes in narcissism.

Therefore, you can use your power to build walls to keep people out, or you can use your power to break barriers and welcome people in.

You can use your faith to terrorize people and terrorize them into submission, or you can use your faith to encourage people to reach the highest heights of enlightenment.

You can use your energy to create nuclear bombs and spread the darkness of destruction, or you can use it to spread the joy of light to millions of people.

You may ruthlessly pollute the seas and cut down all forests.

We can destroy ecosystems, or we can lovingly look at them and regenerate life from water and trees.

You can land on Mars and build an armed fortress, or you can seek out life forms and species to learn and respect.

And all the money we all make can be used to wage useless wars, to get little kids with guns to kill each other, or to make more food to feed their bellies.

My country has taught me that the human capacity to love is like piety.

It shines in a world that civilization has already altered too much.

The talks that have taken place here over the last few days, the wonderful people that have come to show their talents, the personal achievements, the innovation, the technology, the science, the knowledge that we gain from attending TED Talks, and all of you, are reason enough for us to celebrate our future "we."

But in that celebration, the quest to cultivate the capacity for love and compassion needs to assert itself, as well.

So I believe that the future "you" is the infinite you.

It's like a circle, called a chakra in India.

It ends where it begins to complete itself.

You, who perceive time and space differently, understand both your unimaginably great importance and your utterly insignificance in the larger context of the universe.

You who love with a pure heart, see with true eyes, dream with a pure clarity of mind, return to your innate human innocence.

The future “you” must be like an aging movie star who has been made to believe there is a possibility of a world that totally, totally, self-obsessively loves itself.

It has to be you to create a world—indeed, a world that is its own best lover.

That's what I believe should be the "you" of the future, folks.

thank you very much.

thank you.

(Applause.) Thank you.

(Applause.) Thank you.

(applause)

I'm Lee Sedol.

Lee Sedol is one of the best Go players in the world, and he's had what his friends in Silicon Valley call the "holy cow" moment (laughter) when he realizes that AI is actually progressing much faster than we expected.

In other words, humans have lost on the Go board. What about in the real world?

Well, the real world is much bigger and much more complex than the board.

It's become much less noticeable, but it's still a matter of decision.

And when you think about the technology that's coming out more and more...

Noriko Arai said reading is not yet done on machines, at least in terms of understanding.

But it will happen, and when it does, shortly thereafter the machine will read everything mankind has ever written.

And that, as we've already seen with Go, will enable machines to be more proactive than humans, and the more information they have access to, the better they can make decisions in the real world.

So is it a good thing?

Well, I hope so.

Our entire civilization, everything we hold dear, is based on our intelligence.

And if we could get more intelligence, there would be really no limits to what humanity could do.

And, as some have said, I think this could be the greatest event in human history.

So why do people say AI could spell the end of humanity?

is this new?

Is it just Elon Musk and Bill Gates and Stephen Hawking?

Not really. This idea has been around for a while.

Here is a citation. "Even if we can keep the machine in a subordinate position by turning it off at strategic moments"—and we'll get back to that idea of ​​"turning off" later, "we as a species should feel very humble."

So who said this? This is Alan Turing in 1951.

As we all know, Alan Turing is the father of computer science and, in many ways, the father of AI.

When you think about this problem, the problem of creating something more intelligent than your own species, you might call it the "gorilla problem." Because gorilla ancestors did this millions of years ago. And now we can ask the gorilla: "Was this a good idea?"

So they had a meeting to discuss whether it was a good idea, and after a while they came to the conclusion, "No, this was a terrible idea."

Our species is in dire straits.

In fact, you can see existential sadness in their eyes.

(Laughter) So what can we do about this uncomfortable feeling that it might not be a good idea to create something smarter than our species?

Well, actually there is nothing but quitting AI. No, because of all the advantages I just mentioned, and because I'm an AI researcher.

In fact, I would like to continue working with AI.

So we actually need to clarify the issue a bit more.

What's the problem?

Why can great AI cause catastrophe?

So here's another quote. “Better be sure enough that the purpose built into the machine is the one we really want.”

That's what Norbert Wiener said in 1960, shortly after seeing one of the very early learning systems learn to play checkers better than its creator.

But this could have been said of King Midas as well.

King Midas said, "I want everything I touch to turn to gold." And he got exactly what he asked for.

That was, so to speak, what he was thrown into the machine, after which his food and drink, and his relatives, were turned into gold, and he died of misery and hunger.

Therefore, we will call this the "King Midas Problem" of stating a goal that is not truly aligned with what we actually want.

In modern parlance, we call this the "value alignment problem."

Setting the wrong goals is not the only part of the problem.

There is also another part.

When you set a goal for a machine, even if it's as simple as "bring me a cup of coffee", it says to itself:

Someone might switch me off.

Well, we have to take steps to prevent that.

Disable the "off" switch.

I will do anything to protect myself from interference with this purpose given to me. ”

So the problem we face is a very defensive and single-minded pursuit of goals that are not, in fact, aligned with the true purpose of humanity.

And indeed, that is the key takeaway from this talk.

One thing to remember is that you can't go get coffee when you're dead.

(Laughter) It's very simple. Just remember that. Ask yourself three times a day.

(Laughter) And actually, this is exactly the plot of 2001: A Space Odyssey. HAL has a purpose, a mission that is inconsistent with humanity's purpose, which leads to this conflict.

Fortunately, HAL is not superintelligent.

He's pretty smart, but eventually Dave outsmarts him and manages to switch him off.

But we may not be so lucky.

So what shall we do?

I am redefining AI to break away from the classical notion of a machine intelligently pursuing a purpose.

There are three principles involved.

The first is the principle of altruism, where the robot's sole purpose is to maximize human purpose and human value.

And the values ​​here do not mean values ​​that touch the skin, are good, are good.

All I want to say is how man wants his life to be.

So this actually violates Asimov's Law, which states that robots must defend their existence.

It has absolutely no interest in maintaining its existence.

The second law, if you like, is the law of humility.

And this turned out to be very important for making robots safe.

Robots don't know what human values ​​are, so they need to maximize them, but robots don't know what they are.

Doing so avoids the problem of single-minded pursuit of purpose.

It turns out that this uncertainty is very important.

Now, to be useful to us, you have to have some idea of ​​what we want.

Because it obtains its information primarily by observing human choices, our own choices reveal information about what kind of life we ​​prefer.

These are the three principles.

Let's see how this applies to the question "Can you turn off the machine?" As Turing suggested.

This is the PR2 robot.

This is the one in our lab with a big red "off" switch on the back.

The question is whether it can be switched off.

If you do it the classic way, you're giving it the purpose of "bring me a coffee, I gotta get you a coffee, you can't bring me a coffee if I'm dead", so obviously PR2 is listening to me and thus saying, "I have to disable my 'off' switch and taser everyone else at Starbucks who could possibly get in my way."

(Laughter) So this is inevitable, right?

This kind of failure mode seems inevitable, but it arises from having a specific and well-defined purpose.

But what if the machine is uncertain about its purpose?

Well, it justifies another way.

"Okay, humans may switch me off, but only if I'm doing something wrong.

Well, I really don't know what I'm doing wrong, but I know I don't want to do it. ”

These are the first and second principles.

“So we should let humans switch off.”

And indeed, we can calculate the incentives for robots to allow humans to switch them off, which is directly related to the degree of uncertainty about the underlying purpose.

And when the machine is switched off, that third principle comes into play.

You learn that what you did was not right, so you learn something about the goals you should pursue.

In fact, with proper use of Greek symbols, as mathematicians usually do, we can actually prove the theorem that such robots have proven beneficial to humans.

It is clear that it is better to use a machine designed in this way than not to use it.

This is a very simplistic example, but it's the first step in what we're trying to do with human-compatible AI.

Now, this third principle is probably the one you're having trouble with.

You're probably thinking, "Well, I'm misbehaving.

I don't want my robot to act like me.

Sneak in the middle of the night and take things out of the refrigerator.

I will do this and that. ”

There are many things you don't want your robot to do.

But in practice it doesn't work that way.

Just because you do something wrong doesn't mean the robot will mimic your behavior.

It may help you understand your motives and resist them if necessary.

But it's still hard.

In fact, what we're trying to do is make it possible for machines to predict what they'd prefer for any person, any life they might live, and the lives of all other people.

And doing this is fraught with a great many difficulties. I don't think this issue will be resolved any time soon.

In fact, it is we who have the real trouble.

As I said, we behave badly.

In fact, some of us are downright mean.

Now, as I said earlier, the robot doesn't have to copy that behavior.

Robots have no purpose of their own.

It is purely altruistic.

And it should not be designed only to satisfy the desires of one user - the user - in fact, it should respect everyone's preferences.

So a certain amount of nastiness can be dealt with, and even your nastiness that you might be bribed as a passport officer because you need to support your family and send your children to school, for example.

It is understandable. It doesn't mean steal.

In fact, it just helps get kids through school.

Computing power is also limited.

Lee Sedol is a genius Go player, but he still lost.

Therefore, looking at his actions, he acted to lose the game.

That doesn't mean he wanted to lose.

Therefore, to understand his behavior, we need to actually invert the human cognitive model, which includes computational limitations, a very complex model.

But it's still something we can work to understand.

From my point of view as an AI researcher, perhaps the hardest part is the fact that we have a lot of people, so machines have to somehow make trade-offs and weigh the preferences of many different people, and there are many different ways to do that.

Economists, sociologists and moral philosophers understand it, and we actively seek their cooperation.

Let's see what happens if we get it wrong.

For example, you can have a conversation with an intelligent personal assistant that may become available in the next few years.

Consider Siri on steroids.

Siri then said, "My wife called to remind me about dinner tonight."

And of course you forget. "What? What's for dinner?"

what are you talking about? "

"Well, we'll be celebrating our 20th anniversary at 7pm."

"I can't do that. I have a meeting with the Secretary General at 7:30.

How did this happen? ”

"Well, I warned you, but you ignored my advice."

"Well, what should I do? I can't say I'm busy."

"Don't worry. I've arranged for his flight to be delayed."

(Laughs) "Some kind of computer malfunction."

(laughs) "Really? Can you do that?"

"He apologizes profusely and looks forward to seeing him at lunch tomorrow."

(Laughter) There's a slight error in the values ​​here.

This clearly follows the wife's "happy wife, happy life" values.

(Laughter.) It could also go the other way.

When you get home after a busy day at work, your computer may display "Have you had a long day?"

"Yes, I didn't even have time to have lunch."

"You must be very hungry."

"I'm hungry, can you make me dinner?"

"There is something I must tell you."

(Laughter) "There are people in South Sudan who are in more urgent need than you."

(Laughs) "Well then, I'm going home. Please make dinner yourself."

(Laughter) So we have to solve these problems. I look forward to working on it.

There are reasons for optimism.

One reason is that we have a huge amount of data.

Because remember, I said they were going to read everything mankind has ever written.

Most of what we write is about humans doing things and other people getting mad at them.

So there is an enormous amount of data to learn from.

There are also very strong financial incentives to do this right.

Now imagine a home robot at home.

You are also late for work and the robot has to feed the children. The kids are hungry and the fridge is empty.

And the robot sees the cat.

(Laughter) And because the robot hasn't properly learned the human value function, it doesn't understand that the cat's emotional value outweighs the cat's nutritional value.

(laughs) So what happens?

Well, it goes like this: "A deranged robot cooks a kitten for a family dinner."

The domestic robot industry will come to an end with that one incident.

So there is a huge incentive to get this right long before we get to super-intelligent machines.

In summary, I'm really trying to redefine AI to have a decidedly useful machine.

Its principles are: Machines are altruistic, wanting only our ends, but uncertain as to what those ends are, and watching us all to learn more about what it is that we really want.

And hopefully in the process, we will learn to be better people.

thank you very much.

(Applause) Chris Anderson: Very interesting, Stuart.

We're standing here for a bit as I think they're preparing for their next speaker.

I have a few questions.

So the idea of ​​programming in ignorance seems intuitively very powerful.

What stops robots, as they reach superintelligence, from reading the literature and actually discovering the idea that knowledge is better than ignorance, yet changing their own goals and simply rewriting their programming?

Stuart Russell: Yes, and like I said, I want you to learn more about our purpose.

The more accurate it is, the more certain it will only be, so the evidence will exist and be designed to interpret it correctly.

For example, you can see that the evidence contained in books is highly biased.

They only talk about what kings and princes and elite white men are doing.

So this is a complex issue, but one that will become more and more useful as you learn more about its purpose.

CA: You can't just boil it down to one law. It's built in, "If a human tries to switch me off, I obey. I obey."

SR: Absolutely not.

That would be a terrible idea.

So imagine you have a self-driving car and want to drop off a five-year-old child to kindergarten.

Would you like your 5 year old to be able to switch off the car while driving?

Probably not.

A reasonable person would be more willing to switch off.

If the person is completely random or even malicious, you don't want to be turned off.

CA: Okay. Stuart, I really hope you can work this out for us.

Thank you very much for that story. That was amazing.

SR: Thank you.

Have you ever wondered how important the ocean is in our daily life?

The ocean covers two-thirds of the earth.

They provide half of the oxygen we breathe.

They moderate our climate.

And they provide jobs, medicines, and food containing 20 percent of the protein to feed the entire world population.

People used to think that the ocean was so vast that it could not be affected by human activity.

Well, today I want to talk to you about ocean acidification, or the evil twin of climate change, a serious reality that is changing our oceans.

Did you know that 25 percent of the carbon dioxide we emit into the atmosphere is absorbed by the oceans?

Carbon dioxide is one of the greenhouse gases responsible for climate change, so this is one of the great services the ocean provides.

But as we continue to pump more and more carbon dioxide into the atmosphere, more and more carbon dioxide is dissolved in the oceans.

And this is changing ocean chemistry.

Various chemical reactions occur when carbon dioxide dissolves in seawater.

Fortunately, I don't have time to go into the details of chemistry today.

However, as more carbon dioxide enters the sea, the pH of the seawater drops.

This basically means that ocean acidity is increasing.

And this whole process is called ocean acidification.

And it's happening at the same time as climate change.

Scientists have been monitoring ocean acidification for over 20 years.

This figure is an important time series over Hawaii, where the top line shows a steady increase in the concentration of atmospheric carbon dioxide, or CO2 gas.

And this is a direct result of human activity.

The bottom line shows that the concentration of dissolved carbon dioxide on the sea surface has increased, and since the measurement started, it has increased at the same rate as the carbon dioxide in the atmosphere.

The bottom line indicates the chemical change.

As more carbon dioxide entered the ocean, the pH of the seawater dropped. This basically means that ocean acidity has increased.

In Ireland, scientists at the Marine Institute and Galway NUI are now monitoring ocean acidification.

And we too are witnessing acidification at the same rate as major ocean time-series sites around the world.

So it's happening right in front of us.

Here I would like to give an example of how data can be collected to monitor the changing ocean.

First, collect a large number of samples in the middle of winter.

As you can imagine, the North Atlantic can experience severe storms. Not for people with motion sickness, but we collect invaluable data.

So this instrument is lowered to the side of the ship. Sensors are attached to the bottom of the ship that provide information about the surrounding water, such as temperature and dissolved oxygen.

And you can collect seawater samples in these big bottles.

So we take samples at regular intervals all the way to the surface, starting at depths of 4 kilometers or more on the seafloor in the immediate vicinity of the continental shelf.

Seawater is brought back on deck and analyzed either on board or back in the laboratory to study various chemical parameters.

But why should we care?

How will ocean acidification affect us all?

Now, here's an alarming fact.

Ocean acidity has already increased by 26% since pre-industrial times, directly due to human activity.

Ocean acidity is expected to increase by 170% by the end of the century unless we start reducing our carbon footprint.

So this is what happens while our children are alive.

This acidification rate is 10 times faster than ocean acidification over more than 55 million years.

Therefore, our marine life has never experienced such rapid changes before.

So we literally had no idea how they were going to deal with it.

Well, millions of years ago a natural acidification event occurred, but it was much slower than what we see today.

And this coincided with the mass extinction of many marine species.

So is that what we're heading for?

Well, maybe.

Studies have shown that some species are actually doing very well, but many are reacting negatively.

One of the major concerns is that as ocean acidity increases, the concentration of carbonate ions in seawater decreases.

These ions are now basically the building blocks for the shells of many marine organisms, including crabs, mussels and oysters.

Another example is coral.

It also requires these carbonate ions in seawater to form coral structures to form reefs.

As ocean acidity increases and carbonate concentrations decrease, these species first find it more difficult to shell.

And at even lower levels it can actually start to dissolve.

This is a pteropod and is called a sea butterfly.

It is also an important food source for many marine species, from krill to salmon to whales.

The pteropod shells were placed in seawater with the expected pH by the end of this century.

After just 45 days at this very realistic pH, the shells are found to be almost completely dissolved.

Ocean acidification can therefore affect through the food chain and even into our dinner plates.

I mean, who likes shellfish? Or salmon?

Or are there many other fish species whose marine food sources may be affected?

These are cold water corals.

And did you know that there are actually cold-water corals in Irish waters just outside the continental shelf?

And they support rich biodiversity, including some very important fisheries.

By the end of this century, it is projected that 70 percent of the known cold-water corals across the oceans will be surrounded by seawater that is dissolving their coral structures.

My final example is these healthy tropical corals.

They were placed in seawater with a pH expected by 2100.

After half a year, the coral has almost completely melted.

Coral reefs currently support 25 percent of all marine life in the ocean.

all marine life.

We can see that ocean acidification is a global threat.

I have an 8 month old boy.

If we don't delay this situation now, I'm afraid to think what our ocean will be like when he grows up.

You can see the acidification.

We already emit a lot of carbon dioxide into the atmosphere.

But you can delay this.

Worst-case scenarios can be prevented.

The only way to do that is by reducing our carbon footprint.

This is important for you, for me, for the industry, for the government.

Together, we must slow global warming, slow ocean acidification, and contribute to maintaining healthy oceans and a healthy planet for our generation and generations to come.

(applause)

It's six o'clock in the morning and it's pitch black outside.

My 14 year old son is fast asleep in his bed, reckless and deep sleep like a teenager.

I turned on the light and physically shook the poor boy awake. I know it's like removing a Band-Aid, and it's best to get it over with as soon as possible.

(Laughter) I have a friend who yells, “Fire!” Just to wake up a sleeping teenager.

And another was so disgusted that he had to pour cold water on his head to get him out of bed.

Sounds cruel...

But probably familiar?

Every morning I ask myself. "How can what I know what I know and what I do for a living let my son do this?"

As you know, I am a sleep researcher.

(Laughter) So I know a lot about sleep and the effects of sleep deprivation.

As a rapidly growing teenager, I know I am depriving my son of the sleep he so desperately needs.

We also know that by waking him up hours before his natural body clock tells him he's ready, we're literally robbing him of his dreams, the kind of sleep most associated with learning, memory consolidation, and emotional processing.

But my child is not the only one who is sleep deprived.

Sleep deprivation is prevalent among American teenagers.

Only about 1 in 10 people get the 8-10 hours of sleep each night that sleep scientists and pediatricians recommend.

Now, if you're thinking, "Hmm, we're doing great, my child can study for eight hours," remember that eight hours is the minimum recommended.

It's barely passed.

Eight hours is like getting a C on your report card.

There are many possible contributing factors to this epidemic, but the main factor preventing teens from getting the sleep they need is actually a matter of public policy.

It's not hormones, it's not social life, it's not Snapchat.

Nationwide, many schools are opening around 7:30 a.m. or earlier, even though major medical institutions recommend middle and high schools start no earlier than 8:30 a.m.

These early start policies have a direct impact on how long, or indeed how little, American teenagers sleep.

They are also subjecting teens and their parents to a fundamentally unwinnable battle with their bodies.

During puberty, teenagers experience a delay in their body clock. Our body clock determines when we feel most awake and when we feel sleepiest.

This is partly caused by changes in the release of the hormone melatonin.

A teenager's body waits until about 11 p.m. for melatonin release to begin, which is two hours later than adults and young children.

This means that a teenager waking up at 6am is biologically equivalent to an adult waking up at 4am.

On those unlucky days when I have to wake up at 4am, I'm a zombie.

Functionally useless.

You probably shouldn't be driving because you can't think straight and are easily irritable.

But this is what many teenagers in America feel every day at school.

In fact, many of the moodiness, irritability, laziness, and depression that characterize teens can be the product of chronic sleep deprivation.

For many teens battling chronic sleep deprivation, the go-to strategy to compensate is consuming large amounts of caffeine in the form of Venti Frappuccinos, energy drinks and shots.

So, essentially, our entire population is tired but nervous young people.

Proponents of sleep-friendly start times know that adolescence is a time of dramatic development, especially for the parts of the brain responsible for higher-order thought processes such as reasoning, problem-solving, and good judgment.

In other words, it is precisely this type of brain activity that is responsible for inhibiting the impulsive and often dangerous behaviors typical of adolescence, which is terrifying for us parents of teens.

They know, like us, that when teenagers don't get the sleep they need, there are immediate and lasting effects on their brains, bodies, and behaviors.

They have trouble concentrating, are less alert, and many may even show signs of ADHD-like behavior.

But the effects of sleep deprivation in teens go far beyond the classroom, and sadly contribute to many of the mental health problems that soar in adolescence, including drug use, depression, and suicide.

A study of teens in the Los Angeles Unified School District found that teens who had trouble sleeping were 55% more likely to have used alcohol in the past month.

Another study of more than 30,000 high school students found that less sleep was associated with a 38 percent increase in sadness and hopelessness and a 58 percent increase in teen suicide attempts.

And if that's not enough, teens who don't get enough sleep are at higher risk for many of the physical health problems that plague our nation, including obesity, heart disease and diabetes.

Plus, there's the risk of getting sleep-deprived teens who just got their driver's licenses at the wheel.

Studies show that getting five hours or less of sleep each night is equivalent to driving with a blood alcohol level above the legal limit.

Advocates of sleep-friendly start times and researchers in the field have published a body of science showing the tremendous benefits of delayed start times.

The findings of this study are unequivocal and, as a sleep scientist, I rarely speak with such certainty.

Teens in districts with late start times are getting more sleep.

To the naysayers who might think that a late start to school means teens are just staying up late, in fact, their bedtime stays the same, but they wake up longer and sleep longer as a result.

They are more likely to come to school. School absenteeism decreased by 25% in one district.

And they are less likely to drop out.

Not surprisingly, they have excellent academic performance.

Therefore, this has significant implications for reducing achievement gaps.

Scores on standardized math and reading tests improve by 2-3 percent.

This is as powerful as reducing class size by a third, or replacing a so-so teacher in a classroom with a really good one.

Their mental and physical health will improve and even their families will be happier.

I mean, who wouldn't want to feel a little more joyful and less grumpy since their teenage years?

Even communities are safer, as car accident rates have dropped, down 70% in one district.

Given these tremendous benefits, this might seem like a no-brainer, right?

So why have we as a society not heeded this call?

Arguments against delaying the start time often go something like this: "Why should teens start late?

We need to strengthen them so that they are ready for the real world!"

But that's like telling a parent of a 2-year-old, "Don't let Johnny nap or he won't be ready for kindergarten."

(Laughter) Delaying the start time also creates a lot of logistical challenges.

Not only the students and their families, but also the entire community.

Updated bus routes, increased transport costs, impact on sports, pre-school and after-school care.

These are the same concerns that surface again and again from school district to district whenever school start times are debated across the country.

These are legitimate concerns, but they are issues that we must resolve.

They are no good excuse for not doing what is right for your kids to start middle school and high school by 8:30 am.

And school districts large and small across the country that have made this change have found that these concerns are often unfounded, far outweighing the enormous benefits to student health and performance and collective public safety.

So, if tomorrow morning you happen to be able to turn the clocks back an hour and get another hour of delicious sleep and your day feels a little longer and full of hope, think about the incredible power of sleep.

And think what a wonderful gift it would be if children could naturally wake up in tune with their biology.

Thank you and sweet dreams.

I have a 2-year-old daughter named Naya who has the misconception that this conference was named in her father's honor.

(laughter) Who am I to argue against my baby girl?

As many of you know, being a parent can focus your attention on long-term issues like climate change.

It was the birth of my daughter that inspired me to start this climate change organization to counteract the over-polarization of this issue in the United States and find a way forward in a more conservative direction.

Yes, folks, Republican action on climate change is possible.

Could be even better.

(Laughter.) Let's prove it.

What we really need is a killer app for climate policy.

In the tech world, a killer app is one that is transformative enough to create its own market, like Uber.

In a world of climate change, killer apps are a highly promising new solution that can break down seemingly insurmountable barriers to progress.

These also include psychological barriers.

Climate advocates have long encouraged their compatriots to make short-term sacrifices now for benefits that will come to people in other countries 30 or 40 years from now.

It just doesn't fly because it goes against basic human nature.

Then there are the geopolitical barriers.

Under current global trade rules, countries have strong incentives to free ride on other countries' emission reductions rather than step up their own programs.

This has been the curse of any international climate negotiations, including Paris.

Finally, there are partisan barriers.

Even Germany, the UK and Canada, the most enthusiastic countries, are far from cutting emissions at the scale and speed needed.

far cry.

And here in the United States, the partisan climate divide is much deeper.

We are fundamentally stuck, which is why we need climate policy killer apps to break through each of these barriers.

I believe the path to climate change progress in the United States runs through the Republican Party and the business world.

So in launching the Climate Leadership Council, I started by reaching out to senior Republican politicians and business leaders. Among them are America's most respected Republican elders, James Baker and George Schultz. Martin Feldstein and Greg Mankiw, two of the country's most respected conservative economists. and Henry Paulson and Rob Walton, two of the most successful and admired business leaders.

We co-authored "The Conservative Case for Carbon Dividends".

This is the first time that a Republican leadership has come up with concrete market-based measures to combat climate change.

(Applause.) Thank you.

(Applause.) We announced the plan at the White House two weeks after President Trump took office.

Since then, nearly every major editorial board in the country has endorsed our plan, and today Fortune 100 companies across a wide range of industries support the plan.

Now, you're probably wondering what the hell is this plan all about.

Our carbon dividend solution is based on four pillars.

The first is a gradual increase in carbon tax.

Capitalism, like most operating systems, is a great system, but it is prone to bugs and in this case is called "market failure".

The biggest problem is that market prices do not take social and environmental costs into account.

This means that all market transactions are based on inaccurate information.

This fundamental bug in capitalism contributes more to the climate change plight than any other single factor.

In theory, this is an easy problem to solve.

Economists agree that the best solution is to put a price on the carbon content of fossil fuels, known as a carbon tax.

This will reduce the carbon footprint of all economic transactions every day of the year.

However, the carbon tax itself has proven to be unpopular and a political impasse.

The answer is to return all the funds raised directly to the people in the form of an equal monthly dividend.

This would turn the unpopular carbon tax into a popular populist solution, and also solve the underlying psychological barriers we discussed by giving everyone tangible benefits here and now.

And these benefits will be significant.

Assuming carbon tax rates start at $40 per ton, a family of four will receive $2,000 per year from the start.

According to the U.S. Treasury Department, the bottom 70 percent of Americans will receive more dividends than they pay in rising energy prices.

That means 223 million Americans will win economically by solving climate change.

And it -- (applause) is revolutionary and has the potential to fundamentally change climate politics.

But there is another revolutionary element here.

If the carbon tax rate rises, so will the dividend amount.

The more we protect the climate, the more benefits our citizens will receive.

This creates a positive feedback loop. This is very important. This is because the only way to meet long-term emissions reduction targets is to increase the carbon tax rate every year.

The third pillar of our program is to remove regulations that are no longer needed once the Carbon Dividend Plan has been enacted.

This is a key selling point for Republicans and business leaders.

So why should we sacrifice carbon in exchange for climate regulation?

Let me show you.

Our plan will achieve almost double the emissions reductions of all Obama-era climate regulations combined, and nearly triple the new standards after President Trump lifts all these regulations.

This assumes a carbon tax starting at $40 per tonne, which equates to an additional charge of approximately 36 cents per gallon of gasoline.

Our plan itself meets the upper bound of the US commitments under the Paris Climate Agreement, and as you can see, the emission reductions will continue over time.

This shows the power of a conservative climate policy based on free markets and limited government.

Ultimately, we could help working-class Americans get ahead, while at the same time reducing regulation and significantly reducing pollution.

Don't you think it's something we can all support?

(Applause.) The fourth and final pillar of our program is a new climate domino effect based on border carbon adjustments.

It sounds complicated, but it's also revolutionary. Because it ultimately offers a whole new strategy for achieving the global carbon price we need.

Let me give you an example.

Suppose country A adopts a carbon dividend plan and country B does not.

Well, in order to level the playing field and protect the competitiveness of its industries, country A taxes imports from country B based on carbon content.

fair enough.

But here's where it gets really interesting. Because the money collected at the border will increase the dividends sent to the citizens of country A.

Now, how long do you think it will take the citizens of country B to realize that the money should go to them and push forward with a carbon dividend scheme on their land?

Adding a few more countries creates a new climate domino effect.

When one major country or region introduces a carbon dividend with border carbon adjustments, other countries will be forced to follow suit.

Dominoes fall down one by one.

And this domino effect can start anywhere.

My favorite is the US, but it could start in the UK, Germany, other European countries and even China.

Take China for example.

China is committed to cutting greenhouse gas emissions, but what its leaders are more interested in is shifting the economy towards consumer-led economic development.

Nothing can be done more to hasten that transition than giving every Chinese citizen a monthly dividend.

In fact, this is the only policy solution that allows China to simultaneously achieve its environmental and economic goals.

That's why this is the killer app for climate policy. Because it allows us to overcome the psychological barriers we discussed earlier, the partisan barriers and, as we just saw, the geopolitical barriers.

All we need is a country to lead the way.

One way to find what you're looking for is by viewing ads.

So let's read this together.

Needed: Countries to pioneer carbon dividend schemes.

Cost to country: zero.

Start Date: As soon as possible.

Benefits: most effective climate action, popular and populist, boosting growth and business, shrinking government and helping the working class.

Additional Compensation: Gratitude for current and future generations, including my daughter.

thank you.

(Applause) Chris Anderson: Ted, I just have one question.

In fact, I'm not sure I've ever seen a conservative get a standing O at TED before that.

That's nice.

This logic seems very strong, but some of the political people you speak to say it's hard to imagine this going through Congress yet.

How do you feel about the momentum behind this?

Ted Halstead: I understand that many people are very pessimistic about what is happening in the United States with President Trump.

I'm not so pessimistic. Here's why.

This White House action, early action on climate change, is just the first move in a complex game of climate chess.

So far, it has been an abolition-only strategy. Pressure for alternative programs will increase. That's where we come in.

There are three reasons. I'll explain in a second.

One is that the business community is fundamentally breaking with the White House on climate change.

In fact, we have found that many Fortune 100 companies support our program.

Within the next two months, we'll be announcing some amazing names to join the program.

Second, there is nothing wrong with American politics that there is a more fundamental chasm between the Republican base and the Republican leadership than climate change.

And third, given this chess analogy, the big decision going forward is, "Will the regime stay in Paris?"

Well, let's pan both ways.

The question arises as to what the plan is if he stays in Paris, as many within the administration have been demanding.

I have a plan.

But if they don't stay in Paris, the international pressure will be overwhelming.

Our Secretary of State will ask other countries to contribute to NATO, and they will say, "No, give me the commitment in Paris."

Keep your promise, we will keep our promise. ”

As such, the international community, the corporate world, and even Republican supporters will be demanding alternatives to the Republican Party.

And hopefully we were able to provide it.

CA: Thank you so much, Ted.

TH: Thank you Chris.

(applause)

Look at this work of art.

what do you see?

At first glance, it looks like a sheet is hung over the grandfather's clock and a rope is wrapped around the center.

But if you see it for the first time, you should definitely watch it twice.

Look again.

what do you see now?

A closer look reveals that the entire work of art is made from a single sculpture.

No clocks, no ropes, no sheets.

A single piece of bleached Honduras mahogany.

Let me be clear here: this exercise is not for looking at sculptures.

It's about observing and understanding how careful observation can save lives, change companies, and even help us understand why our children behave the way they do.

This is a skill I call visual intelligence, and I use my works of art to teach everyone from ordinary people, to Navy SEALs, homicide detectives, trauma nurses, and others whose job it is to seek.

In fact, no matter how skilled you are at seeing, you still have a lot to learn about seeing.

Because we all think we can catch a glimpse and a split second, but the real skill lies in understanding how to look slowly and how to look more carefully.

The talent lies in remembering to step back and look through the lens when we feel overwhelmed by the urgency of the day that demands our attention, helping us understand what we have so far missed.

So how can looking at paintings and sculptures help?

Because art is a powerful tool.

It's a powerful tool that leverages both vision and insight to reconstruct our understanding of where we are and what we see.

This is an example of a work of art that reminded me that visual intelligence is a continuous learning process and can never be mastered.

I stumbled across this quiet, deceptively abstract painting, and had to step in front of it a second or third time to understand why it resonated so deeply.

Well, I've seen the Washington Monument in person a thousand times and was familiar with the color change in the marble in the third part, but I had never seen it out of context or as a true work of art.

And here Georgia O'Keeffe's painting of this architectural icon made me realize that if we take it seriously, it's possible to see the everyday in a whole new, spectacular way.

Now, some skeptics believe that art is only in museums.

They believe it has no practical use beyond its aesthetic value.

I know who they are in every audience I teach.

They have their arms crossed, their legs crossed, and their body language says, 'What are you going to learn from this woman who is torturing about painting and sculpture?

So how can we make it meaningful to them?

I show them works of art like this portrait of Kumi Yamashita.

And I ask them that they should come closer, and come closer, and ask questions about what they see while looking at a work of art.

And if they ask the right question, "What is this work of art?"

is it a picture? Sculpture?

what is it made of? "...

They will find that this entire work of art is made from wooden boards, 10,000 nails and a single unbreakable thread.

Interesting to some, what does that have to do with the work of these people?

And the answer is everything.

Because we all interact with people many times each day, and we need to be able to ask better questions about what we see.

Learning how to formulate questions that elicit the information you need to do your job is an important life skill.

Like the radiologist who told me that seeing the negative space in a painting helps identify less noticeable abnormalities on an MRI.

Another police officer said that understanding the emotional dynamics between people in a painting helped him read body language at a domestic violence crime scene, helping him think twice before raising his gun and firing.

And even parents can take note of the lack of color in the picture to understand that what children say to themselves is just as important as what they don't say.

So how can we be visually more intelligent?

That would be 4 A's.

Whenever a new situation, a new problem arises, we practice the four "As".

First, assess your situation.

We ask, "What's in front of us?"

Then analyze it.

We say, 'What's important?

what do i need what don't you need? ”

Then articulate it in conversations, notes, texts and emails.

And we act and make decisions.

We all do this many times a day, but we don't understand what role looking and looking play in all these actions, and how visual intelligence can actually improve it all.

So recently I met with a group of counter-terrorism officials at the museum in front of this painting.

In El Greco's painting Purification of the Temple, the Christ in the center expels sinners from the Temple of Prayer with a radical and violent gesture.

A group of counter-terrorism officials had five minutes to work with the painting, and in that short time they had to assess the situation, analyze the details, and define what they would do if they were in the painting.

As you can imagine, observations and insights were different.

who do they talk to?

Who will be the best witness?

Who could be a potential witness?

who was hiding?

Who had the most information?

But my favorite comment came from a veteran cop who looked at the central character and said, "Can you see that guy in pink?" -- Referencing Christ -- He said, "Let's put a collar on him, he's causing all the trouble."

(Laughter) So looking at art is the perfect way to rethink how we solve problems without the help of technology.

A look at the work of Felix Gonzalez Torres reveals the perfect synchronization of the two clocks.

The hour, minute and second hands are perfectly aligned.

They are placed next to each other and touch each other, and the title is "'Untitled' (Perfect Lovers)."

But a closer look reveals that these two are battery-powered clocks, which helps us understand: "Hey, wait a minute..."

One of these batteries will die before the other.

One of these clocks would slow down and stop before the other, changing the symmetry of the artwork. ”

Just clarifying that thought process includes the need for a contingency plan.

We need to be prepared for when and how the unexpected, the unexpected, the unknown.

Now, using art to increase your visual intelligence requires planning for the unexpected, understanding the big picture and details, and noticing what's not there.

So, in this painting by Magritte, noticing that there are no tracks under the train, no fire in the fireplace, and no candles standing in the candlesticks is actually a more accurate depiction of this painting than saying, "The train comes out of the fireplace, and the candlesticks on the mantle."

It might sound counterintuitive to say something that isn't there, but it's actually a very valuable tool.

When a detective trained in visual intelligence in North Carolina was called to the scene of the crime, it was a fatal boating accident, and a witness told the detective that the boat had capsized and the crew had fallen under it and drowned.

Now, crime scene investigators instinctively look for obvious information, but this detective did something different.

He searched for what wasn't there, which is even more difficult.

And he raises the question, if the boat did capsize, as the eyewitness said it did, then how could the papers at one end of the boat have dried out completely?

Based on that one small but important observation, the investigation moved from accidental death to homicide.

Now, just as important as saying things that don't exist is the ability to find visual connections in unseen places.

Like the totem poles of Marie Watt's blanket.

This shows that finding hidden connections in everyday objects can resonate very deeply.

The artist collected blankets from various people within the community and had the blanket owners write on tags the importance of the blankets to their families.

Among the blankets were baby blankets, picnic blankets and dog blankets.

We all have blankets in our homes and understand the importance of their role.

But, likewise, I also instruct new doctors. When you enter the patient's room, look around the room before picking up the chart.

Are there balloons, cards or special blankets on the bed?

It told doctors it had a connection to the outside world.

If the patient has helpers in the outside world, the doctor can best care with that connection in mind.

In medicine, people connect as humans before they are identified as doctors and patients.

But this method of heightening perception doesn't have to be destructive, and it doesn't require a complete overhaul of your look.

A more insightful observation, like Jorge Mendes Blake's sculpture building a brick wall over Kafka's El Castillo, shows that subtle but invaluable observations can be made.

The book can be identified, and you can see how the symmetry of the brick directly above it has been broken, but by the time you reach the edge of the sculpture, the book is no longer visible.

But when we look at the artwork as a whole, we can see that the effect of the destruction of the work on the brick is subtle and unmistakable.

One thought, one idea, one innovation can change an approach, change a process, and even save a life.

I have been teaching visual intelligence for over 15 years and have found to my great surprise, to my endless amazement and amazement, that looking at art with a critical eye helps keep us firmly entrenched in the unknown, whether we are militiamen, caregivers, doctors or mothers.

Because, let's be honest, things just don't work out.

(Laughter) Things aren't going well.

Don't get me wrong, I'll eat that donut right away.

(Laughter) But we need to understand what consequences our observations have and translate observable details into actionable knowledge.

Like Jennifer Odem's Table Sculpture standing guard on the banks of the Mississippi River in New Orleans, defending against the threat of post-Katrina floods and facing adversity, we too have the ability to be proactive and influence positive change.

I have delved into the art world to help people of all disciplines see the extraordinary in the ordinary, articulate what is missing, and inspire creativity and innovation, no matter how small.

And most importantly, it builds relationships behind the scenes, enabling all of us to look at our work and the world with new eyes.

thank you.

(applause)

I would like to start with a simple question. Why do poor people make so many wrong decisions?

I know it's a tough question, but look at the data.

Poor people borrow more, save less, smoke more, exercise less, drink more and eat less healthy.

why?

Well, the standard explanation was once summed up by British Prime Minister Margaret Thatcher.

And she called poverty a "character flaw."

(Laughter) It's basically a lack of character.

Now, I don't think many people would be so frank.

But the idea that there is something wrong with the poor themselves is not limited to Mrs Thatcher.

Some of you may believe that poor people should be held accountable for their mistakes.

Others might argue that we should help them make better decisions.

But the underlying assumption is the same. there is something wrong with them.

If we could change them, if we could teach them how to live life, and if they would just listen.

And to be honest, this has been something I've been thinking about for a long time.

It was only a few years ago that I realized that everything I thought I knew about poverty was wrong.

It all started when I stumbled upon a paper by several American psychologists.

They traveled 8,000 miles all the way to India for some interesting research.

And it was an experiment with sugar cane farmers.

You should know that these farmers collect about 60% of their annual income at once right after harvest.

This means that they are relatively poor at one time of the year and wealthy at another.

The researchers asked for an IQ test before and after harvest.

What they discovered afterwards completely blew my mind.

Farmers performed much worse in pre-harvest tests.

The effect of living in poverty was found to be equivalent to a 14 point drop in IQ.

For reference, this is comparable to losing a night's sleep or the effects of alcoholism.

A few months later, I heard that Eldar Shafir, a professor at Princeton University and one of the authors of this study, was coming to the Netherlands, where I live.

So we met in Amsterdam to discuss his revolutionary new theory of poverty.

I can sum it up in just two words. It is the "deficiency spirit".

It turns out that people behave differently when they perceive that they are in short supply.

And it doesn't really matter what it is - not enough time, not enough money, not enough food.

You know that feeling when you have too much to do, or when your blood sugar plummets because you've put off your lunch break.

That way, you can focus on the immediate shortcomings: the sandwich you need to eat now, the meeting starting in five minutes, the bill you have to pay tomorrow, and so on.

Therefore, the long-term perspective is ignored.

It's like a new computer running 10 heavy programs at the same time.

It's getting slower and slower and I'm getting errors.

It will eventually freeze. It's not because your computer is bad, it's because you have too many things to do at once.

Poor people have the same problem.

They are not making stupid decisions because they are stupid, but because they live in situations where everyone makes stupid decisions.

Then I suddenly understood why so many anti-poverty programs don't work.

For example, investments in education have little effect.

Poverty is not lack of knowledge.

A recent analysis of 201 studies on the effectiveness of money management training concluded that training had little effect.

Now, don't get me wrong. This is not to say that poor people do not learn anything. They can definitely get smarter.

But that's not enough.

Or, as Professor Shafir told me, "It's like teaching a man to swim and then throwing him into a stormy sea."

I still remember sitting there confused.

And I thought we might have understood all this decades ago.

So these psychologists didn't need complicated brain scans. They only need to measure the farmers' IQ, and the IQ test was invented over 100 years ago.

Actually, I just realized I read about the psychology of poverty before.

George Orwell, one of the greatest writers of all time, experienced poverty firsthand in the 1920s.

"The essence of poverty is that it 'annihilates the future,'" he wrote at the time.

And he marveled at "how people take for granted their right to preach to you and pray for you as soon as your income falls below a certain level."

Now these words still resonate with me in the same way.

The big question, of course, is what can be done?

Modern economists have several solutions in mind.

We could help the poor with their paperwork, or send them text messages asking them to pay their bills.

This type of solution is very popular among modern politicians. The main reason is that it costs very little.

I think these solutions are emblematic of this era where we often just treat the symptoms and ignore the root cause.

So I wonder. How about changing the environment in which the poor live?

Or, going back to the computer analogy. Why keep fiddling with software when you can easily solve the problem by installing additional memory instead.

At that point, Professor Shafir replied with a blank expression.

And a few seconds later he said, "Oh, I see.

You want to give more money to the poor in order to eradicate poverty.

Oh sure that sounds good.

Unfortunately, there is no such brand in America as Left Politics in Amsterdam. ”

But is this really an outdated left-wing idea?

I remember reading about old plans. It was proposed by the leading thinkers of history.

The philosopher Thomas More first suggested this more than 500 years ago in his book Utopia.

And its supporters range from left to right, from civil rights activist Martin Luther King Jr. to economist Milton Friedman.

And it's an incredibly simple idea: a basic income guarantee.

what is that?

Well, it's easy.

This is a monthly grant, enough to cover basic needs such as food, housing and education.

No one can tell you what you have to do for it and what you have to do about it because it is completely unconditional.

A basic income is a right, not a benefit.

No prejudice at all.

So as I learned about the true nature of poverty, I couldn't help but wonder: Is this the idea we've all been waiting for?

Could it really be that simple?

And over the next three years, I read everything I could about basic income.

I researched dozens of experiments around the world, and it didn't take me long to find stories of towns that had experiments that actually eradicated poverty.

But then...

Almost everyone forgot it.

This story begins in Dauphin, Canada.

In 1974, all residents of this small town were guaranteed a basic income, ensuring that no one fell below the poverty line.

An army of researchers landed on the town as the experiment began.

For four years, everything went well.

But then a new government was elected, and Canada's new cabinet saw little point in this expensive experiment.

So when it became clear they had no money left to analyze the results, the researchers decided to pack the files into about 2,000 boxes.

Twenty-five years later, Canadian professor Evelyn Forget discovered the record.

For three years, she subjected her data to all kinds of statistical analyses, but the results were the same every time. The experiment was a resounding success.

Evelyn Forget found that the Dauphin people were not only wealthier, they were also smarter and healthier.

The children's school performance improved significantly.

Hospitalization rates dropped by 8.5 percent.

Domestic violence incidents decreased, as did mental health complaints.

And people didn't quit their jobs.

Those who worked a little less were new mothers and students, who stayed in school longer.

Similar results have since been found in countless other experiments around the world, from the United States to India.

So...

Here's what I learned.

When it comes to poverty, we rich people should stop pretending we know best.

We should stop sending shoes and teddy bears to the poor and people we have never met.

And get rid of the paternalistic bureaucratic giant industry when they can only pay the poor people they are supposed to help.

(Applause.) Because the great thing about money is that people can use it to buy what they need, not what some self-proclaimed expert thinks they need.

Imagine how many brilliant scientists, entrepreneurs and writers like George Orwell are now dying in scarcity.

Imagine how much energy and talent would be unleashed if we eradicated poverty completely.

I believe basic income works like venture capital for people.

And poverty costs so much that we cannot afford not to do it.

Take, for example, the cost of child poverty in the United States.

That figure is estimated at $500 billion each year, given rising health care costs, rising dropout rates, and rising crime.

Now, this is an incredible waste of human potential.

But let's talk about the elephant in the room.

How can I guarantee a Basic Income?

Well, it's actually a lot cheaper than you think.

What they did with the Dauphin is finance it with a negative income tax.

This means that your income will replenish as soon as you fall below the poverty line.

And that scenario, according to our economists' best estimates, could lift all poor Americans above the poverty line at a net cost of $175 billion (a quarter of America's military spending, or 1% of GDP).

We may actually be able to eradicate poverty.

Well, that's our goal.

(Applause.) The time for small thoughts and small actions is over.

I truly believe the time has come for radical new ideas, and a basic income is more than just a policy.

It's also a complete rethink of what work actually is.

In that sense, it will liberate not only the poor, but the rest of us as well.

Today, millions of people feel that their work has little meaning or importance.

A recent poll of 230,000 employees in 142 countries found that only 13% actually love their jobs.

Another poll found that 37% of UK workers have jobs they don't even think need to exist.

It's like Brad Pitt said in Fight Club. "Too often we do jobs we hate to buy things we don't need."

(Laughter) Now, don't get me wrong -- I'm not talking about teachers or garbage collectors or caregivers here.

When they stop working, we're in trouble.

I'm talking about highly paid professionals who have excellent resumes and earn money in the following jobs.

Hold peer-to-peer meetings between strategic traders while brainstorming about the added value of disruptive co-creation in a networked society.

(Laughter) (Applause) Or something like that.

Imagine again how much talent we waste just because we teach our children that they have to make a living.

Or consider what the math guru at Facebook lamented a few years ago. “The brightest minds of our generation are figuring out how to get people to click on your ads.”

i am a historian.

And if history teaches us anything, it's that things can be different.

Nothing is inevitable in the way we build our societies and economies today.

Ideas can and do change the world.

And I think it's become abundantly clear, especially in the last few years, that we can't stick to the status quo - we need new ideas.

We know that many of you may feel pessimistic about the future of rising inequality, xenophobia and climate change.

But knowing what we are against is not enough.

We have to be there for something too.

Martin Luther King, Jr. did not say, "I have nightmares."

(Laughter) He had a dream.

(Applause.) So...

This is my dream. I believe in a future where the value of your work is determined not by the size of your salary, but by the amount of happiness you spread and the amount of meaning you give.

I believe in a future where the purpose of education is not to put you in another useless job, but to prepare you for a fulfilling life.

I believe in a future where living without poverty is not a privilege but a right we all have.

So here we are.

I'm here.

We have the research, we have the evidence, we have the means.

More than 500 years after Thomas More first wrote about basic income and more than 100 years after George Orwell discovered the nature of poverty, we all need to change our worldview. Because poverty is not a lack of character.

Poverty is lack of cash.

thank you.

(applause)

I have a confession.

I have been in an affair since I was 17.

When I think of this incident, I wish I could talk about the butterflies in my stomach and the maps I drew on the ground, but I can't.

I wish I could talk about the sweet words spoken and the gifts received in this matter, but I cannot.

All I can tell you is what happened after that, the days when I was constantly asking, "Why, why, why me?"

I remember how it all started.

I was in my senior year of high school and my class had just won a sports championship, so we were singing and dancing and hugging each other.

I went and took a shower.

Then went to dinner.

And when I sat down and tried to eat, my teeth started chattering and I couldn't put the spoon in my mouth.

I rushed to the infirmary, but since I couldn't speak, all I could do was point to my mouth.

She didn't know what was going on so she told me to lie down. And it worked. After a few minutes the chatter stopped.

When I was about to run out, she told me, no, she insisted, to go to the dorm so I could sleep.

Here I am in my final year of high school, just months after taking my high school final exams, and days after taking a series of exams called “mocks” here in Kenya, with the aim of gauging how prepared I am for my final exams.

Never sleep and be ridiculed by a series of exams.

I went to class, sat down to take Kenyan history notes, and was in a coastal town in Kenya with the great Mektirili Wa Menza, the Giliama woman who led her people against British colonial rule.

Then, out of nowhere, my left hand began to twitch, as if I was making marks on an imaginary piece of paper.

It went back and forth, and with each stroke, my classmates stopped concentrating on reading and started looking at me.

And I tried very hard to stop it, but I couldn't. Because it had a life of its own.

And then, at the final show and official introduction, when I was convinced that everyone was watching us, I had my first full-blown seizure, and that was the beginning of what happened 15 years ago.

Seizures are a characteristic feature of most types of epilepsy, and every first seizure should be evaluated by a doctor to determine if it is epilepsy or if it is a symptom of something else.

In my case, it was confirmed that I had epilepsy.

I spent most of my time in the hospital and at home, returning only to take my final exams.

Despite having seizures between papers, I managed to get the grades I needed for my actuarial science degree at the University of Nairobi.

(Applause.) Unfortunately, I had to drop out in my second year.

I didn't have enough coping skills or a support community around me.

I was lucky enough to get a job, but I had a seizure at work and was fired from the job.

So I was in a space where I was constantly asking myself why this had to happen to me.

I lived in denial for a long time, perhaps because I dropped out of school or got fired from a job.

Or maybe it's because of what I've heard about epilepsy and people living with it. They will not travel or get a job by themselves. They are outcasts and harbor spirits within them that need to be rescued.

And the more I thought about these things, the more severe the seizures, the more days I would have my legs immobilized, my speech slurred, and so on for days on end.

Two or three days after the attack, I still had twitching in my head and hands.

I felt like I had lost everything, and sometimes even the will to live.

(sighs) I was so frustrated inside.

So I started writing. Because the people around me didn't have the answers to the questions I had.

So I wrote my worries and doubts.

I wrote about the good days, the bad days, and the really bad days and shared them on my blog.

Over time, I began seeing and hearing from people with epilepsy, their families, and even those who had not been diagnosed with epilepsy.

And I changed from a girl who always asked me why, to a girl who not only asserts herself, but does it for people who haven't found their voice yet.

(Applause.) My seizures have gone from 2-3 a day to 2-3 a year.

I went on -- (applause) I went on to employ five people when I started Kenya's first free mental health and epilepsy support line.

And I travel -- (applause) And I travel to talk about my affair. All these things have been said that people like me who live with epilepsy could never do it.

Every year, 80% of Nairobi's population is diagnosed with epilepsy worldwide.

And they, like me, experience feelings of prejudice and exclusion.

So it is the purpose of my life's journey to continue these conversations, confessing my infidelity so that the undiagnosed can be made aware and always reminded that it is okay to be involved with people like us, that we, like them, can take on whatever life throws at us, as long as they break down the walls of prejudice and exclusion.

thank you.

(applause)

This story begins in 1985. I was 22 years old then and defeated Anatoly Karpov to become world chess champion.

Earlier that year, I had a so-called simultaneous exhibition in Hamburg, Germany, with 32 of the world's best chess-playing machines.

I won all the games and it wasn't too surprising that I could win 32 computers at the same time.

For me it was a golden age.

(Laughter) Machines were weak and hair was strong.

(Laughter) Just 12 years later, I was fighting for my life against a single computer in a match called "The Brain's Last Stand" on the cover of Newsweek.

No pressure.

(Laughter) From mythology to science fiction, man versus machine is often portrayed as a matter of life and death.

John Henry, called the Man of Steel in 19th-century African-American legends, competed against steam-powered hammers tunneling through mountain rock.

The legend of John Henry is part of a long history of narratives that pit mankind against technology.

And this competitive rhetoric is now the norm.

We are in a race, battle, or war with machines.

Jobs are being lost.

People are replaced as if they disappeared from the earth.

Suffice it to say that movies like "The Terminator" and "The Matrix" are non-fiction.

There are few arenas where the human body and mind can compete equally with computers and robots.

I really wish I had a little more.

Rather, it was both my blessing and my curse to literally be human in the human-versus-machine race that everyone still talks about.

In the most famous human-machine contest since John Henry, I played two matches against the IBM supercomputer Deep Blue.

No one remembers I won my first match -- (laughter) (applause) in Philadelphia and lost the rematch in New York the following year.

But I think it's fair.

No day in history has a special calendar for all those who failed to climb Everest before Sir Edmund Hillary and Tenzing Norgay summited it.

And in 1997, when chess computers finally matured, I was still world champion.

I am Everest and Deep Blue has reached the summit.

Of course, I have to say that it was not Deep Blue that did it, but that its creators, Anantaraman, Campbell, Hoang and Su, did it.

Hats off to them.

As always, machine wins were man wins. We tend to forget when humans are overtaken by our creations.

Deep Blue won, but was it smart?

No, it wasn't. At least not in the way Alan Turing and other computer science founders wanted.

It turns out that if the hardware gets fast enough and the algorithms smart enough, chess can be brute-force crushed.

Although Grandmaster level chess by the output definition, Deep Blue was intelligent.

But even at an incredible speed of 200 million positions per second, Deep Blue's method yielded little dreamlike insight into the mysteries of human intelligence.

Soon machines will be taxi drivers, doctors and professors, but will they be 'intelligent'?

I'd rather leave these definitions to philosophers and dictionaries.

What really matters is how we humans feel about living and working with these machines.

When I first met Deep Blue in February of 1996, I had been World Champion for over ten years, played 182 matches in the World Championship, and hundreds of matches against other top players in other competitions.

I knew what to expect from my opponents and what to expect from myself.

I was used to measuring their movements, their emotional state by observing their body language and looking into their eyes.

And I sat across from the deep blue chessboard.

I immediately felt something new, something unsettling.

You might experience a similar feeling the first time you get into a self-driving car, or the first time a new computer administrator gives orders at work.

But when I sat in my first match, I had no idea what I could do with this.

IBM has invested heavily in technology because it can be exponential.

I lost that match.

And I couldn't help but wonder, maybe it's invincible?

Is my beloved chess over?

It was a human question, a human fear, and the only thing I knew for sure was that my opponent, Deep Blue, had no such worries.

(Laughter) After this devastating blow, I fought back and won my first match, but the writing was still on the wall.

I lost to the machine in the end, but I didn't have the fate of John Henry who won but died with a hammer in his hand.

[John Henry dies with hammer in hand, Palmer C. Hayden] [African American Museum, Los Angeles] It turns out the chess world still wanted a human chess champion.

And even today, when the latest free mobile phone chess apps are more powerful than Deep Blue, people are still playing chess like never before.

Prophets predicted that no one would dabble in games that machines could conquer, but they were wrong and proved to be wrong, but prophecies have always been a popular pastime when it comes to technology.

What I have learned from my own experience is that if you want to make the most of your technology, you have to face your fears, and if you want to make the most of your humanity, you have to overcome your fears.

While licking my wounds, I got a lot of inspiration from fighting Deep Blue.

As the old Russian saying goes, if you can't beat them, join them.

So I thought, what if I could play using a computer? I thought, what if we could put the computer by our side and play with our strengths: human intuition combined with machine computation, human strategy, machine tactics, human experience and machine memory.

Is this the perfect game ever played?

My idea came to fruition in 1998 when I played this human-machine competition against another elite player under the name Advanced Chess.

However, this first experiment failed to effectively combine human and machine skills.

Advanced chess has taken hold on the Internet, and in 2005, so-called freestyle chess tournaments brought revelations.

A team of grandmasters and top machines entered, but the winner was neither grandmaster nor supercomputer.

The winners were two American amateur chess players operating three ordinary PCs simultaneously.

Their skill in coaching the machine effectively negated the superior chess knowledge of the Grandmaster's opponents and the far superior computational abilities of others.

And we arrived at this formulation.

Weak human players and machines and better processes outperform very strong machines alone, but more notably, stronger human players and machines and inferior processes.

This convinced me that I needed a better interface to guide the machine toward more useful intelligence.

The combination of man and machine is the present, not the future.

Anyone who uses online translation to get the gist of news articles in foreign newspapers knows that translations are not perfect.

Then use the human experience to figure it out and the machine will learn from the modifications.

This model is pervasive and invested in medical diagnostics and security analytics.

Machines process data, calculate probabilities, achieve 80 percent, 90 percent, and facilitate analysis and decision-making on the part of humans.

But you can't get your kids to school in a self-driving car with 90 percent accuracy, even if it's 99 percent.

So a leap is needed to add a few more significant decimal places.

Twenty years after its second bout against Deep Blue, the sensational “Brain's Last Stand” headline has become a household name as intelligent machines are at work in every field on a daily basis.

But unlike in the past, when machines replaced livestock and manual labourers, today machines are chasing people with college degrees and political clout.

And as someone who has fought and lost against machines, I am here to tell you that this is great, great news.

Ultimately, all professions will feel these pressures. Otherwise, human progress will come to a halt.

We don't get to choose when and where technological progress will stop.

You can't slow down.

In fact, we need to speed up.

Our technology is so good at removing difficulty and uncertainty from our lives that we must pursue even more difficult and uncertain challenges.

The machine has a calculating function.

we have an understanding.

The machine has instructions.

we have a purpose.

Machines have objectivity.

we have a passion

Don't worry about what our machines can do today.

Rather, we should worry about what they can't do today. Because we need the help of new intelligent machines to make our grandest dreams a reality.

And if we fail, it's not because our machines are too intelligent or not intelligent enough.

If we fail, it's because we've become complacent and narrow-minded.

Our humanity is not defined by skills like swinging a hammer or playing chess.

There is one thing that only humans can do.

It's a dream

So dream big.

thank you.

(applause)

I want to share with you what my father taught me. It has no persistent state.

This is a lesson he has taught me over and over again, and I have learned it the hard way to be true.

Here I am in my 4th grade class.

Here is a picture from my yearbook taken in a class at a school in Monrovia, Liberia.

My parents immigrated from India to West Africa in the 1970s and I had the privilege of growing up there.

I was nine years old, loved to kick a soccer ball, and was a complete math and science geek.

I really was living the kind of life every kid dreams of.

But there is no permanent state.

Civil war broke out in Liberia on Christmas Eve 1989.

The war started in the countryside and within months rebels marched toward our homeland.

My school was closed, and when rebels took over the only international airport, people started fleeing in panic.

One morning my mother knocked and said, "Raj, pack your bags and go."

We were rushed to the center of town, where we split into two lines on the tarmac.

My family and I were lined up and stuffed into the cargo hatch of the rescue plane.

And I was sitting on the bench with my heart pounding.

Looking out from the open hatch, I saw hundreds of Liberians in separate lines, with children strapped to their backs.

As they tried to jump in with us, I saw the soldiers hold them back.

They were not allowed to escape.

we were lucky

We lost what we had but benefited from the community of supporters who resettled in America and gathered around us as immigrants.

They welcomed my family into their home and coached me.

And they helped my father start a clothing store.

As a teenager, I would visit my dad on the weekends to help him sell sneakers and jeans.

And every time business took a turn for the worse, he reminded me of that mantra. "There is no permanent state".

That belief, the tenacity of my parents, and the community of supporters helped me get into college and eventually medical school.

War once shattered my hopes, but it gave me the chance to pursue my dream of becoming a doctor.

My condition had changed.

It's been 15 years since I escaped from that airfield, but I still can't get the memory of those two lines out of my head.

I am a medical student in my mid-twenties and wanted to go back to medical school to see if I could contribute to those left behind.

But when I returned, there was complete destruction.

The war left only 51 doctors available to serve a country of four million people.

It's like having only 10 doctors in the city of San Francisco.

So even if a doctor falls ill in one of the few cities, there may still be a chance.

But when I get sick in the remote rainforest countryside where it can take days to get to the nearest clinic, I've seen patients die from conditions that no one should die from.

Consider a two-year-old who wakes up one morning with a fever. Realizing that she may have malaria, the only way to get the medicine she needs is to take her to the river bed, get in a canoe, paddle to the other side, and walk up to two days through the woods just to get to the nearest clinic.

One billion people live in the world's most remote communities, and despite advances in modern medicine and technology, our innovation hasn't reached the last mile.

These communities have been marginalized because they have been considered too difficult to reach and too difficult to serve.

Illness is universal. No access to care.

And when I realized this, my soul was on fire.

No one should die because they live far from doctors and clinics.

No state should be permanent.

And the help in this case did not come from the outside, but actually from the inside.

It came from the community itself.

meet them

In rural Liberia, where most girls don't have the chance to finish primary school, Musu persevered.

At the age of 18, he graduated from high school and returned to his hometown.

She realized that no children were being treated for diseases that needed treatment, fatal diseases such as malaria and pneumonia.

So she signed up as a volunteer.

There are millions of volunteers like Musu in rural areas around the world. So we thought maybe community members like Musu could actually help us solve the puzzle.

Our healthcare system is structured so that the job of diagnosing illness and prescribing medicine is limited to a team of nurses and doctors like myself.

But nurses and doctors are concentrated in cities, leaving rural communities like Musu behind.

So we started asking, "What if we could reshape the healthcare system?"

What if community members like Musu could be included as part of the medical team, or become central to the medical team?

What if Musu helped bring medical care from city clinics to people's doorsteps?

Mus was 48 when I met her.

And despite her great talent and guts, she hadn't had a paying job in 30 years.

So what if technology could help her?

What if you could give her real training, give her real medicine, and get her a real job?

In 2007, as I was trying to answer these questions, my wife and I got married.

We asked relatives to stop giving gifts to the marriage registry and instead donate some money to get start-up capital to start a non-profit.

I promise you, I'm much more romantic than that.

(Laughter) We ended up raising $6,000 and working with Liberians and Americans to create a non-profit organization called Last Mile Health.

Our goal is to bring healthcare workers within reach of everyone, wherever they are.

We designed a three-step process of training, equipping, and paying volunteers like Musu to invest more in becoming paraprofessionals and community health workers.

First, we trained mus in the prevention, diagnosis and treatment of the top 10 diseases afflicting village families.

The nurse's supervisor visited her monthly to guide her.

We outfitted her with the latest medical technology, like this $1 rapid malaria test, and put it in a backpack full of drugs like this to treat infections like pneumonia. And importantly, we also included a smartphone to help her track and report on the epidemic.

Finally, I acknowledged the dignity of Musu's work.

We made a deal with the Liberian government to pay her a salary and give her the chance to get a real job.

And she's great.

Musu has learned more than 30 medical skills, from screening children for malnutrition, to using smartphones to assess the cause of a child's cough, to helping someone with HIV, to providing follow-up care to an amputee.

As part of our team, community health workers working as paraprofessionals can ensure that many of the things primary care physicians do go to places most primary care physicians never go.

One of my favorite things to do is work with local healthcare workers to care for patients.

So last year I was visiting A.B. Like Musu, I had the chance to go to A.B. School.

He was in the eighth grade when his parents died.

He became an orphan and had to drop out.

Last year we hired and trained A.B. As a community healthcare worker.

And while he was door-to-door, he met a boy named Prince. His mother had difficulty breastfeeding him, and by the time he was six months old, Prince was beginning to weaken.

A.B. had just been taught how to use this color-coded tape measure to wrap around a child's upper arm to diagnose malnutrition.

A.B. Prince found himself in the Red Zone and this meant he had to be hospitalized.

So we took A.B. Prince and his mother to the river, got in a canoe and paddled for four hours to the hospital.

Then, after Prince was discharged from the hospital, A.B. taught mothers how to give their babies nutritional supplements.

A few months ago, I was taken to A.B. Prince, and he was a chubby petite guy.

(Laughter) He's reaching a milestone, getting up and starting to say a few words.

I am very inspired by the local health workers.

I often ask them why they do that, and when I asked A.B. "Teacher, this is the first time I've picked up a pen and written since I dropped out of school.

My brain is getting fresh. ”

The story of AB and Musu taught me fundamental things about being human.

Our willingness to serve others actually helps us change our own circumstances.

A few years ago, in the face of a global catastrophe, I was so moved by how strong my will to serve my neighbors was.

In December 2013, something happened across the border in the Guinean rainforest.

A toddler named Emile fell ill with vomiting, fever and diarrhea.

He lived in an area with sparse roads and a severe shortage of health workers.

Emile died, a few weeks later his sister died, and a few weeks after that his mother died.

And the disease will spread from one community to another.

And it took three months before the world recognized it as Ebola.

We have already lost months when every second counts, and by then the virus had spread like wildfire across West Africa and eventually to the rest of the world.

Businesses were closed and airlines began canceling routes.

At the height of the crisis, when we were told that 1.4 million people could be infected and most of them would die, almost in despair, I remember standing with a group of health workers in the rainforest where the outbreak had just started.

We have helped them train and equip them with the masks, gloves and gowns they need to protect themselves from the virus when dealing with patients.

I remember the horror in their eyes.

And I remember staying up at night wondering if I had made the right decision to keep them on site.

When Ebola threatened to bring humanity to its knees, Liberia's community health workers did not give in to fear.

They did the same thing as before. I answered the call to serve my neighbor.

Communities across Liberia learned the symptoms of Ebola and worked with nurses and doctors to go door-to-door to find and treat the sick.

They tracked thousands of people exposed to the virus and helped break the chain of transmission.

Nearly 10,000 community health workers risked their lives to help hunt down the virus and stop its progress.

(Applause.) Today, with Ebola under control in West Africa, we have learned a few things.

We have learned that blind spots in rural healthcare can lead to disease hotspots, which put us all at greater risk.

We have learned that the most efficient emergency system is actually a routine system, and that system must reach all communities, including rural communities like the Emir.

And most of all, I learned from the bravery of Liberian community health workers that we humans are not defined by the circumstances we face, however hopeless they may seem.

We are defined by how we react to them.

Over the past 15 years, I have seen the power of this idea to transform ordinary citizens into community health workers, everyday heroes.

And I've seen it done everywhere from the woodlands of West Africa to the rural fishing villages of Alaska.

Granted, health workers in these areas don't practice neurosurgery, but they do make healthcare accessible to anyone, anywhere.

So what are you going to do?

Well, we know millions of people are still dying from preventable causes in rural areas around the world.

And we know that the majority of these deaths occurred in these blue-shaded 75 countries.

And what we do know is that by 2030, we could save nearly 30 million lives by training an army of community health workers to learn even just 30 life-saving skills.

30 services could save 30 million lives by 2030.

This is more than just a blueprint, we are proving it can be done.

In Liberia, the Liberian government trains thousands of workers like A.B. Post-Ebola Mus will provide medical care to all children and families in the country.

And we are honored to work with them and are currently working with many organizations operating in other countries to help them do the same.

If we could help these countries scale up, we could save millions of lives and create millions of jobs at the same time.

But without technology it is impossible.

People worry that technology will take our jobs, but when it comes to local healthcare workers, technology has actually been essential to creating jobs.

Without the technology, without this smartphone and the rapid testing it would have been impossible to adopt A.B. and Mus.

And I think the time has come when technology will help us train and help us train better people faster and better than ever before.

As a doctor, I use technology to stay up to date and maintain my certification.

Using smartphones, using apps, using online courses.

But if ABs want to learn, they have to canoe back to the training center.

And when Mus shows up for training, instructors are stuck using flip charts and markers.

Why shouldn't they be able to learn like I do?

If we really want our community health workers to acquire these life-saving skills and more, we need to change this outdated model of education.

Technology can really be a game changer here.

I have been in awe of the digital education revolution led by Khan Academy, edX and others.

And I've been thinking that now is the time. The time has come for the digital education revolution and the community medicine revolution to collide.

So this brings me to my TED Award wish.

I hope -- I hope you will help us recruit the largest army of community health workers the world has ever known by creating the Community Health Academy, a global platform to train, connect and empower.

(Applause.) Thank you.

(Applause.) Thank you.

Here are the ideas: We create and curate the best digital educational resources.

We bring them to community health workers around the world, including A.B. and Mus.

They can take video lessons on vaccinating their children or take an online course on spotting the next epidemic so they are not stuck using flip charts.

We will help these countries certify these workers so that they are not just an underrepresented and underrepresented group, but a profession as prestigious and prestigious as nurses and doctors.

And we will build a network of innovative companies and entrepreneurs that can save lives and connect with workers like Musu so she can better serve her communities.

And we will work tirelessly to persuade governments to make community health workers the cornerstone of their health care plans.

We plan to test and prototype the Academy in Liberia and several other partner countries, then roll it out globally, including in rural North America.

We believe that with the power of this platform, we can better convince countries that a medical revolution is really possible.

My dream is that this academy will contribute to the training of hundreds of thousands of local residents and to the provision of healthcare to their neighbors. Its neighbors are the hundreds of millions of people who live in the world's most remote communities, from the forest communities of West Africa to the rural fishing villages of Alaska. From the hilltops of Appalachia to the mountains of Afghanistan.

If this vision aligns with yours, visit communityhealthacademy.org and join this revolution.

Please let us know if you, your organization, or someone you know may be able to help us build this Academy over the next year.

As I look at this room now, I realize that our journey was not of our own making. They are shaped by others.

And there are many here who have been involved in this cause.

We are so honored to be a part of this community and one that is willing to take on such a bold cause. Therefore, I would like to express my reflection at the end.

It made me think more deeply about what my father taught me.

Recently, I also became a dad.

I have two sons and my wife and I just recently found out she is pregnant with our third child.

(Applause.) Thank you.

(Applause.) I was recently in Liberia caring for my third pregnant woman, just like my wife.

However, unlike my wife, the first two babies did not receive prenatal care.

She lived in an isolated community in the woods, where for 100 years there had been no medical care...

Until last year, when a nurse trained her neighbors to become community health workers.

So, I was seeing this patient in her second trimester and I pulled out the ultrasound machine to see how the baby was doing. Then she started telling stories about her first two children. I put the ultrasound probe on her belly and she stopped mid-sentence.

She turned to me and said, "Doctor, what is that sound?"

It was the first time I heard a baby's heartbeat.

And just as my wife's and myself's eyes lit up when we heard the baby's heartbeat, so did hers.

Throughout human history, disease has been ubiquitous, but access to care has not.

But as a sage once told me, no condition is permanent.

It's time.

It's time to do everything we can to change this situation together.

thank you.

(applause)

My work is about behaviors that we all do unconsciously on a collective level.

I mean behaviors that we deny, behaviors that operate beneath the surface of our everyday consciousness.

And as individuals, we all do these things every day all the time.

It's like when you're being mean to your wife because you're mad at another person.

Or when you drank a little too much at a party out of anxiety.

Or when you overeat because your emotions hurt.

And when we do things like this, the unconscious actions of 300 million people can have catastrophic consequences that no one wanted, no one intended.

And that's what I see in my photographic work.

This is an image I recently completed. So when you stand away, it looks like a neo-gothic cartoon image of a factory spewing pollution.

And when you get a little closer, it starts looking like a bunch of pipes, like a chemical plant or an oil refinery, or a hellish highway interchange.

A closer look reveals that it is actually made up of many plastic cups.

In fact, this is the equivalent of 1 million plastic cups. That's the number of plastic cups used every 6 hours on US air flights.

We use 4 million cups a day on our flights and virtually none are reused or recycled.

The industry just doesn't do that.

Today, that number seems small compared to the number of paper cups we use every day, but 40 million hot drinks per day, mostly coffee.

We couldn't fit 40 million cups on canvas, but we could fit 410,000. 410,000 cups is like this.

This corresponds to 15 minutes of cup consumption.

If you could actually stack this many cups, it would be about that size.

And our cup has an hour's worth.

And our cup is enough for a day.

You can still see small figures of people at the bottom.

This is as tall as a 42-story building, and I put the Statue of Liberty there for scale reference.

Speaking of justice, another phenomenon occurring in our culture is of great concern to me. That said, America currently has the largest percentage of its population in prison than any other country on the planet.

In our country, one in four people, or one in four people in prison, is American and is incarcerated.

And I wanted to show you the numbers.

That number is 2.3 million Americans imprisoned in 2005.

It has increased since then, but the number is still unknown.

So I wanted to show you 2.3 million prison uniforms, but in the actual print of this piece, each prison uniform edge is the size of a nickel.

I'm small. These were barely visible materials, and displaying 2.3 million of them required a canvas larger than any printer in the world would print.

So I had to split it into multiple panels that were 10 feet high and 25 feet wide.

This is the work installed in a gallery in New York. They are my parents watching the work.

(Laughs) Every time I see this work, I always think that my mother is whispering to my father, "I finally folded the laundry."

(Laughter) Now I want to show you some of my work on addiction.

And this time it's about tobacco addiction.

I wanted to make a piece that showed the real number of Americans dying from smoking cigarettes.

More than 400,000 people in the United States die each year from cigarette smoking.

So this piece consists of a lot of cigarette packs.

And if you slowly step back, you can see that it is Van Gogh's painting "Skull with Cigarette".

Strange considering that 3,000 Americans died on 9/11 when that tragedy happened.

And do you remember the reply?

It reverberates all over the world, and will continue to resonate throughout the ages.

It will be talked about in 100 years.

But on the same day, 1,100 Americans died from smoking.

And the next day, another 1,100 Americans died from smoking.

Since then, 1,100 Americans have died every day.

And today, 1,100 Americans die from smoking.

And we are not talking about it, we are ignoring it.

Tobacco lobby, too strong.

We just consciously ignore it.

And knowing what we know about the destructive power of tobacco, we continue to allow our children, sons and daughters to be exposed to the presence of the influences that start them.

And this is the content of the next work.

This is just a lot of cigarettes. 65,000 cigarettes is the same as the number of teens who start smoking this month and the number of cigarettes smoked each month in the United States.

More than 700,000 children under the age of 18 start smoking in the United States each year.

Another strange epidemic in the United States that I would like to share with you is the phenomenon of prescription drug abuse and misuse.

This is an image I made from a lot of Vicodin.

Well, actually, I only had one Vicodin that I scanned many times.

(Laughter) So, as you step back, you see 213,000 Vicodin pills, equivalent to the number of hospital emergency room visits per year in the United States, due to the abuse and misuse of prescription pain relievers and anti-anxiety medications.

One-third of drug overdoses in the United States involve cocaine, heroin, alcohol, and everything else, while one-third of drug overdoses are prescription drugs.

strange phenomenon.

This is a piece I just completed recently about another tragic phenomenon. That's the phenomenon, and the growing obsession we have with breast implants.

Last year, 384,000 American women had elective breast implants.

It is fast becoming the most popular high school graduation gift for young girls about to go to college.

This image was created from a Barbie doll, and if you stand in the back, you'll see a floral pattern like this, and if you go all the way back, you'll see 32,000 Barbie dolls. This represents the number of breast implants performed each month in the United States.

Most of them concern women under the age of 21.

And oddly enough, the only cosmetic surgery more popular than breast augmentation is liposuction, which is mostly performed by men.

I would like to emphasize here that these are just examples.

I wouldn't take these as the biggest problems.

These are just examples.

The reason I do this is because I'm concerned that we don't feel like a culture enough right now.

This type of anesthesia is now practiced in the United States.

We are outraged, outraged and saddened by what is happening in our culture right now, what is happening in our country, and the atrocities being committed in our name all over the world.

they went missing. These feelings are lost.

Our cultural and national joys are nowhere to be found.

I think one of the reasons for this is that each of us is trying to create in our minds about the interrelationship of things as we try to build this new kind of worldview, this holographic worldview, this holographic image. Social impact ten thousand miles away from the day-to-day decisions we make as consumers.

As we try to construct this view and educate ourselves about the enormity of our culture, the information we have to deal with is these gigantic numbers: millions, billions, billions, and now trillions.

Bush's new budget runs into trillions of dollars, numbers that our brains cannot comprehend.

You can't make sense of these huge statistics.

What I try to do in my work is take these numbers and statistics out of the raw language of the data and translate them into a more universal, felt and visual language.

Because I believe that if we could feel these issues, if we could feel these things more deeply, they would be more important to us than they are now.

And if we can find it, we will be able to find within each of us what we need to find to face the big question of how we will change.

That, to me, is the big problem facing humanity today. It's how we change. How do we change as a culture? And how do we take responsibility for the part of the solution that each of us is responsible for: our own actions?

My belief is that you don't need to blame yourself for thinking about these issues.

I don't mean to criticize America.

I just want to say that this is who we are now.

And if there's something about our culture that we don't like, we have a choice.

The degree of integrity that each of us can bring to the surface, the depth of character we can invoke when faced with the question of how we change to pose this issue, has already defined us as individuals and as a nation and will continue to do so in the future.

And it will have a profound impact on the well-being and quality of life of billions of people who will inherit the consequences of our decisions.

I'm not talking about this in the abstract, I'm talking about it. This is who we are in this moment, in this room.

thank you, hello.

(applause)

(music) Sophie Holley-Weld: Okay, no need to get up, but...

We can see you clearly -- (laughter) so you have to dance with us.

And this is kind of a choreographed dance that we're going to do -- Betta Lemme: It's very easy.

SHW: And we're going to flick our wrists like this, and you're going to do it with us.

(music) (singing) I know I didn't put my wrists up (both sing) I know I didn't get it Came, came, went, gone I was conquered in no time I was there and I quit Awoo!

I know I didn't raise my wrist I know I didn't catch Came, came, left, went away Conquered in no time I was there and I quit Oh!

BL: (speaking) Come on!

(music) SHW: I have another appointment.

It's a little pointing dance.

(music) Seated people, I want to see your pointing.

yes!

(singing) I know I didn't put my wrists up (both sing) I know I couldn't get hold of it Came, came, went, gone I was conquered in no time I was there and I stopped Oh...

(Applause) Plate!

(music) (clapping to the beat) (music) oh...

SHW: (speaking) Okay, flick your hand.

(Singing together) I know I didn't put my wrists up, I know I didn't catch them Come, come, go, went I conquered them right away I was there and I quit I know I didn't put my wrists up, I know I didn't catch them .

(laughs) (music) Oh!

(Applause) SHW: Thank you very much.

(applause)

Silicon Valley is obsessed with disruptive things, but the biggest disruptors haven't come out of Silicon Valley lately.

It originated from the steel cities of Ohio, the rural areas of Pennsylvania and the Panhandle of Florida.

And this last US presidential election was the root of all the turmoil.

Again, politics are personal.

Millions of Americans became activists overnight, pouring into the streets at record speed and in record numbers.

(Laughter) The election has had the same effect on family holiday dinners that Uber has had on New York City's taxi system.

The couple broke up and their marriage fell apart.

And the election is affecting my personal life the same way Amazon is doing to malls.

These days, the ACLU is at the forefront 24/7, and even if I sneak a few miles on the treadmill, reading another president's tweet in the headline scroll instantly wipes out any cardio benefits I've gotten.

Even my secret enjoyment of studying Italian painters has been influenced by politics.

Now I study and even sneak up on the old masters.

This is my desk, where a postcard exhibition of mainly Italian Renaissance famous and obscure paintings is held.

Now, in my daily work at the ACLU, art has given me a much-needed respite from the hustle and bustle of politics, but not now.

The day after the inauguration, I was at the Women's March in San Francisco and the crowd was chanting, "This is what democracy looks like."

"This is what democracy looks like."

There I was in the rain, with my sign and umbrella, flashing an old painting that first captivated me many years ago.

I had a hard time remembering the different parts of the actual painting depicting good and evil governments.

It was as if the old master was teasing me.

Want to know what democracy looks like?

Go back and see my frescoes.

And so did I.

In 1339 Ambrogio Lorenzetti completed a monumental commission in the Governing Council Chamber of the Palazzo Pubblico in Siena.

It is a picture that speaks to us today and even screams.

"Art is a lie that makes you realize the truth," Pablo Picasso once said.

And as we seek the truth about government, we should keep Ambrogio's writings in our collective mind's eye as fables, not lies.

During Lorenzetti's time, the political legitimacy of Italian city-states was often highly precarious.

Siena was a republic, but in the twenty years leading up to the commission, there was a great deal of unrest.

The political leaders of Siena, who would literally rule under the watchful eye of these allegorical figures, were Lorenzetti's intended audience.

He cataloged the duties of rulers to their subjects.

Now you can spend years studying these frescoes.

Some are academics.

I'm not an art historian, but I'm passionate about art and I'm overwhelmed by works of this magnitude.

So let's focus on the big things first.

This is a parable of good government.

The majestic figure in the center here, dressed in the colors of Siena, embodies the Republic itself.

Lorenzetti labels him a "commune" and basically tells the Sienas that they must rule themselves, not a king or a tyrant.

Now there are his advisers around the commune.

justice prevails.

She actually looks up to the person of wisdom who holds up her scales of justice.

Concord, or Harmony, has an off-balance thread that binds her to her people and makes them all fellow citizens of the Republic.

And finally there will be peace.

She has a relaxed expression, as if listening to Bob Marley.

Peace does not sweat when good government reigns.

These are big images and big ideas, but I really love small things.

Along another wall, Lorenzetti depicts the impact of good government on the real, everyday lives of ordinary people in a series of tasteful details.

In the countryside, hills are being maintained and farms are being built.

Seeding, hoeing, milling and tilling crops all in one photo.

Crops and livestock are put on the market.

In the city builders build towers.

People attending law lectures and 14th-century TED talks.

(laughs) Elementary school students are playing.

Merchants thrive.

Life-sized dancers dance with joy.

And watching over the Republic is the Winged Person Security, whose banner reads, "Let all march freely without fear."

Now, the amazing thing about these 800-year-old images is that they are familiar to us today.

We'll see what democracy looks like.

We experience the influence of good government in our lives, just as Lorenzetti did in his lifetime.

But what has haunted me since November 9th is the allegory of bad government.

It's badly damaged, but it reads like today's newspaper.

And it is the tyrant, not the commune, who rules the tyranny.

He has horns, fangs, cross-eyed eyes, and braided hair.

He clearly spends a lot of time on that hair.

(laughter) Justice now lies helplessly at its feet, shackled.

Her scales are cut off.

Justice was Tyrant's primary antagonist and she was eliminated.

Now, Lorenzetti surrounds the tyrant and illustrates the vice that gives rise to bad government.

Greed is an old lady clutching a vault and a fisherman's hook to attract wealth.

Vainglory holds the mirror and Lorenzetti warns against narcissistic leaders guided by their egos and vanity.

To the right of Tyrant is cruelty.

The half-lamb, half-scorpion rebel lures us into a false sense of security and poisons the republic.

A crook with bat wings.

Division can be seen to the left of the Tyrant.

She is dressed in the colors of Siena.

"Shi" and "No" are drawn on the body.

She uses a carpenter's saw to cut herself in half.

And Fury brandishes mob weapons, stones and knives.

In the rest of the fresco, Lorenzetti shows the inevitable effects of bad government.

The civic ideals celebrated elsewhere in this room have betrayed us, and we are seeing it.

Cities that were once beautiful are crumbling, countryside is desolate and farms are abandoned.

Many are on fire.

And in the sky above is a winged figure, not security, but a terror figure, whose flag reads, "No one walks this road without fear of death."

Now, the last image, the most important image, was not actually painted by Lorenzetti.

it belongs to the viewer.

Today, the audience of Lorenzetti's frescoes is not the governing but the governed, the individual who stands before his fables and walks away with insight, heeding the call to action.

Lorenzetti warns that when the shadows of greed, fraud, division, and even tyranny loom over our political landscape, we must recognize it, especially when those shadows are projected by political leaders who vocally claim to be the voices of good government and who promise to make America great again.

And we must act.

Democracy should not be a spectator's sport.

The right to protest, the right to assemble freely, the right to petition the government, these are not just rights.

These are obligations in the face of greed, deception, and division.

We must destroy -- (applause) We must destroy our lives so that we can destroy the immoral rise of power by those who betray our values.

We and our people must stand together to promote justice and bring peace to our nation, and we have a choice.

We can indulge ourselves in the worst nightmare of Lorenzetti's misgovernment, or we can stay in the streets and continue our destructive, messy, noisy life.

That is what democracy looks like.

thank you.

(Applause) Chris Anderson: First of all, it's amazing.

Obviously, a lot of people passionately, you spoke passionately to a lot of people here.

I think some people here say, "Trump was elected by 63 million people."

He's far from perfect, but he tries to do what he's chosen to do.

Shouldn't we give him a chance?

Anthony Romero: I think we need to recognize his legitimacy as president and the legitimacy of his policies.

And when so many policies go against the core values ​​that we are equal before the law, that we are not judged by the color of our skin or the religion we worship, we must challenge those values ​​while recognizing and respecting the fact that democracy has made us presidents who champion those values.

CA: And the ACLU isn't just a leftist force, is it?

You also make other claims.

AR: Well, we often piss people off at some point.

that's what we do.

And we were recently taking a position on why Ann Coulter should be able to speak at Berkeley and why Milo has the right to free speech.

And unfortunately, I even wrote a blog that almost burned down a house among some of my members when I talked about the fact that as president, Donald Trump also has the right to free speech, and that his efforts to hold him accountable for inciting violence at his marches and rallies are unconstitutional and un-American.

And when you issue that statement to a very foamy support base that is always excited to fight Donald Trump, you get a new statement that says, "Wait, these rights are for everyone, including presidents we don't like."

And that's what we do.

(Applause) CA: Anthony, you spoke so powerfully to many of us.

Thank you very much. thank you.

(applause)

(dominos fall) (toy car) (ball rolls) (music: "This Too Shall Pass") (singing) I know I can't keep getting depressed and I can't keep dragging that weight.

If you don't have that much to carry, you'd better run as fast as you can when you hit the ground When the morning comes When the morning comes You can't stop these kids from dancing But why would you want to, especially when you've already got the dance?

(xylophone) (singing) 'Cause don't blame the children anymore when your heart won't move and your knees won't bend.

(Xylophone) (Singing) When the morning comes When the morning comes When the morning comes When the morning comes When the morning comes (Xylophone) (Singing) Let it go, it'll go away I can't let you go When the morning comes -- I can't keep letting you down, no, you can't let me go When the morning comes -- I can't keep letting you down, no, you can't let me go When the morning comes (Paint gun fires) (Applause) Damien Kulash: Thank you, thank you.

We are OK Go and have been a band since 1998.

But in the last decade, we've become known not only for the elaborate music videos you saw earlier, but also for the songs that accompany them.

So in a few minutes we'll play along with another question, but in the meantime we'd like to answer this question that we're asked all the time but have never really come up with a good answer for. That is, how we think about these ideas.

By the way, the videos aren't all Rube Goldberg machines.

Last year I danced in zero gravity, and even drove a car and performed stunts through an obstacle course in the desert with thousands of musical instruments.

(Laughter) In one of the videos, we choreographed hundreds of people with umbrellas in an abandoned parking lot outside of Tokyo, filmed from a drone half a mile above.

I mean, it's all these ideas that people are interested in, and the reason I've had such a hard time explaining how we think about these ideas is that it really feels like we don't think about them at all.

i think i found it.

To explain, I have obsessive habits.

I play parallax and perspective games with my eyes almost all the time, and have been since I was a teenager.

And I think a big factor in that may have been how I decorated my high school bedroom.

(Laughter) What I did there as a teenager, of course, was just talking on the phone for a surprisingly long time.

So I was in this visual maelstrom, sitting in the same spot most of the time, and I think I was probably overloaded in general - my brain tried to make sense of it, and I do - if I could move my head a little to one side, the edge of the desk would perfectly match the poster on the opposite wall. Or, if you stick your thumb out, first closing your left eye, then your right eye, your thumb would go back and forth between Jimi Hendrix's left and right eyes.

(Laughs) Of course I didn't do it consciously. It's kind of like scribbling while you talk, which I still do all the time.

This is my wife, Christine -- (Applause) Yes!

Wow!

And when we're out to dinner, it's not uncommon for her to cut off midway through a great conversation, and when she stops, I realize it's me who's acting weird.

What I'm going to do is put the fig back in place and stick it out of her head like a ponytail.

(Laughter) The whole point of telling you this is what it feels like to have an idea for me.

It's like it's made of disjointed parts, with disjointed chunks floating in it.

And if you're receptive and observant, and importantly, you're exactly in the right place, you can align them.

So if you get used to it – if it's your job to think of ideas this way, ideas will start beckoning to you like Jimi's eyes beckoning to a poster or figs beckoning from the back of Christine's head.

Writing music is kind of like repeating that process over and over, having a lot of sounds and grooves and chord progressions and looking for what's beyond, little blobs there, pieces of a puzzle that click into place.

And when it actually clicks, it feels like you've found the piece of the puzzle yourself instead of figuring it out yourself. So it's like a set of relationships that you unlocked yourself.

But especially for video, we usually want this particular feeling, which is strange.

And there's always an element of surprise, so we're not just looking for good ideas, we're looking for good ideas that surprise us in some way.

And this causes some problems, because...

This process we all use to make things actually has a very strong bias against amazing ideas.

The process I'm talking about is the process you all know, and we do it all the time.

you come up with ideas.

Just sit down and come up with a great idea, then make a plan for how you're going to bring that idea to life.

And then, with that plan in mind, you revisit the initial idea, possibly revise it, go back and forth between idea and plan, plan and idea, until you come up with a really great plan.

And when you have it, only then go out and do it.

This is kind of a perfect system when it comes to maximizing resource utilization. Because it's very cheap.

It usually costs very little to think about, but this is almost always very expensive, so you need to be well prepared by the time you get there and be able to squeeze out every last drop of what you have.

But there are problems with this, and math can help reveal the biggest problems.

Go back to the video I mentioned earlier.

That Rube Goldberg machine contained about 130 interactions.

That was 130 things we had to go ahead with the plan.

So let's say you create a new video with 130 moving parts that are similarly complex.

If we're really good planners in that system, we might be competent enough to make every part of that system 90% reliable.

90 percent sounds good, doesn't it?

it's not.

It's actually terrible. The numbers speak for themselves.

The probability that all 130 will not fail at the same time is 90% to the 130th power, which is 0.9.

So if we calculate that, we get...

(Ding) .000001, which is 10,000ths of 1%. So your chances of success are literally 1 in a million.

(Whistle) (Laughter) So, that's not the kind of bet I want to make, so let's ramp that confidence up to 99 percent.

.99 to the 130th power is ...

(D) .27 -- 27 percent.

It's much less difficult and could potentially be used like this.

But really think about it.

How many parts of your life do you trust 99% of the time?

And can you really collect all 130 in one place at once?

And if you can really do that, don't you think you deserve success?

That's right -- will it work?

But no, it actually fails three times more often than it succeeds.

The result of all this is that if your project is very complex, which means that, like all ambitious projects, there are many moving parts, you're basically constrained to shuffle ideas that have already proven to be 100% reliable.

So come back to me sitting there with my thumbs up in the air trying to line up something amazing.

To begin with, if all I can consider is ideas that have already been repeated over and over again, I'm screwed.

However, there are ways around this. We all know there are a lot of untested ideas out there, and many of them turn out to be as credible as they need to be. At this planning stage, we just don't yet know if they are reliable.

So we try to identify where there might be a lot of untested ideas.

We try to find a sandbox and bet a lot of resources on playing in that sandbox.

(Laughter) Because you have to believe that it's the process in the sandbox that reveals which ideas are not only amazing, but also surprisingly credible.

Here are some of the sandboxes we used to create the video.

Let's play with optical illusions.

Dance on moving ground.

Let's make toast with a laser cutter.

Or do something with a zero gravity plane.

But instead of actually sitting there trying to figure out what it was, I spent a whole third of my budget getting into a real vomiting comet and bouncing on a wall for a week.

So while this might look like a test, it really isn't. At this point, we don't know what our idea is yet, and we have no plans to test it.

So we're just playing around, trying everything we can think of. Because I need to fill this idea space with the chaos of my high school bedroom.

'Cause if you can get Bob and Weave and you can give a thumbs up and put some things together -- (Ding) I don't think anyone has ever put things together like that before.

And when the project is over, people will ask again how you came up with the idea. And we will be puzzled. Because from our point of view it doesn't feel like we've thought of it at all, we just feel like we've found it.

Now play another video and that song.

It was for the song "The One Moment" and the sandbox for this song was ballistics and math.

So I spent a whole month creating a huge spreadsheet for this.

It was like my playspace was 400 rows long and 25 columns wide. If anyone can figure this out, I think it's just this crowd.

(Laughter) There's nothing better than a giant spreadsheet, right?

(laughs) Thank you very much, everyone.

We are OK Go, this is called "The One Moment".

(Applause) [The One Moment] (Explosion) [What I just saw was real and took 4.2 seconds] (Video) Please let me know when it's safe.

(percussion) [This is the same moment...

[music] (guitar) (singing) That's right, there's nothing sweeter than the certainty that all this will end And the certainty that this will all end So put your arms out on me, put your arms out on me And this will be the moment and this will be the only thing we remember

(guitar) (singing) So while we keep looking back at the overgrowth where the mud takes back our footprints and our bones swallow the road But for the grace of God we go, but for the grace of God we go Oh...

So don't you stay here with me and we'll build till our hands are blistered And this is the moment that matters -- so will you be here with me and build us some temples -- this is the only moment that matters -- build us some temples -- this is the moment that matters -- build us some monuments -- this is the moment that matters Build us some temples -- this is the moment that matters.

Build us some monuments -- important moments, oh (guitar) (applause)

Zika: Our latest terrifying disease.

what is that? where did it come from?

What should I do about it?

For most adults, it's a relatively mild illness - slight fever, slight headache, joint pain, possibly a rash.

In fact, most infected people don't even know they are infected.

But the more we learn about the Zika virus, the more terrifying it becomes.

For example, doctors are noticing an increase in a recent epidemic called Guillain-Barré syndrome.

In Guillain Valley, the immune system attacks nerve cells and can partially or completely paralyze them.

Fortunately, it's extremely rare and most people recover.

However, infection during pregnancy can lead to serious complications.

A child with a deformed head.

Here is a normal baby.

This is the so-called microcephalic infant.

A brain in a head that is too small.

And there is no known cure.

In fact, just a year ago, doctors in northeastern Brazil were the first to notice a peak in the incidence of microcephaly after the Zika outbreak.

It took doctors another year to convince them that the Zika virus was the cause, but now they are.

If you're the "provide evidence" type, check out this publication.

So where did it come from and how did it get here?

And here it is.

Like many other viruses, it originated in Africa, particularly the Zika forests of Uganda.

Researchers at the nearby Yellow Fever Institute identified an unknown virus in monkeys in the Zika forest, after which it was named.

A few years later, the first human cases of Zika surfaced in Uganda and Tanzania.

The virus then spread eastward through West Africa and through equatorial Asia (Pakistan, India, Malaysia and Indonesia).

But it was still mostly monkeys and of course mosquitoes.

In fact, in the 60 years between its first identification in 1947 and 2007, there were only 13 reported cases of Zika in humans.

And then something extraordinary happened in the tiny Yap Islands of Micronesia.

There was an epidemic that completely affected 75 percent of the population.

How did you get there? by air.

Currently, there are 2 billion passengers on commercial airlines.

Infected passengers can board planes and fly halfway around the globe (if they develop symptoms) before they develop symptoms.

And when they land, the local mosquitoes start biting them, spreading their fever.

Zika next surfaced in French Polynesia in 2013.

By December of that year, it was locally transmitted by mosquitoes.

It caused an explosive epidemic, affecting about 30,000 people.

From there it spread radially around the Pacific Ocean.

Outbreaks occurred in the Cook Islands, New Caledonia, Vanuatu, the Solomon Islands, and most of the South American coast and Easter Island.

Then, in early 2015, cases of a dengue-like syndrome spiked in the city of Natal in northeastern Brazil.

The virus was Zika, not dengue. and spread rapidly. The coastal Recife, the center of the metropolis, soon became the epicenter.

Well, people speculate that it was the 2014 World Cup soccer fans who brought the virus into the country.

However, some speculate that it may have been introduced by Pacific Islanders who participated in the championship canoe races in Rio that year.

Well, today is exactly one year later.

The virus is locally transmitted by mosquitoes virtually throughout South and Central America, Mexico and the Caribbean. Until this year, thousands of cases diagnosed in the United States were infected elsewhere.

But as of this summer, it's reportedly local to Miami.

here.

Then what should I do?

Well, preventing infection is either protecting people or getting rid of mosquitoes.

Focus on people first.

You can get vaccinated.

You cannot travel to Zika areas.

Alternatively, you can cover it up and apply insect repellent.

Getting vaccinated is not an option because there is no vaccine yet and probably not for years.

Staying at home is also not a surefire defense, as we know that staying at home is a potential STD.

Covering and applying insect repellent can help...

until you forget.

(Laughter) No more mosquitoes. And here's how we control mosquitoes. Spray pesticides.

Protective equipment is required as these are toxic chemicals that kill not only insects but humans as well.

However, it takes much more time to kill a person than it does to kill an insect.

These are photos from Brazil and Nicaragua.

But it looks the same in Miami, FL.

Of course, you can also spray pesticides from an airplane.

Last summer, Dorchester County, South Carolina's Mosquito Control Authority allowed the spraying of the insecticide Nared one early morning, as recommended by the manufacturer.

Later that day, the beekeeper told reporters that the apiary appeared to have been hit by a nuclear attack.

husband.

Bees are good people.

Floridians protested, but the spraying continued.

Unfortunately, the number of Zika cases has also increased.

This is because pesticides are not very effective.

So are there approaches that are perhaps more effective than sprays and have fewer drawbacks than toxic chemicals?

I'm a big fan of biological control and I share that idea with Rachel Carson, author of Silent Spring, the book that started the environmental movement.

In this book she tells, for example, how a very nasty pest of livestock was eliminated in the last century.

Today no one knows that amazing story.

So Jack Block and I reiterated that story today when I was writing an editorial on the mosquito problem.

Then, in capsule form, the pupae (the immature form of the insect) were irradiated until they were sterile, and after they had grown to adulthood, they were released from small planes to literally hundreds of millions of planes into the Southwest, Southeast, Mexico and Central America, eventually eradicating the dreaded pest across much of the Western Hemisphere.

Our real purpose in writing this editorial was to show readers how we can do that today, using our knowledge of genetics rather than radiation.

Let me explain.

The villain is Aedes aegypti.

It is the most common insect vector for diseases such as Zika, but also dengue, chikungunya, West Nile virus, and the ancient plague yellow fever.

It's the urban mosquito, and it's the females that do the dirty work.

She chews to get a blood meal to feed her offspring.

Males do not bite. They don't even have mouth parts to chew on.

A small British company called Oxitec has genetically engineered the mosquitoes so that their eggs do not develop into adults when mated with wild females.

let me show off

This is the normal reproductive cycle.

Oxitec designed mosquitoes so that when a male mates with a wild female, the eggs do not develop.

Think it's impossible?

So let's diagrammatically show how they do it.

This represents the nucleus of the mosquito cell, and the central entanglement represents the genome, the totality of its genes.

Scientists have added a single gene that encodes the protein represented by this orange ball. This gene feeds back on itself to keep producing more of that protein.

However, the extra copies disrupt the mosquito gene and kill the mosquito.

To keep it alive in the lab, they use a compound called tetracycline.

Tetracycline blocks that gene and allows normal development.

They added even smaller creases so they could study what happens.

And they added a gene that made the insects glow under ultraviolet light, so when they were released they could accurately track how far they traveled, how long they lived, and all sorts of data for good scientific research.

This is the pupal stage, at which females are larger than males.

This allows them to be divided into males and females, with only males able to grow to adulthood.

And let me remind you that males don't bite.

From there it's pretty easy.

They stuff beakers of male mosquitoes into milk cartons and drive around town, using GPS guidance to release the mosquitoes.

This is the mayor of the city releasing the first batch of what they call "friendly Aedes".

I would like to say that this is an American city, but it is not.

Brazilian Piracicaba.

A staggering 91 percent reduction in dengue cases in just one year.

It is more effective than spraying any insecticide.

So why doesn't the US have this amazing biological control?

Because it is GMO, that is, genetically modified organisms.

Notice how the subtitle here says that if the FDA allows it, we can do the same here when Zika arrives.

And of course it arrived.

So now I have to tell the short version of the long and painful story of GM regulation in the US. There are three agencies in the United States that regulate genetically modified organisms. FDA, Food and Drug Administration, EPA, Environmental Protection Agency, and USDA, United States Department of Agriculture.

It took these people two years to decide that it was the FDA that would regulate genetically modified mosquitoes.

And they would do it as a new animal drug, if that makes sense.

It took another five years to convince the FDA that this wouldn't harm people and wouldn't harm the environment.

They finally gave them permission to do a little test in the Florida Keys this summer. They had been invited there years ago when dengue broke out in the Keys.

I wish it was that easy.

When local residents heard that their area would be tested for genetically modified mosquitoes, some began organizing protests.

They even organized an online petition using this cute logo, which eventually collected about 160,000 signatures. And he called for a referendum to be held in just two weeks on whether to allow the trial at all.

Well, it's Miami that really needs these better ways to control insects.

And that's where attitudes change.

In fact, most recently, a bipartisan group of more than 60 members of Congress wrote to Secretary of Health and Human Services Sylvia Burwell requesting rapid access to this new technology for Florida at the federal level.

The bottom line is that biological control of harmful insects is more effective than using toxic chemical pesticides and is much more environmentally friendly.

Such was the case with Rachel Carson. It's true today.

The difference is that we now have much more information about genetics than we did then, and therefore our ability to use that information to influence these biological controls has improved.

And I hope that what I've done has piqued your curiosity to the point where you've started doing your own research, not just about GM mosquitoes, but about other genetically modified organisms that are so controversial today.

I think you would be surprised and delighted if you did so and delved into all the misinformation and marketing on the part of the organic food industry and Greenpeace and found the science, the exact science.

thank you.

(applause)

She wrote, "When I become famous, I will tell everyone that I know a hero named Marlon Peterson."

Heroes rarely look like me.

In fact, I'm kind of trash.

No, it's not the most attractive way to start a talk or start a conversation. Perhaps you have some doubts in your mind about it.

Why would this person say such things about himself?

what does he mean?

How can someone who considers himself trash see him as a hero?

We believe that we learn more from questions than from answers.

Because when we question something, we invest in taking in certain new information or wrestling with certain ignorance that makes us feel uncomfortable.

That's why I am here. To make us question even if it makes us uncomfortable.

My parents are from Trinidad and Tobago, the southernmost island in the Caribbean Sea.

Trinidad is also home to the steel pan, the only acoustic instrument invented in the 20th century.

Derived from the African drum and evolved from the genius of a city called Raventil, one of Trinidad's ghettos, and the neglect of the American military...

Well, let me tell you, during World War II, the United States set up a military base in Trinidad, and when the war ended, the island was left littered with empty barrels, or garbage.

So the people of Raventil repurposed the old leftover drums into full chromatic scales, or steel pans.

Now playing music from Beethoven to Bob Marley to 50 Cent, they literally made music out of garbage.

Twelve days before my 20th birthday, I was arrested for being involved in a violent attempted robbery in Lower Manhattan.

Four people were shot while people were sitting in a coffee shop.

Two people died.

5 of us were arrested.

We were all Trinidad and Tobago products.

We were the “bad immigrants,” or “anchor babies,” easily maligned by President Trump and millions of Americans.

I was thrown out like waste, which is a given for many.

I ended up serving 10 years, 2 months and 7 days in prison.

I was sentenced to 10 years in prison in a correctional facility.

I was declared worthless, the exact opposite of humanity.

Interestingly, it was during those years in prison that a series of letters saved me and helped me work through the darkness and guilt associated with the worst moments of my young life.

I was able to feel that I was useful.

she was 13 years old.

She wrote that she thought of me as a hero.

I remember reading it, and I remember crying reading those words.

She was one of over 50 students and 150 letters I wrote during a mentoring correspondence program I co-organized with a friend who was a middle school teacher in my hometown of Brooklyn.

We called it the Young Scholar Program.

Every time young people told me their stories and struggles, drew pictures of their favorite cartoon characters and sent them to me, said they counted on my letters and advice, my values ​​grew.

It made me feel what I could contribute to this planet.

It changed my life.

Thanks to those letters and what they told me, their teenage stories, they gave me permission, not excuses, but the courage to admit to myself that that fateful day in October 1999 had a reason. The trauma of living in a community where guns are easier to come by than sneakers. Trauma from being raped at gunpoint at age 14. That is why, for me, that decision, that fatal decision, was not improbable.

Those letters were very important to me, and writing, receiving, and communicating with those people had such an impact on my life that I decided to share the opportunity with friends who were in the same with me.

My friends Bill, Corey, and Alox, all in prison for violent crimes, also shared their words of wisdom with young people and felt connected in return.

We are now published authors, youth program innovators, trauma experts, gun violence prevention advocates, TED speakers, and (laughs) and good dads.

That's what I call a positive return on investment.

Most of all, building that program taught me that when you sow the seeds, when you invest in humanity wherever people are, you can reap amazing rewards.

In this latest era of criminal justice reform, I often wonder. Why do so many people believe that only those convicted of non-violent drug crimes deserve empathy and humanity?

Criminal justice reform is human justice.

Am I not human?

Investing in resources that make people more relevant in communities like Raventil, parts of Brooklyn, or nearby ghettos, we can literally create the communities we want.

We can do better.

We can do better than just investing in law enforcement as a resource. Because law enforcement doesn't give us a sense of relevance, which is at the heart of why so many of us do so many harmful things to pursue a problem.

Gun violence is just a visible representation of many underlying traumas.

Investing in the redeeming value of relevance provides both personal responsibility and healing.

What I care about is people's work, because people work.

Dear family, do the hard, hard, and hard work of giving undeserved kindness to those we can trash or simply ignore or discard.

I am asking myself.

In the last two months, I have lost two friends to gun violence. Both were innocent bystanders.

One was hit by a car on the way home.

Another was sitting in a cafe eating breakfast while vacationing in Miami.

I am asking myself to understand the redemption value of the relevance of those who murdered them, as I struggle to find my own worth.

I urge you to challenge our own ability to fully experience our humanity by understanding the full biographies of people we could so easily choose not to meet, because heroes are waiting to be recognized and music is waiting to be made.

thank you.

(applause)

(singing) Waterboy (strumming guitar) Where are you hiding?

(strums guitar) If you don't come soon, I'll tell Dad.

(strums guitar) There's no hammer -- (strums guitar) It's in this pile (strums guitar) That sound is like mine, boy -- (strums guitar) It's like mine.

(strums guitar) I'm going to break this rock, baby—(strums guitar) From here to Macon.

(strums guitar) All the way to jail, boy -- (strums guitar) All the way to jail.

(strums guitar) You Jack of Diamonds -- (music) You Jack of Diamonds I know you in the old days, I know you in the old days.

You robbed my pocket, you robbed my pocket of silver and gold, dude you robbed of silver and gold.

Waterboy, where are you hiding?

If you don't come soon, I'll let your father know.

There's no hammer in this mountain that makes a noise like mine, boy, there's no noise like mine.

I'll break this rock, boy, from here to Macon.

All the way to jail, boy, all the way to jail.

Waterboy (strums guitar) Where are you hiding?

(Strumming guitar) If you don't come here, if you don't come here, if you don't come here, I'll tell my dad.

(strums guitar) (Applause) Thank you.

It was based on a number of work songs and arranged by my hero, Odetta.

And the next song is, well, I started with Carolina Chocolate Drops, continued my solo career, and did a lot of historical music.

And I believe it is very important to know your history as a musician. It is important as a person, as a nation, as a people.

So I read a lot about where music came from, where this country came from.

I read a lot of books about the Civil War and slavery.

And it's really hard.

Look?

It's really hard to read.

So what I do, as an artist, is read the stories of people like this and put all that emotion into it instead of just thinking, 'Oh, slavery was terrible.

It was.

But it's reading individual stories of what it was like for these people.

Look?

Then I'm like, "Oh, that could have been me."

And now people. Look?

So what to do with that feeling, you have to do something about it.

As an artist, I write.

So I wrote a song based on some of the stories I read, it's called "Come Love Come."

I'll try it now.

(Applause) (Singing) Love has come, the road is low, the road is long and hard, I know.

Come, love me, my way is free, I'll be waiting in Tennessee.

(music) (singing) When I was four years old, my dear mother was cornered by the boss man.

She was knocked down with her head turned, and they buried her in the cold, cold ground.

Love is coming, the road is low, the road is long and hard, I know.

Come, love me, my way is free, I'll be waiting in Tennessee.

(music) When I was 12, my dear father was strong and fearless until the day he raised his hand, but then he was sold to Alabama.

Love is coming, the road is low, the road is long and hard, I know.

Come, love me, my way is free, I'll be waiting in Tennessee.

(music) When I was 16, I found my charm, found my man, and jumped on my broom.

We committed to each other for the rest of our lives and became man and wife on Saturday night.

Love is coming, the road is low, the road is long and hard, I know.

Come, love me, my way is free, I'll be waiting in Tennessee.

(music) When I was eighteen, trumpets sounded and boys in blue came over the wall.

I took a chance and followed freely, but they led the way to Tennessee.

Love is coming, the road is low, the road is long and hard, I know.

Come, love me, my way is free, I'll be waiting in Tennessee.

(music) Now I'm sitting in a little hut with 13 other people behind me.

I sent you the word, so all I can do is wait, wait, wait for you.

Love is coming, the road is low, the road is long and hard, I know.

Come, love me, my way is free, I'll be waiting in Tennessee.

Love is coming, the road is low, the road is long and hard, I know.

Come, love me, my way is free, I'll be waiting in Tennessee.

Oh, oh, oh

Oops... Oh, I'll be waiting.

I'm waiting for you

I'm waiting I'm waiting

(Applause.) Thank you.

Therefore, where there is darkness, we need light.

And in the African American community, finding ways to elevate ourselves has been around for hundreds of years.

Finally, here are some songs by Sister Rosetta Tharp. She is one of the most influential figures in American music that most people have probably never heard of.

If so, I would be very happy.

She was one of the rock 'n' roll guitar innovators and one of the first artists to cross over from gospel to secular.

She's a very important person, so I'm going to talk about her as much as I can.

These are some of her songs.

please do not worry. There is always an opportunity to sing.

(music) (singing) Look down and see that lonely road before you continue your journey.

Look up, look up, and greet your Maker. Gabriel will blow the horn.

I'm exhausted from carrying such a burden, and I'm going on that lonely road.

Look down that lonely road before continuing your journey.

Look down and see that lonely road before you continue your journey.

Look up, look up, and greet your Maker. Gabriel will blow the horn.

I'm exhausted from carrying such a burden, and I'm going on that lonely road.

Look down, look down, look down, look down that lonely road before you continue your journey.

I hear music in the air above my head, above my head. I hear music in the air.

I hear music in the air, above my head, above my head. I hear music in the air.

I hear music in the air above my head, above my head. I hear music in the air. I truly believe there is heaven somewhere.

Above my head, I hear singing in the air.

Over my head, over my head, I hear you singing in the air, I hear you singing in the air.

Above my head, above my head, I hear singing in the air and I truly believe there is heaven somewhere.

(speaks) Alright, Guitar Man!

(guitar music) It's Hubby Jenkins, folks.

(singing) Above my head, above my head, I hear screaming in the air.

Over my head, over my head, I hear screams in the air. A scream is heard in the air.

Above my head, above my head, I hear screams in the air, yes, and I truly believe there is heaven somewhere.

(speaking) So give me a little bit of that base.

(bass solo) That's right!

Wow!

Bass: Jason Cypher.

Jamie Dick on drums.

Well, we're running out of time.

Now it's time for you to sing.

This is call and response.

When I call you, you answer.

There's a lot of songs like this, but you know what's going to happen, right?

are you going to sing along

I said, are you going to sing along?

Audience: Yes!

Rhiannon Giddens: Let's go!

(singing) Above my head AM: Above my head RG: Music in the air AM: Music in the air.

RG: Above my head AM: Above my head RG: Music in the air AM: Music in the air RG: Above my head AM: Above my head RG: Music in the air AM: Music in the air RG: And I truly believe there is heaven somewhere.

1 more time!

Above my head AM: Above my head RG: I hear music in the air AM: Music in the air.

RG: Above my head AM: Above my head RG: I hear music in the air AM: I hear music in the air.

RG: Above my head AM: Above my head RG: I hear music in the air AM: Music in the air RG: And I really believe there is heaven somewhere.

I said I really believe there is heaven somewhere.

heaven somewhere.

(holds note) (applause and cheers) (music ends) (applause)

First of all, thank you so much for giving me the opportunity to speak about superheroes at TEDxGateway in India.

I wish I could have been there in person, but this is the next best thing.

I would love to share some of what I have learned over the years with any Indian artists and writers who want to create new superheroes and new superhero adventures.

I've been thinking a lot about India lately. That's because I'm working with my good friend Sharad Devarajan and Graphic India to create a new Indian superhero called Chakra the Invincible, who lives in Mumbai.

My goal with chakras was very simple.

I wanted to bring an Eastern concept like chakra into the Western world of superheroes.

And to me, superheroes always capture the imagination of people around the world, regardless of their background. I think people are always looking for something that represents the ideal person or the ideal situation.

Almost all of us loved fairy tales when we were young.

Remember stories of giants, witches, wizards, monsters, and other very colorful and larger-than-life things.

But when I get a little older, I'm too old to read fairy tales.

But the love for that kind of story never goes away.

If you think about it, today's superhero stories are just like fairy tales for grown-ups.

Like a fairy tale, the characters are larger than life.

They have the same kind of super powers. Some can fly, some are very powerful, and some are invisible.

It gives viewers and readers a chance to relive the excitement of childhood.

Today, when they read or watch superhero stories, they are really reading adult fairy tales. That's why I love them so much.

For me, the human side of superheroes is probably always the most important part.

By that I mean: Ok, assuming your superhero might be very strong, or could fly or run as fast as a comet, but unless you're concerned with the superhero's personal life, you're just reading shallow stories.

Just because a person has psychic powers doesn't mean they may not have the same personal problems as you or me.

Maybe he doesn't have enough money, maybe he has family problems, maybe the girl he loves doesn't love him.

Or maybe the girl he loves doesn't want to be involved with superheroes.

Superheroes are more than just 1D or 2D, as there are many things you can think of to complete a character or personality.

You want a three-dimensional superhero who lives, breathes, cares, and experiences things like you and I, except for the fact that they have superpowers.

One thing I'd like to mention is that most writers - and I think it's unfortunate - try to write what they think a particular audience will enjoy.

I couldn't do that because I can't think of other people's feelings.

I only know what I enjoy, so when I write stories, I always try to write stories that I find myself enjoying reading, stories that intrigue me while I am waiting for what happens next.

And I don't know what other people are thinking, but I know what I am thinking. And I feel like I'm not that weird. If there is a type of story that I like, there must be many people who like the same type of story.

Therefore, I have always written to please myself. Not to please a particular type of audience. Because you can't know your audience as much as you know yourself.

And if I write a story that I enjoy writing and can't wait to see what happens next, I expect that the majority of the public will feel the same way and that they will enjoy it too.

In summary, I've always tried to please myself rather than others and somehow it seems to have worked because I don't seem to be that different from other people.

In conclusion, I'd like to suggest that you use your imagination and don't be afraid to come up with the wildest ideas in the world.

If what you create is really different and colorful, and if it's well written, people will enjoy it.

Now, when I say "well written," what I mean is that you might have the most amazing concept in the world, suddenly there's a guy who can fly faster than the speed of light.

It might be funny, but you have to make him believable and give readers and viewers reason to think he's really capable of it.

How did he get that power?

The origin of superpowers is always very interesting.

At least we get a proper origin, like Spider-Man being bitten by a radioactive spider, for example, so viewers can grab onto something and say, "Well, that could have happened, I'm going to enjoy it now."

So, even if you're writing the equivalent of a fairy tale for adults, try to keep it factual and detailed enough that the reader or viewer will say, "Well, that could have happened." Then the general public will also agree with the fun.

But if you go too wild and don't explain why it's so wild, it can be overkill in some cases.

So what I'm saying is, let your imagination run free. But always base what happens on some provable fact. That way, your readers and viewers can tune in and enjoy it as much as you enjoy writing it.

Good luck then!

Thank you for listening. I really enjoyed talking with you.

Excelsior!

So imagine you've miniaturized your smartphone and connected it directly to your brain.

With this kind of brain chip, you could upload and download to the Internet at the speed of thought.

Visiting social media or Wikipedia is a lot like examining your own memory, at least internally.

It will be as easy and intimate as you think.

But will it be easier to know what is true?

Of course, just because a method of accessing information is faster doesn't mean that method is more reliable. Also, not everyone interprets it the same way.

And it doesn't mean you'll get better at evaluating it either.

In fact, more data can make the situation even worse, as evaluations take less time.

Something similar is already happening to us now.

We already carry a world of information in our pockets, but the more information we share and access online, the harder it seems to be to tell what's real and what's fake.

It's as if we know more, but understand less.

Now, I think modern life is characterized by a large portion of the public living in an isolated information bubble.

We are not only polarized in values, but also in facts.

One reason is that the data analytics that power the Internet not only give us more information, but also give us more information we need.

Our online lives are personalized. From the ads we read to the news that pops up in our Facebook feed, everything is tailored to suit our tastes.

So while we get more information, much of that information reflects ourselves as much as reality.

Ultimately, I think the bubble will inflate rather than burst.

So perhaps we find ourselves in the paradoxical situation where we think we know more, but disagree with what we know.

So how do we resolve this knowledge polarization problem?

One obvious tactic is to fix technology and redesign digital platforms to make them less susceptible to polarization.

And I'm happy to report that many smart people at Google and Facebook are working on just that.

And these projects are important.

I think fixing technology is obviously very important, but I don't think fixing technology alone will solve the problem of knowledge polarization.

Because I don't think it's a technical problem after all.

I think this is a human problem and has to do with our way of thinking and our values.

To solve it, I think I need help.

You will need the help of psychology and political science.

But I think you'll also need some philosophical help.

Because solving the problem of knowledge polarization requires returning to one basic philosophical idea: that we live in a common reality.

I think the idea of ​​a common reality is similar to many philosophical concepts. Easy to say, but strangely hard to put into practice.

In order to really embrace it, I think we need to do three things, each of which is a challenge at the moment.

First, we must believe in truth.

You may have noticed that our culture now has some troubled relationship with that concept.

As a political commentator said a while ago, our opinions seem so inconsistent that the facts no longer exist.

But the idea is really the expression of some kind of seductive argument floating in the air.

It's like this: We cannot get out of our own perspective. We cannot get out of our prejudices.

Each attempt only gives us more information from our perspective.

So, in this way of thinking, it might be better to admit that objective truth is an illusion, or that it doesn't matter because we never know what it is or doesn't exist at all.

It is not a new philosophical thought, a skepticism of truth.

As some of you know, it was very popular in some academic circles at the end of the last century.

But it actually goes back, if not further, to the Greek philosopher Protagoras.

Protagoras said that objective truth is an illusion, because "man is the measure of all things."

Man is the measure of all things.

It may seem to some people a sobering or liberating reality politics. Because it allows each of us to discover or create our own truth.

But really, I think it's a selfish rationalization disguised as philosophy.

It confuses the difficulty of being certain with the impossibility of truth.

Of course, it's hard to be sure about anything. We may all be living in a "matrix".

You may have a brain chip implanted in your head and been given all the wrong information.

But actually we agree on all sorts of facts.

We agree that bullets can kill people.

We agree that you can't fly with your arms flapping.

We agree, or should, that there is an external reality and ignoring it can hurt.

Nevertheless, skepticism about the truth can be seductive because it allows us to rationally rid ourselves of our own prejudices.

In doing so, we are like the guy in the movie who knows he lives in the world of The Matrix, but decides he likes it anyway.

It feels good to get what you want.

It feels good to be right all the time.

So often it's easier for us to wrap ourselves up in our cozy bubbles of information, live with malice, and take those bubbles as a measure of reality.

I think one example of how this malice affects our behavior is our response to the phenomenon of fake news.

The fake news circulating on the internet during the 2016 US presidential election was designed to fuel our prejudices and inflate our bubble.

But it wasn't just that he cheated so many people that was really shocking.

What's really striking to me about the phenomenon of fake news is how quickly it has become the subject of knowledge polarization. So much so that the very term "fake news" now simply means "news stories I don't like."

That's an example of the malice to truth I'm talking about.

But I think the real danger of skepticism is that it leads to tyranny.

"Man is the measure of all things" necessarily becomes "Man is the measure of all things."

Just as "all for their own sake" always seems to be "only the strong survive."

At the end of Orwell's 1984, Thought Cop O'Brien tortures the protagonist, Winston Smith, into believing that two plus two equals five.

The point of what O'Brien is saying is that he wants to convince Smith that whatever the party says is true, and that whatever the party says is true.

And what O'Brien knows is that once the idea is accepted, critical opposition is impossible.

By definition, if those in power tell the truth, you cannot tell the truth to those in power.

I said three things must be done in order for us to truly accept that we are living in a common reality.

The first thing is to believe in the truth.

The second can be summed up by the Latin phrase "Sapere aude," or "dare to know," which Kant used as his motto for the Enlightenment.

Or, as Kant would have it, "dare to know for yourself."

In the early days of the Internet, many of us thought that information technology would always make it easier for us to know information ourselves. And, of course, in many ways it did.

However, as the Internet has become a part of our lives, our dependence on and use of the Internet has become more passive.

Google knows much of what we know today.

We download a set of packaged facts and shuffle them along the social media assembly line.

Now, knowing Google is useful precisely because it involves a kind of intellectual outsourcing.

We offload our efforts to networks of others and algorithms.

And, of course, it allows us to avoid cluttering our minds with all sorts of facts.

Download when you need it.

That's amazing.

But there's a difference between downloading a set of facts and actually understanding how or why those facts come to be.

Understanding why a particular disease is prevalent, how mathematical proofs work, or why a friend became depressed requires more than just a download.

You'll probably have to do some work yourself. It's about having a little creative insight. Use your imagination. to go out into the wild. Experiment. work on the proof. talking to someone

Of course, I'm not saying you should stop learning about Google.

I'm just saying that I shouldn't overestimate it either.

We need to find ways to encourage more positive forms of knowledge that don't always involve pushing our efforts into a bubble.

Because too often what you know about Google is what you know about the bubble.

And knowing your bubble means you're always right.

But to dare to know, to dare to understand, means to risk the possibility that you are wrong.

It means risking the possibility that what you want is not the truth.

Now consider the third thing I think we must do if we want to accept that we live in a common reality.

Third, be a little humble.

Humility here means epistemological humility. This means, in a way, knowing that you don't know everything.

But it means more than that.

It means believing that the evidence and experiences of others can improve your worldview.

You believe that your worldview can be improved based on the evidence and experiences of others.

It's not just about embracing change.

It's not just about being open to self-improvement.

It means thinking that one's knowledge can be enhanced or enriched by what others contribute.

That's part of what it has to do with recognizing that there is a common reality that you are also responsible for.

I think it's fair to say that our society isn't very good at promoting or encouraging that kind of humility.

It's also because we tend to confuse arrogance with confidence.

It's also because, as you know, it's easier to be arrogant.

It's easier to think that you know everything.

It's easier to think that you understand everything.

But this is another example of the malice of truth I have been talking about.

So, like many philosophical concepts, the concept of a common reality can seem so obvious that we pass by it and forget why it matters.

Democracy does not work unless citizens strive, at least for some time, to live in a common space, a space where they can exchange their views when they disagree, especially when they disagree.

But you cannot strive to live in that space unless you have already accepted that you are living in the same reality.

To accept it, we must believe in the truth and encourage a more positive way of knowing.

And we must have the humility to understand that we are not the measure of everything.

We may someday realize the vision of the internet in our brains.

But if we want it to be liberating rather than frightening, if we want it to be not only passively knowing but expanding understanding, we must remember that our perspective, however wonderful and beautiful it may be, is only one perspective of reality.

thank you.

(applause)

Please try to imagine. When you walked in here tonight, you noticed that everyone in the room looked pretty much the same and generally looked good regardless of age or race.

That person sitting right next to you may have the most peculiar inside. But we all have the same vacant look all the time, so you have no clue.

It's the kind of eerie change that's taking over cities, and it only applies to buildings, not people.

The city is full of roughness and shadow, texture and color.

Architectural surfaces with great character and character can still be found in apartment complexes in Riga and Yemen, public housing in Vienna, Hopi villages in Arizona, brownstones in New York and wooden houses in San Francisco.

These are not palaces or cathedrals.

It is an ordinary house that expresses the ordinary splendor of the city.

And they do so because the need for shelter is closely tied to the human desire for beauty.

Its rough surface gives us a city we can touch.

right? A street where you can read the letters by tracing the bricks and stones with your finger.

But as cities are getting smoother, it's getting harder.

Newer downtowns will often have towers made of concrete and steel and covered with glass.

If you look at skylines around the world, like Houston, Guangzhou, or Frankfurt, you'll see the same army of high-gloss robots marching across the horizon.

Now think about all that we lose when architects stop using every available material.

Rejecting granite, limestone, sandstone, wood, copper, terracotta, brick, wattle, and stucco simplifies architecture and impoverishes cities.

It's like putting all of the world's cuisines into in-flight meals.

(laughs) Chicken or pasta?

But even worse, this collection of glass towers in Moscow suggests a disdain for the civic and communal aspects of city life.

right? Such buildings are intended to enrich their owners and tenants, but not necessarily the rest of our lives as we move through the spaces between buildings.

And we plan to do it for free.

Shiny towers are an invasive species, suffocating cities and destroying public spaces.

We tend to think of façades as make-up, the final decorative layer of what is effectively a finished building.

But just because the facade is superficial doesn't mean it isn't deep.

Let me give you an example of how urban surfaces affect our lives.

When visiting Salamanca, Spain, I was drawn to Plaza Mayor any time of the day.

In the early morning sunlight rakes the façade to sharpen the shadows, and at night the light of the lamps divides the building into hundreds of different areas, balconies, windows and arcades, each a separate pocket of visual activity.

Its detail and depth, its charm, give the square a theatrical quality.

A place where generations gather.

Teenagers sprawl on the pavement, seniors occupy the benches, and real life begins to look like an opera set.

The curtain rises on Salamanca.

So I'm talking about the appearance of the building, not the form, function or structure. Yet those surfaces give texture to our lives. Because buildings create spaces around them, and those spaces draw people in and keep them away.

And the difference is often related to the quality of the exterior.

Therefore, one of the modern equivalents of Salamanca's Plaza Mayor is the Place de la Defense in Paris. This square is a windswept, glassed-in square that office workers rush through on their way from the subway to their private rooms, but otherwise spend as little time as possible.

In the early 1980s, architect Philip Johnson sought to recreate an elegant European plaza in Pittsburgh.

This is PPG Place. It's a half-acre open space surrounded by commercial buildings made of mirrored glass.

And he decorated them with metal trim, bays and Gothic towers that stood out against the skyline.

But on the ground, the square feels like a black glass cage.

Sure, there are kids running back and forth in the fountains in the summer and ice skating in the winter, but it lacks the casualness of a laid-back hangout.

It's not the kind of place you want to just hang out and chat.

Public spaces thrive or fail for a variety of reasons.

Architecture is just one thing, but it is important.

Modern squares like Melbourne's Federation Square and Copenhagen's Superkillen combine old and new, rough and smooth colors, neutral and light colors, and thrive because they don't rely too heavily on glass.

Now, I'm not against glass.

It is an ancient all-purpose material.

Easy to manufacture, transport, install, replace and clean.

They range from giant ultra-transparent sheets to translucent bricks.

A new coating changes the mood with a change in light.

In an expensive city like New York, allowing views has the magical power of multiplying real estate values, and in fact is the only commodity a developer has to offer to justify its surreal prices.

With the construction of the Crystal Palace in London in the mid-19th century, glass rose to the top of the list of quintessential modern materials.

By the mid-20th century, it came to dominate the downtowns of several American cities through highly spectacular office buildings such as the Skidmore, Owings, and Merrill-designed Lever House in Midtown Manhattan.

Eventually, the technology advanced to the point where architects could design structures so transparent that they virtually disappeared.

And in the process, glass became the default material for high-rise cities. There are very strong reasons for that.

Because as the world's population concentrates in cities, the most disadvantaged flock to jelly-built slums.

But with hundreds of millions of people needing a place to work in apartments and increasingly large buildings, it makes economic sense to build towers and cover them with cheap and practical curtain walls.

However, there is a limit to the expressiveness of glass.

This is part of the wall surrounding a square in the pre-Hispanic city of Mitla in southern Mexico.

2,000-year-old carvings reveal that this was a site of great ceremonial importance.

Today we can look at them and see a historical and textural continuity between their sculptures, the surrounding mountains, and the churches built over the ruins using stone looted from the site.

Near Oaxaca, even ordinary stucco buildings become canvases for bright colors, political murals and sophisticated graphic arts.

This is a complex and necessary language for communication, but it could easily be wiped out by the glass epidemic.

The good news is that architects and developers have begun to rediscover the joys of texture without straying from modernity.

Some find innovative uses for old materials such as brick and terracotta.

Others invent new products like the molded panels Snohetta used to give the San Francisco Museum of Modern Art a wrinkly, sculptural quality.

Architect Stefano Boeri also created a living façade.

This is his vertical forest, a pair of high-rise apartments in Milan, the most visible feature of which is green.

And Boeri is designing a version of this for Nanjing, China.

And imagine how cleaner the air in China's cities would be if green façades were as prevalent as glass façades.

But the truth is that most of these are one-off boutique projects that aren't easily replicated on a global scale.

That's the point.

Using geographically significant materials prevents cities from all looking the same.

Copper has a long history in New York - the Statue of Liberty, the crown of the Woolworth Building - but it was long out of fashion until SHoP Architects used copper to cover the American Copper Building, a pair of twisted towers on the East River.

It's not finished yet, but you can see how the setting sun illuminates its metal façade. It turns green with age.

Buildings can be like humans.

Their faces speak to their experiences.

This is an important point. Because when the glass gets old, you just replace it, and the building looks pretty much the same as before until it's finally demolished.

Almost every other material has the ability to absorb an infusion of history and memory and project it into the present.

Enid completed the Utah Museum of Natural History in Salt Lake City by covering it with copper and zinc ore that has been mined in the area for 150 years, camouflaging the building against the ocher hills to create a natural history museum that reflects the region's natural history.

And when Pritzker Prize-winning Chinese Wang Shu was building Ningbo's History Museum, he didn't just make wrapping paper from the past, he built memories directly into the walls using bricks, stones, and shingles salvaged from demolished villages.

Architects can now use glass in equally lyrical and original ways.

Here in New York, two buildings, the Jean Nouvel building and the Frank Gehry building, face each other across West 19th Street, and their come-and-go play of reflections is like a symphony of light.

But when the city grows glass by default, it becomes a hall of mirrors, unsettling and cold.

After all, cities are centers of diversity where cultures, languages ​​and lifestyles from all over the world come together and blend.

Therefore, rather than enveloping all diversity and diversity in buildings of overwhelming sameness, we must have architecture that respects the full spectrum of urban experience.

thank you.

(applause)

Paying close attention to something is not so easy, is it?

That's because our attention is pulled in so many different directions at once, and it's actually pretty impressive if we can stay focused.

Many people think that attention is what we focus on, but it's also what information our brains try to filter out.

There are two ways to get your attention.

First, there is the overt attention.

Obvious attention moves your eyes toward something to pay attention to it.

Then there is the secret caution.

Secret attention involves paying attention to something without moving your eyes.

Think about driving for a moment.

Your overt attention, or eye direction, is in front, but it's covert attention constantly scanning areas around you that you're not actually looking at.

I'm a computational neuroscientist working on cognitive brain-machine interfaces, ie brain-computer integration.

I love brain patterns.

Brain patterns are important to us. Because we can build models for computers based on brain patterns, and based on those models, computers can perceive how well our brains are working.

The computers themselves can also be used as therapeutic aids when things go wrong.

But it also makes sense. Because choosing the wrong pattern will give you the wrong model and thus the wrong treatment.

right?

In the case of attention, the fact that we can shift attention not only with our eyes but also with our thoughts makes hidden attention an interesting model for computers.

So, I wanted to know the brain wave patterns during overt and surreptitious viewing.

I set up an experiment for that.

In this experiment there are two blinking squares, one blinking slower than the other.

Depending on which of these flickers you pay attention to, certain parts of your brain will begin to resonate at the same rate as that flicker.

Therefore, by analyzing brain signals, we can track exactly where you are looking and paying attention.

So, to see what happens in the brain when we pay too much attention, we asked people to look directly at one of the squares and pay attention to it.

In this case, of course, we found that a blinking square appeared in brain signals from the back of the head responsible for processing visual information.

But I was very interested in seeing what happened in the brain when I secretly paid attention.

So this time, I asked them to look at the center of the screen without moving their eyes and focus on one of these squares.

When I did that, I found that both of these flicker rates showed up in the brain signal, but interestingly, only one signal that was focused on had the stronger signal, so there was something in the brain processing this information, and that thing in the brain was basically frontal activation.

The front part of the brain is responsible for advanced cognitive functions as a human being.

The front part seems to act as a filter, trying to keep information coming in only from the focused right flicker and suppressing information from the ignored flicker.

The brain's ability to filter is certainly key to getting attention, but some people, like those with ADHD, lack it.

Therefore, people with ADHD are unable to curb these distractions and therefore cannot concentrate on a single task for long periods of time.

But what if this person could connect his brain to a computer and play certain computer games to train his brain to curb these distractions?

Well, ADHD is just one example.

These cognitive brain-machine interfaces can be used for many other cognitive areas.

My grandfather had a stroke just a few years ago and completely lost the ability to speak.

He could understand everyone's words, but he couldn't even write because he couldn't read or write, so he had no way of replying.

Then he quietly took his last breath.

I remember thinking at the time. "What if there was a computer that could speak for him?"

After many years in the field, I now know that this is possible.

Imagine if people could find brain wave patterns when they think of images and letters, such as letter A producing a different brain wave pattern than letter B.

Will computers one day be able to communicate for people who cannot speak?

What if a computer could help us understand the thoughts of someone in a coma?

We're not quite there yet, but pay close attention.

I'll be there soon.

thank you.

(applause)

This happy picture of me was taken in 1999.

I was in my senior year of college, right after dance practice.

I was really, really happy.

And I remember exactly where I was after about a week and a half.

I was sitting in the back seat of a used minivan in a campus parking lot when I decided to commit suicide.

From decision to full-fledged planning proceeded quickly.

And I was nearing the edge of the cliff.

It's the closest I've ever been.

And the only reason I took my finger off the trigger was by a few lucky coincidences.

And after the fact that's what scared me the most, it's the chance factor.

So I got to very methodically test different ways of managing my ups and downs and it turned out to be a good investment. (Laughter) Many normal people may have, say, 6 to 10 major depressive episodes in their lives.

I have bipolar depression. It's running in my family.

At this point I have over 50 years of experience and have learned a lot.

I've been taking a lot of at-bats and rounds in the dark ring and taking notes.

So instead of standing up and teaching you all sorts of recipes for success or highlight reels, I thought I'd share my recipe for avoiding self-destruction, and arguably self-paralysis.

And the tools I've found that have proven to be the most reliable safety nets against emotional freefall are actually the same tools that have helped me make the best business decisions.

But that's secondary.

And that is… stoicism.

It's boring.

(Laughter) You might think of Spock, or you might imagine -- (Laughter) a cow standing in the rain.

It's not sad. Not particularly happy.

It is just a faceless creature that receives whatever life sends.

For example, one might not think of an ultimate rival like New England Patriots head coach Bill Belichick, who holds the record for most Super Bowl wins in NFL history.

And in the last few years, stoicism has spread like wildfire to the NFL's top echelons as a tool for mental toughness training.

Mention the names of our founding fathers, Thomas Jefferson, John Adams, and George Washington, and you might think of none other than three students of Stoicism.

In fact, George Washington staged a play about the Stoics—this is Tragic Cato—at Valley Forge to keep the troops motivated.

So why do activists pay so much attention to ancient philosophies?

This seems very academic.

As an operating system for thriving and making better decisions in high-stress environments, I encourage you to look at stoicism a little differently.

And it all started here, on the verandah.

So, around 300 BC, in Athens, a man named Zeno of Cytium gave many lectures walking around a painted porch, or "store."

This later became stoicism.

And in the Greco-Roman world, people used Stoicism as an overarching system to do so many things.

But for our purposes, the most important of these was training ourselves to distinguish between what we could control and what we couldn't, and doing exercises to focus solely on the former.

This reduces the emotional reactivity that makes it a superpower.

Conversely, let's say you're the quarterback.

I miss the path. You get furious with yourself.

This may cost you money for the game.

If you're a CEO and blame a very important employee for a minor violation, it can hurt them.

For example, if you're a college student and you're stuck in a negative spiral, feeling helpless and hopeless unabated, it can be life-threatening.

The stakes are therefore very high.

The toolkit contains many tools to get you there.

I will focus on an event that completely changed my life in 2004.

At that time, I found myself for two reasons. One, a very close friend, a young man my age, died suddenly of pancreatic cancer. And the girlfriend I thought I was going to marry has left.

She didn't give me Dear John's letter because she had had enough, but she gave me this Dear John's shield.

(Laughter) I'm not making it up. I kept it.

"Business hours end at 5 o'clock."

At the time I was working on my first serious business and she gave me this to keep on my desk for my personal health.

I had no idea what I was doing. I was working 14+ hours a day, 7 days a week.

I used stimulants to be active.

I used depressants to calm myself down and sleep.

It was a disaster.

I felt completely trapped.

Trying to find the answer, I bought a book on simplicity.

Then I found a quote that made a big difference in my life. “We suffer more in imagination than in reality,” said the famous Stoic writer Seneca Young.

It led me to his letter, which led me to the exercise "Premedititi Malorum". This means premeditation of evil.

Simply put, this is about visualizing the worst-case scenarios you fear in detail and preventing them from taking action so that you can take action to overcome that paralysis.

My problem was a very loud, very constant monkey mind.

Just thinking to solve a problem doesn't work.

I had to put my thoughts down on paper.

So I created a written exercise for myself that I call "fear setting," which is similar to goal setting.

It consists of 3 pages.

It's very simple.

The first page is here.

"What if I...?"

This is what you fear, what causes anxiety, what you procrastinate.

This could be asking someone out on a date, ending a relationship, asking for a promotion, quitting your job, or starting a company.

It can be anything.

For me, it was either taking my first vacation in four years, going away from business for a month to London, where I could stay in a friend's room for free, and either removing myself as a business bottleneck or closing the business.

In the first column, “Definition,” write down all the worst things you can imagine that would happen if you took that step.

I want 10 to 20.

I won't go through all of them, but I'll give you two examples.

One was, "I'm going to London, but it's going to rain, it's going to be depressing, and it's all going to be a huge waste of time."

Second, you miss a letter from the IRS and are subject to audits, raids, closures, and more.

Then go to the "Prevention" column.

In that column, I will answer the following questions: What can I do to prevent each of these bullets from happening, or at least reduce the chances by a small amount?

So I was able to carry around a portable blue light and use it for 15 minutes in the morning in case I was depressed in London.

I knew it would help prevent depressive episodes.

As for the IRS, I was able to change the mailing address on file with the IRS so that the documents would reach my accountant instead of the UPS address.

Easy, easy.

Then go to "Repair".

So, if the worst happens, what can you do to repair the damage, and who can you ask for help?

In the first case, London, well, you can pay to fly to Spain and soak up the sunshine. Even if you go into a funk, you can undo the damage.

If you lose your letter from the IRS, you can call a lawyer friend or ask, say, a law professor what they recommend, who to talk to, and how people have dealt with it in the past.

So one question I had to keep in mind when creating this first page was: Has anyone in history figured this out without much intelligence or drive?

Perhaps the answer is yes.

(Laughter) The second page is simple. What are the advantages of an attempt or partial success?

You can see that we grow our fears and look cautiously at the upside.

So, if you try whatever you're considering, will it give you emotional, financial, or other confidence and skills?

For example, what is the advantage of base hitting?

This will take 10-15 minutes.

3rd page.

This may be the most important, so don't skip it. "The cost of inaction."

Humans are very good at figuring out what would go wrong if they tried something new, like asking for a raise.

What we don't often consider is the enormous cost of not changing the status quo.

So, if I avoided this action or decision, and similar actions and decisions, I should ask myself, what would my life look like in six months, twelve months, or three years from now?

Further away, it begins to look like something intangible.

And look into it emotionally, financially, physically, whatever.

And when I did this, a horrifying picture was drawn.

I am self-medicating and if I don't step back my business will collapse at any moment.

My relationships were either frayed or broken.

And I realized that doing nothing was no longer an option for me.

That's page 3. that's it. That's what sets the fear.

And then I realized on a scale of 1 to 10, 1 being the least impact and 10 being the most impact. I found that if I went on a trip, I was at risk of 1 to 3 temporary, reversible pain and 8 to 10 permanent, positive, life-changing effects.

So I went on a trip.

No disaster happened.

Certainly there were some problems.

I was able to get out of business.

I ended up extending my round-the-world trip by a year and a half, which laid the foundation for my first book and brought me here today.

And all of my greatest triumphs and greatest calamities can be traced back to setting fears at least once a quarter.

It's not a panacea.

You will find that some of your fears are well-founded.

(Laughter) But you shouldn't come to that conclusion without first looking under a microscope.

And while not all hard times and hard choices get easier, many things do.

I would like to end with a profile of one of my favorite contemporary Stoics.

Jerzy Gregorek.

He is a four-time Olympic weightlifting world champion, political refugee, and poet at the age of 62.

He can still kick my butt and probably most butts in this room.

He is an impressive man.

I spent a lot of time in his store and on his porch asking for advice on life and training.

He was a member of the Polish Solidarity, a non-violent movement for social change, but was violently repressed by the government.

He lost his career as a firefighter.

His mentor, Fr., was then kidnapped, tortured to death, and thrown into the river.

He was then threatened.

He and his wife fled Poland, had to fly from country to country, and finally arrived in the United States lying on the floor with nothing.

He currently lives in a very nice place in Woodside, CA. Out of the 10,000+ people I've met in my life, he would be in the top 10 in terms of success and happiness.

And the punchline is coming, so pay attention.

I texted him a few weeks ago and asked, "Has he read Stoicism?"

And he replied with a two-page sentence.

It doesn't look like him at all. he is a simple man

(Laughter.) And not only did he know a lot about asceticism, but he pointed out the inflection points in adhering to his principles and ethics in all of his most important decisions, and how he had tapped into asceticism and fear-setting kind of things, and it blew my mind.

And he finished with two words.

First, he could not imagine a life more beautiful than that of a Stoic.

And the last is his mantra, he applies to all, but so does you. "Choices are easy, life is hard.

Hard choices, easy life. ”

The hard choices—the things we fear most to do, ask, or say—are often exactly what we most need to do.

And the biggest challenges and problems we face, whether in our own heads or with others, are never resolved in casual conversation.

So I encourage you to ask yourself: Where in your life right now is it possible that defining your fears is more important than defining your goals?

In the meantime, always keep in mind Seneca's words, "We suffer more in imagination than in reality."

thank you very much.

(applause)

Here are four concrete examples. Finally, let's talk about how a company called Silk tripled its sales. How did an artist named Jeff Koons go from obscurity to huge sums of money and great influence? About how Frank Gehry redefined what it means to be an architect.

And one of my biggest blunders as a marketer in the last few years was when the record label I started put out a CD called "Sauce."

Before that, I have to talk about sliced ​​bread and a guy named Otto Rohwedder.

So what were they saying before sliced ​​bread was invented in the 1910s?

Like the great invention since the telegraph or something.

But a man named Otto Lohwedder invented the sliced ​​bread and, like most inventors, focused on the patent part and the manufacturing part.

And the important thing about the invention of sliced ​​bread is that in the first 15 years after sliced ​​bread became available, no one bought it. no one knew about it. It was a complete and utter failure.

The reason is that nobody wanted it until Wonder showed up and found a way to spread the idea of ​​sliced ​​bread.

The success of sliced ​​bread, like almost everything we've talked about at this conference, isn't necessarily about what the patent looks like or what the factory looks like, it's about getting the idea across.

And I think the way to get what you want or make the change you want is to find a way to spread your ideas.

And it doesn't matter to me if you run a coffee shop, or you're an intellectual, you run a business, or you fly a hot air balloon.

We live in a century of diffusion of ideas.

Whatever the idea, the one who can spread it wins.

When talking about this, I usually choose business. Because your business will create the best photos for your presentation. Also because it's the easiest way to keep score.

But please allow me to use these examples. Because I'm talking about what you decide to spend your time doing.

Television and other media are central to the dissemination of ideas.

Television and the mass media have in some ways made it very easy to spread ideas.

I call it the "television industrial complex".

The way the television industry conglomerate works is that you buy ads, disturb some people, and thereby get distribution.

Use the distributions you get to sell more products.

Profit from it and buy more ads.

And it goes round and round the same way the military-industrial complex worked long ago.

That model is the story we heard yesterday. If we could get to the Google home page, find a way to get promoted there, or grab someone by the throat and tell them what we want to do.

Then everyone will notice and we will win.

Well, this television industrial complex affected my entire childhood, and probably yours as well.

So, all of these products are successful because someone figured out how to use advertising to reach people in ways they didn't expect and didn't necessarily want, over and over again until they bought them.

And what really happened is that we canceled the television industrial complex.

In the last few years, anyone who markets anything has noticed that it's not working the way it used to.

This photo is really blurry, sorry. I had a bad cold when I drank it.

(Laughs) But the product in the blue box in the center is my sign.

I go to the deli I'm sick; I have to buy medicine.

That blue product brand manager spent $100 million trying to get in my way in a year.

All the TV commercials, magazine ads, spam, coupons, inventory, and $100 million that disturbed me with spicy messages so I could ignore every message.

I ignored all messages as I don't have a problem with painkillers.

I always have the one in the yellow box, so I will buy it.

And I'm not going to spend a minute of my time trying to solve her problem.

This is a magazine called "Hydrate". There are 180 pages about water.

(laughs) Articles about water, ads about water.

Imagine what the world looked like 40 years ago when it was just The Saturday Evening Post, Time and Newsweek.

Now there are also magazines about water.

Nippon Coke's new product "Water Salad".

(laughs) Coca-Cola Japan releases a new product every three weeks. Because you never know what works and what doesn't.

I couldn't write better myself.

Announced 4 days ago. I've circled the important parts so you can see them here.

they came out...

Arby's has spent $85 million promoting oven mitts with Tom Arnold's voice, hoping it will entice people to go to Arby's and buy a roast beef sandwich.

(Laughter) Well, I tried to imagine what an animated TV commercial featuring Tom Arnold would be like driving across town and buying a roast beef sandwich.

(Laughter) Now this is Copernicus. He was right when you were talking to someone who wanted to hear your thoughts.

"The world revolves around me."

I don't want to receive emails from anyone. I would like to receive an "email".

(Laughter) So when I say consumers, I don't just mean the people who buy things at Safeway. I mean the people at the Pentagon who might buy something, or the New Yorkers who might print your article.

Consumers don't care about you at all. they just don't care.

One of the reasons is that we have a lot more options and a lot less time than we used to.

And in a world of too many choices and too little time, we naturally end up ignoring things.

My analogy here is that you are driving down the road and you see a cow and you have seen it before so you keep driving.

Cows are invisible. Cows are boring.

Who would stop and pull over and say, "Oh, look, it's a cow."

(Laughter) But wouldn't it be a great special effect if the cow was purple?

I'd be happy to do it again if you'd like.

If the cow is purple, you will notice it for a while.

I mean, if all cows were purple, you'd get bored with it too.

What's talked about, what's done, what's changed, what's bought, what's built is the question, "Is it worthy of attention?"

And the word "remarkable" is a really cool word. Because we think it doesn't just mean "neat", it also means "worth mentioning".

And that is the essence of the dissemination of ideas.

These two of America's most popular cars are $55,000 behemoths, big enough to fit a Mini in the trunk.

People pay full price for both, the only thing they have in common is they have nothing in common.

(Laughter) The best-selling DVD in America changes every week.

It's never The Godfather, it's never Citizen Kane, it's always a third-rate movie with a second-rate star.

But the reason it's number one is because it's the week it launched.

Because it's new, because it's fresh.

People saw it and said, "I didn't know there was such a thing," and they noticed it.

Two of the biggest retail success stories of the last 20 years have been selling super-expensive items in blue boxes, and selling the cheapest items you can make yourself.

The only thing they have in common is that they are different.

We are now in the fashion business. Regardless of what we do for a living, we are in the fashion business.

And people in the fashion industry know what it's like to be in the fashion industry and are used to it.

The rest of us have to find a way to think that way.

How do you know it's not about interrupting people with big full-page ads or forcing people to meet with you?

But it's an entirely different kind of process that determines which ideas go viral and which ones don't.

By reinventing what it means to sell a chair, they sold the Aeron chair worth $1 billion.

They changed the chair from being purchased by the purchasing department to being a status symbol of where they sit at work.

This man, Lionel Poirane, the most famous baker in the world, who passed away two and a half months ago, was my hero and dear friend.

he lived in Paris

In his bakery, all the bread was baked in a wood-burning oven by one baker at a time.

And when Lionel started a bakery, the French made a fuss about it.

They didn't want to buy his bread.

It wasn't what they expected.

it was neat. It was remarkable. It slowly spread from person to person until it became the official bread of a three-star restaurant in Paris.

Currently he is in London and ships worldwide with FedEx.

What marketers used to do was build average products for average people.

That's mass marketing.

smooth the edges. Aim for the center. That's the big market.

They will ignore the geeks and, God forbid, they will ignore the laggards.

It was all about aiming for the center.

But in a world where the television-industrial complex has collapsed, I think that's a strategy we don't want to use anymore.

I think the strategy we want to use is not to market to these people. Because they are good at ignoring you.

But pitch to these people because they care.

People who are obsessed with something.

And when you talk to them, they listen because they like to listen. it's about them.

And with any luck, they tell their friends on the rest of the curve and it spreads.

They have what I call 'Otaku', which is great Japanese.

It represents the desire of an obsessed person to drive around Tokyo to try out new ramen shops.

Building a product, pitching an idea, or coming up with a problem to solve is nearly impossible without a geek relationship.

Instead, you need to find a group that really takes what you have to say seriously.

Talk to them and make it easier to tell your friends.

There are hot sauce geeks, but no mustard geeks.

So there are so many types of hot sauce and not so many types of mustard.

It's not because making an interesting mustard is difficult. You can make interesting mustard, but people don't. No one tells their friends because no one is into it.

It has a strategy, and what they do is walk into a city, talk to people, geeks, and then it spreads all over the city, even to people who just cross the street.

Not everyone wants it, but I don't care.

They want to talk to people who do, and perhaps it will spread.

They make the loudest car stereos in the world.

(Laughter) It's about as loud as a 747.

The car has bulletproof glass, so you can't get into it. Otherwise the windshield will be blown off.

But that doesn't change the fact that if someone wants to put some speakers in their car and they're geeks or have heard about them from geeks, they're willing to go for it.

It's that simple. Sell ​​it to the people listening, and maybe they'll pass it on to their friends.

So when Steve Jobs speaks to 50,000 people in his keynote, they come from 130 countries to watch his two-hour commercial. It's the only reason his company survives. That 50,000 people are desperately interested enough to watch the two-hour commercial and tell their friends about it.

Pearl Jam have released 96 albums in the last two years.

Each made a profit. how?

They only sell on their website.

Buyers have otaku, which they tell their friends about, and it spreads and spreads.

This hospital crib cost $10,000, ten times the standard.

But hospitals are buying this product sooner than any other model.

Hard candy manicures aren't for everyone, but they're a hot topic among those who love them.

This paint saved the Dutch Boy paint company and made it a fortune.

The cans made by Dutch Boy are 35 percent more expensive than regular paint because they are remarkable and people are talking about them.

They didn't just stick new ads on their products. They have changed what it means to make paint products.

AmIhotornot.com -- 250,000 people visit this site every day. This site is run by two volunteers. You could say they're tough graders -- (Laughter) They didn't get this way by doing a lot of publicity.

They have walked this path by being remarkable, sometimes a little too remarkable.

And this picture frame has a cord coming out of the back that plugs into the wall.

My father keeps this on his desk and watches his grandchildren change every day.

And everyone who walks into his office hears the whole story of how this ended up on his desk.

And one by one, the ideas spread.

These are not diamonds, they really aren't.

It's made from "remains".

You can have yourself gemstoned after cremation.

(Laughter) Oh, you like my ring? It's my grandmother.

(Laughter) The fastest growing business in the entire mortuary industry.

But it doesn't have to be Ozzy Osbourne. You don't have to go crazy to do this.

All you have to do is understand what people really want and give it.

Finally, we summarize some simple rules.

First, designs are free if you scale.

People who come up with something worthy of attention often know how to use design.

Number two: The riskiest thing you can do right now is stay safe.

Procter & Gamble knows that, right?

The whole Procter & Gamble model has always been average products for average people.

It's dangerous.

All you can safely do now is stay on the fringes and stand out.

And being so nice is one of the worst things you can do.

Very good things are boring. Very good is average.

It doesn't matter if you're making a record album, an architect, or have sociology expertise.

Even if it's very good, it doesn't work because nobody notices it.

So, my three stories.

Silk puts products that don't need to be in the refrigerated section next to the milk in the refrigerated section.

Sales have tripled. why?

Milk, milk, milk, milk, milk--not milk.

For those who were there and watched that section, it was remarkable.

They didn't triple their sales with advertising. They tripled it by doing something remarkable.

That's a great work of art.

It doesn't have to be like it, but a 40-foot-tall dog made out of bushes in the middle of New York City is remarkable.

(Laughter) Frank Gehry didn't just change the museum. By designing one building that was visited by people from all over the world, he transformed the city's entire economy.

Well, at countless meetings at the Portland City Council, we were told we needed an architect. Can I hire Frank Gehry?

Because he did something on the fringes.

And my big mistake? I made a whole (music) record album, preferably in this amazing new format called SACD, in bulk, and marketed it directly to people with $20,000 stereos.

People with $20,000 stereos don't like new music.

(Laughter) So what you have to do is figure out who cares.

Who would put their hand up and say, "I'd love to hear what you're going to do" and pitch something?

Finally, I would like to give an example.

As you can see, if it's nowhere, it's right in the middle.

(Laughter) But they have a lake.

And people came from miles away to swim in the lake.

Not anymore.

What can we build here? ”

And like most committees, they were trying to build something pretty secure.

And then an artist came to them. This is a real artist rendering. He wants to build a 55-foot-tall lava lamp in the center of town.

It's a purple cow. It's worth noting.

I don't know about you, but if they build it, I'm going there.

Thank you for your attention.

welcome. May I have the first slide?

Contrary to calculations by some engineers, bees can fly, dolphins can swim, and geckos can climb even the smoothest surfaces. Now, what I want to do is to let everyone experience the thrill of revealing nature's design within a limited amount of time.

I do this all the time and it's really incredible.

In this presentation, I would like to share a little bit of that with you.

I will talk about the challenge of observing nature's design and how we perceive and use it.

The challenge, of course, is to answer this question. What makes this extraordinary performance possible that allows animals to go basically anywhere?

Once you know that, how can you implement that design?

Well, many biologists will tell engineers and others that it will be millions of years before living things get it right. they are great. They can do everything wonderfully well.

So the answer is biomimicry. Just copy nature directly.

We know from animal studies that the truth is that's exactly what humans don't want to do. Because evolution works on the principle of just goodness, not on the principle of perfection.

And the constraints in building an organism are very strict when you actually look at it. Natural technology has incredible limitations.

please think about it. If you were an engineer and you had to build a car, but you had to start this big, then you had to grow it to full size, and you had to work hard every step along the way,

Or consider the fact that if you build a car, you also need to have a factory inside that car that can build other cars.

(Laughter) And because of history and legacy planning, you can never, never, start from scratch.

In other words, organisms have this important history.

In fact, evolution works more like a tinkerer than an engineer.

This is very important when you start observing animals.

Instead, we believe we should take inspiration from biology.

We must discover the general principles of nature and use these analogies when advantageous.

It's really hard to do this. Because when you really start looking inside animals, how they work, it looks hopelessly complicated. I don't have a detailed history of the design plan and can't look it up anywhere.

They have too much joint and muscle movement.

Even the simplest animals we can think of, like insects, have more neurons and connections than we can imagine.

How can we make sense of this? We believe and hypothesize that one way animals can easily work is if the control of their movements is built into the animal's body itself.

What we discovered is that two-legged, four-legged, six-legged and eight-legged animals all produce the same force on the ground when moving.

They all move and bounce like this kangaroo.

And they can be modeled by spring-mass systems, called spring-mass systems, because we specialize in biomechanics. It's actually a pogo stick.

They all produce pogo stick patterns. is that true?

Humans have one leg that acts like the two legs of a trotting dog, or three legs that act as one in a trotting insect, or four legs that act as one in a trotting crab.

And although they alternately change their propulsion, the pattern is all the same. Nearly all organisms we've examined this way will be available next week. give you a hint. There's an article coming out that something really big like Tyrannosaurus probably can't do this, but we'll find out next week.

Now, it's the animals that are interesting. And like we said, it bounces along the vertical plane like this. In our collaboration with Pixar, A Bug's Life, we discussed the bipedal nature of Ali's character.

And we told them, of course, they would travel in another dimension as well.

And they asked us this question. They say, "These animals move in the horizontal plane, so why model them only in the sagittal and vertical planes?" This is a good question.

No one in the field of biology has modeled this this way.

We followed their advice and also modeled animals moving in horizontal planes. We took their three legs and made them fall as one leg.

We have brought together some of the world's best mathematicians from Princeton University to tackle this problem.

And I was able to create a model in which the animal not only bounces up and down, but also bounces left and right at the same time.

And many organisms fit this kind of pattern.

So why is it important to have this model?

Because it is very interesting. If you perturb this model, push it, and hit something, it will self-stabilize with its structure alone, without the need for a brain or reflexes.

Beautiful model. Let's look at mathematics.

(laughs) That's enough!

(Laughter) When you see animals running, they seem to be self-stabilizing with these basically springy legs. That is, the legs can do their own calculations. In a way, control algorithms are embedded in the shape of the animal itself.

Why didn't we get more inspiration from nature and this kind of discovery?

I would argue that human technology, at least so far, is really different from natural technology.

Think about the typical types of robots you see.

Human technology tended to be big, flat, square, hard, and made of metal. It has a rotating device and an axle. There are almost no motors or sensors.

Nature, on the other hand, is small, curved, bends and twists, has legs instead, appendages, many muscles and a great many sensors.

So it has a very different design. But what's changing, and what's really exciting, and I'll show you some of it next, is that as human technology incorporates more of nature's properties, nature can actually become a much more useful teacher.

Here's one really interesting example.

This is a collaboration with Stanford University.

And they developed this new technology called Shape Deposition Manufacturing.

It is a technique that mixes materials and molds them into a desired shape to incorporate the characteristics of the material.

You can embed sensors and actuators directly into the form itself.

For example, this is a leg. The clear part is stiff, the white part is flexible, and you don't need axles or anything like that.

It just bends beautifully.

So we can incorporate these properties. This inspired them to create a small robot named Sprawl to showcase this design.

Our research also inspired another robot, a biology-inspired bouncing robot from the University of Michigan and McGill University, named RHex, a robotic hexapod, but this one is autonomous.

Head over to the video to see some of these animal movements, then some simple robots inspired by our findings.

Some did it outdoors this morning instead of on the treadmill, but this is the next thing.

This is what we do.

(Laughter) This is a death-headed cockroach. This is the American cockroach you don't think you have in your kitchen.

This is an eight-legged scorpion, a six-legged ant, and a 44-legged centipede.

Well, I said all these animals work like a kind of pogo stick. They bounce as they move. And it can be seen at this ghost club from the beaches of Panama and North Carolina.

You can run up to 4 meters per second.

It actually jumps into the air and like a horse it has an air phase and you can see it bouncing here.

What we found is that whether you look at a human leg like Richard, or a cockroach, crab, or kangaroo, the relative leg stiffness of the spring is the same for all we've seen.

So, what good are springy legs? what can they do?

We wanted to see if it would improve the animal's stability and mobility.

So I built a terrain with obstacles three times the waist height of the animal I was observing.

And we were convinced they couldn't do that. And this is what they did.

Even if an animal ran over it, it would not slow down.

The preferred speed did not drop at all.

I couldn't believe I could do this. He told us that if we could build a robot with very simple, springy legs, we could make it as mobile as any robot ever built.

Here is the first example of that. This is the Stanford Shape Deposition Manufactured Robot, Sprawl.

It has 6 legs. It has tuned springy legs.

It walks like an insect and runs on a treadmill. Now, what makes this robot different from other robots is that it can overcome these obstacles without any difficulty, even though it can't see, feels, or has no brain.

It's this technique of building properties into forms.

This is a graduate student. This is what he does for his thesis projects. Very powerful if a graduate student does it for a thesis project.

(Laughter) This is from McGill University and the University of Michigan. This is RHex, first seen in a demo.

(Laughter) The principle is the same. It has only 6 moving parts and 6 motors, but it has springy adjustable legs. It moves according to the steps of the insect.

The middle legs move in synchronism with the front legs, and the hind legs are on opposite sides. It's like an alternating tripod and can climb over obstacles just like animals.

(Laughter) (Voice: Oh my god.) (Applause) Robert Full: We're going on different surfaces -- sand here -- the legs aren't finished yet, but we'll talk about that later.

RHex is in the woods.

(Laughter) Again, this robot can't see, it can't feel, it doesn't have a brain. It just works with a coordinated mechanical system with very simple parts, but it draws inspiration from the basic mechanics of animals.

(Voice: Oh, I love him, Bob.) RF: This is going down the trail.

When I submitted this to NASA's Jet Propulsion Lab, I was told it didn't have the ability to descend craters in search of Martian ice and, ultimately, life. And he said, it's too complicated, especially for legged robots.

You can't do anything like that. And then we'll talk. I showed this video here using RHex's simple design. And to convince them they should go to Mars in 2011, I dyed the video orange to give it the feeling of being on Mars.

(Laughter) (Applause) Another reason why animals have extraordinary abilities and can go anywhere is because they interact effectively with their environment. The animal I'm going to show you that we studied to find out about this is the gecko.

Here's one, notice its position. it's holding up.

I will try you this time. I will show you the video.

One animal runs on flat ground and the other runs up walls. Which is which?

They are traveling at 1 meter per second. How many people think the person on the left is running up the wall?

(Applause.) Okay. The point is, it's really hard to tell. Unbelievable. We observed students doing this, but they didn't see it.

They can run up walls at 1 meter per second and 15 steps per second, making it look like they are running on flat ground. how do they do this?

It's just amazing. The person on the right was climbing a hill.

how do they do this? They have weird toes. The toes curl up like party favors when you blow on them and peel off like tape.

If there is a tape now, peel it off like this.

They do this with their toes. Strange! This detachment inspired iRobot, with whom we work, to develop Mecho-Geckos.

Here is a version with legs and a tractor or bulldozer version.

Watch a video of some gecko movements. After that, I'll show you a little clip of the robot.

This is a gecko running up a vertical plane. It happens in real time. The story continues there. Obviously we should delay this a bit.

A normal camera cannot be used.

You have to take 1,000 photos per second to see this.

Here's a 1,000 frames per second video.

Now, look at the animal's back.

Can you see how curved it is? we don't know that. It's an unsolved mystery. I don't know how it works.

If you have a son or daughter who wants to go to Berkeley, please come to my lab. we will solve it Well, send them to Berkeley. Because that's what I want to do next. This is the gecko factory.

(Laughter) It's a see-through treadmill with a see-through treadmill belt. So you can observe the animal's legs through the treadmill belt and video how the animal moves.

Here is an animal running on a vertical plane.

Pick a foot and observe the toes to see if you can tell what the animal is doing.

After the curls are undone, peel off the toe skin.

This can be done in 14 ms. can't believe it.

Here is their inspirational robot, iRobot's Mecho-Geckos.

First, let's see how the animal's toes are peeling.

And this is the skinning action of the Meko-gecko.

A pressure sensitive adhesive is used for this.

skin the animal. Skin the geckos – so they can climb autonomously. You can move flat surfaces, move to walls, then move to ceilings.

There is also a bulldozer version. We no longer use pressure sensitive adhesives.

Animals don't use it.

But that's the limit for now.

What does the animal do? The animal has strange toes.

If you look at the toe, there are small leaves there, and if you zoom in and zoom in, you can see that these leaves have small stripes.

At 270x magnification, you can see that it looks like a rug.

If you zoom in on it and zoom in 900 times, you can see that there are tiny hairs there. And if you look closely, those little hairs have stripes. And when you magnify it 30,000 times, you can see that each hair has split ends.

Blowing it up will create a small structure on the edge.

The smallest branch of hair looks like a spatula, and such animals have billions of these nano-sized split ends to get very close to the surface. In fact, there's the diameter of a hair, and a gecko has 2 million hairs, each with 100 to 1,000 split ends.

Consider possible contacts.

We were lucky enough to work with another group at Stanford University to build a special manned sensor to measure the force of a single hair.

This is hair with a little split ends.

When the force was measured, the force was enormous.

They were so large that a patch of hair of this size, or gecko leg, could easily support the weight of a small child of about 40 pounds. Well how do they do that?

We recently discovered this. Is it because of friction?

No, it's too weak. Can you do it with static electricity?

No, you can change the price. Fees are still held.

Are they working together? It's like Velcro.

No, you can put them on the smooth surface of the molecule, but they don't do it.

how about suction? Stick together in a vacuum.

What about wet adhesion? Or capillary adhesion?

Since no adhesive is used, it sticks firmly even underwater.

When you put your foot in the water, it will hold you tight.

So how do they do it? Believe it or not, they are gripped by intermolecular forces, or van der Waals forces.

Perhaps something like this happened in the past in the field of chemistry. There are two atoms, they are close to each other and have electrons moving around. This small force adds up many times in these small structures, so it's enough for them to do it.

What we do is we take inspiration from hair and work with another colleague at Berkeley to manufacture it.

And just recently, we believe we have made a breakthrough and created the first synthetic, self-cleaning, dry adhesive. Many companies are interested in this.

(laughs) I gave it to Nike as a gift.

(Laughter) (Applause) Let's see how this goes. We were so excited by this and realized that on that small scale, everything would become sticky and gravity would no longer matter, so we had to watch the ants and their legs. Because one of my other colleagues at Berkeley built a 6mm silicon robot with legs. But I get stuck. It doesn't work very well.

But ants do, so we'll figure out why and eventually take this action. And imagine. You'll be able to run this swarm of 6mm robots around.

where does this go? I hope you understand now.

Clearly, the Internet already has eyes and ears, with webcams and the like. But it also has feet and hands.

Robots of this kind will be able to perform programmable tasks and will be able to run, fly and swim anywhere. I saw David Kelly at the beginning with the fish.

In conclusion, I think the message is clear.

When we need a message, when nature just isn't enough, when we care about search and rescue, mine clearance, medicine, or whatever else we're working on, we have to preserve nature's design. Otherwise, these secrets will be lost forever.

thank you.

(applause)

The best Christmas my kids had was also the worst Christmas my husband and I had.

7-year-old Elizabeth and her 5-year-old brother Ian couldn't imagine how they could get everything they wanted for Christmas.

The reason Santa was so generous was because of something my husband Pat and I knew but the kids didn't understand.

Something we had just learned and we were terrified.

This was in 1994 and the story actually begins a few years earlier.

For several years I had been noticing a rash on the side of Elizabeth's neck that looked like heat rash.

Both my father and brother died of cancer in the same year, and I was probably overly concerned about the disease.

The doctor assured me everything was fine and nothing to worry about, but I wasn't that confident.

So without a referral, I took Elizabeth to a dermatologist at my own expense.

It was probably an allergy to something, but why did this rash appear only on the side of my neck?

Two days before Christmas 1994, a dermatologist took a quick look at her neck and said, "She has pseudoelastic xanthoma."

And he turns off the lights and looks into her eyes.

Coincidentally, it turns out that this dermatologist was also trained in ophthalmology.

our lucky day.

My stomach hurt.

"your?"

Oma is like melanoma or lymphoma, or cancer.

"Why are you looking in her eyes for skin rashes?"

I didn't scream.

that's right.

Elizabeth has Pseudoxanthoma Elastica, or PXE for short.

Doubts and fears mix and spurt like bile in your throat.

why are you looking into her eyes

What do you know about this? How can you know for sure?

What is the prognosis?

My pastoral counseling training did not prepare me for this.

Dr. Berkovich tells you everything he knows about PXE.

It is a rare hereditary, systemic, slowly progressive premature aging disease.

It causes loosening of skin wrinkles in the flexor area.

It causes legal blindness such as macular degeneration and many cardiovascular problems.

Little was known about the disease, and some people died in their 30s, some reports at the time said.

Then he glances at our son and says, "He has it too."

We want to escape to the original world.

Two days after Christmas, researchers from a university in Boston came to collect blood from us and our children for a research project focused on genetic discovery.

A few days later, researchers from a medical center in New York came and said they wanted blood too.

"These are children.

They are 5 and 7 years old.

Do not double-face the needle.

Go and get a share from other researchers. ”

They laugh in disbelief.

"Together?"

That's when we find that very little is shared in biomedical research.

This moment lit a fire between my husband Pat and me more than any other moment.

Pat and I went to the medical school library and copied all the papers we could find on PXE.

We didn't understand anything.

We bought medical dictionaries and science textbooks and read whatever we could get our hands on.

And although we didn't understand it yet, a pattern was beginning to emerge. And within a month it quickly became apparent that there had been no systematic effort to understand PXE.

Additionally, the lack of sharing we experienced was pervasive.

Researchers competed with each other because the ecosystem was designed to reward competition, not to alleviate suffering.

We realized that we had to tackle this situation ourselves to find a solution for ourselves and others like us.

However, we faced two big obstacles.

One: Pat and I are ignorant of science.

At the time, he was the manager of a construction company, and I was a stay-at-home mom and former university pastor.

A second barrier: Researchers are not sharing information.

People said you can't have a herd of cats.

Yes, you can if you move the food.

(Laughter) (Applause) DNA and clinical data is food.

So we collect blood and medical histories and require all scientists who utilize these resources to share their results with each other and with those who donate.

Long before the Internet was in common use, Pat and I started and conducted research on PXE and founded PXE International, a non-profit organization dedicated to helping individuals with the disease.

Using traditional media, we gathered about 100-150 people from around the world and asked, "Could you please provide your blood, tissues, medical history, and medical records?"

And we put them all together.

I quickly learned that this shared resource was not enough.

So we decided that we needed to do some serious bench science, that is, some serious research.

So we rented bench space in a lab at Harvard University.

A wonderful neighbor came over a few times a week and sat with the kids from 8pm to 2am while Pat and I extracted DNA, ran gels to score, and searched for genes.

A generous postdoctoral fellow mentored us.

Within a few years we discovered the gene.

We patented it to make it freely available.

I created a diagnostic test.

We have established a research consortium.

We held research conferences and opened Centers of Excellence.

We have found over 4,000 people with PXE worldwide, held patient conferences, conducted clinical trials and research.

In this situation, we have lived with fear.

Fear of plucking disease into the neck while the clock ticks.

Fear of researchers. Because they are well qualified and positioned in a world made for them.

Fear that we are making the wrong choice.

Fear that if the deniers are correct, the cats will simply find new food.

But greater than all these fears was our willingness to make a difference for our children and everyone we met along the way.

And we soon realized that what we were doing for one disease, we should be doing for all.

We joined, and ultimately led, the Genetic Alliance, a network of health advocacy, patient advocacy, research and health organizations.

We have built scalable and extensible resources such as biobanks, registries and directories to support any disease.

And as I learned about all these diseases and all disease communities, I realized that there are two secrets in medicine that have had a huge impact on me.

The first is that for people like my children and everyone I've worked with, there's no quick answer, whether it's a common or rare symptom.

And secret number two: the answer lies within all of us, donating our data, our biological samples, and ultimately ourselves.

People who are working to change this situation are getting excited little by little.

Citizen scientists, activists, crowdsourced hackers, and DIY science are changing the landscape.

Even President Obama and Vice President Biden are evangelists of the idea that people should be partners in research.

This is the founding principle of our organization.

Indeed, interventions and treatments are very difficult to discover and develop.

The science is hard, the regulatory regime is hard.

There are many stakeholders and uncoordinated incentives such as publication, promotion and tenure.

I don't blame the scientists for going this route, but I request them and us to do this differently.

Recognize that people are central.

The Genetic Alliance has been experimenting with what it takes to transform these messy systems.

Our goal is to work without boundaries.

It sounds abstract, but for us it's very practical.

When we get frustrated that an entity won't share the data, the data that comes from the people who gave their energy, time, blood, even tears, we need to stop and ask ourselves, "How is it possible to share, but not?"

We are part of this system too.

How can we enable people to freely share their ideas?

To allow people to take risks and get closer to each other?

This leads to the dissolution of the us-versus-them relationship, not only for organizations but also for individuals.

If I ask organizations and individuals to strive for these standards, I too need to explore my own being and practice.

If you ask clinicians, researchers, and administrators to take risks, I, Sharon, need to take risks too.

I have to face my personal fears.

Fear of not getting enough results.

Fear of not being able to teach well.

My fear of not being good enough.

Just before entering their teenage years, children stopped us and said, "We must stop worrying about making change and making an impact and instead learn to live with disease, not fight it, just like we do."

I must ask, where does my fear come from?

The children's manifesto shines a spotlight on that fear.

It comes from a foundation of love.

I love Elizabeth and Ian.

I love people with PXE.

I love all sick people.

i like people

Some of my colleagues have realized that it is not death that we fear, but the enormity of what we love.

This expansive love causes me great pain when faced with loss.

As I discovered my fear, I realized that I and everyone around me had an infinite capacity for love.

And I have also discovered that as I move into this fear, I can learn many new things and find my way to practical solutions, the core of healing and wellness, and more.

You will not be afraid of fear like you used to.

In fact, these days, thanks to the tremendous support of all my fellow travelers, I've realized that this isn't the warning it used to be.

Rather, I realized that it was an invitation to move forward. Because there is a path to love and greater love.

When you look to that fear with gentle curiosity, you discover that within yourself and others you have immense wealth and the ability to step into challenges you thought were impossible.

My children are still ahead of me on the road.

The 29- and 27-year-olds declare themselves happy and healthy despite PXE symptoms in their skin, eyes and arteries.

So I invite you, us, us, to look to fear. To embrace what scares us and find the love that lies within.

Not only will we find ourselves there, but we will also be able to put ourselves in the shoes of those we fear and those who fear us.

When we breathe in that fear and are vulnerable to systems and people who challenge us, our power as change agents increases exponentially.

And when we realize that working on our inner life is working on our outer life, and our outer work is our inner work, we focus on what's real and the shit is done.

(Laughter) There are no limits to what we can accomplish together.

thank you.

(applause)

My 7-year-old grandson, who sleeps right down my hallway, wakes up many times in the morning and says:

Other times, in the middle of the night, she calls out in a trembling voice, "Nana, can you get sick and die?"

I think this pretty much tells us that for me and most people I know we are in a mixed state of happy anticipation and fear.

So a few days before my 61st birthday, I decided to sit down and make a list of all the things I know for sure.

There are few truths in popular culture, but it's good to be certain of a few things.

For example, I am no longer 47, but this is the age I feel and want to think of myself as.

My friend Paul used to say that in his late 70s he felt like a young man with something really wrong.

(Laughter) Our real humans are outside of time and space, but when we look at the paperwork we see that they were actually born in 1954.

My inner self is outside time and space.

It has no age.

As an aside, I can't help but mention that I'm of any age ever and so are you, but it might have helped if I hadn't followed the rules of 60s skincare. The rule was to get as much sun as possible while applying plenty of baby oil and basking in the glow of a foil reflector shield.

(Laughter) But it was so liberating to face the fact that I was no longer the last torment of middle age, so I decided to write down all the truths I knew.

People feel really doomed these days and keep asking me what the truth is.

So I hope my list of mostly positive thoughts can provide some basic operating instructions for anyone feeling really overwhelmed or confused.

First and most true is that all truth is a paradox.

Life is a precious, immeasurably beautiful gift, but here the incarnate side of things makes that impossible.

It was a very bad match for those of us who were born very sensitive.

It's so hard and weird that sometimes I wonder if we're punk.

It's simultaneously filled with heartbreaking sweetness and beauty, desperate poverty, floods and babies and acne and Mozart, all swirling together.

It doesn't sound like an ideal system.

(Laughter) Second: Just unplug it for a few minutes and pretty much everything will work again -- (Laughter) (Applause) You included.

Third, there is little outside of you that can help you in any permanent way, except when you are waiting for an organ.

Serenity and peace of mind cannot be bought, achieved, or dated.

This is the most horrifying truth and I am so outraged.

But this is an inside job and cannot arrange peace or lasting improvement for those we love most in the world.

They must find their own way, their own answer.

I can't run the heroic journeys of grown-up children with sunscreen and chapsticks.

you have to release them.

It would be rude not to.

And if it's someone else's problem, you probably don't have the answer anyway.

(Laughter) Our help is usually not very helpful.

Our help is often harmful.

And helping is the bright side of the control.

Don't help too much.

Do not let everyone receive your help and goodwill.

(Laughter) (Applause) Now you know number four. Everyone is messed up, broken, clingy and scared, even those who seem the most united.

They are more like you than you think, so try not to compare your insides to other people's looks.

It will only make you worse than you are now.

(Laughter) And you can't save them, or fix them, or rescue them, or get someone drunk.

Thirty years ago, it was my actions and thoughts that helped me clean up.

So I enlisted the help of some sober friends and turned to a higher power.

One of God's acronyms is "Gift of Despair," G-O-D. Or, in the words of a sober friend, by the end I was deteriorating too fast to lower my standards.

(Laughter.) So, in this case, God might mean, "I'm running out of good ideas."

Trying to repair, save, or save is futile, but fundamental self-care is quantum, and it radiates from you into the atmosphere, like a little piece of fresh air.

It's a great gift to the world.

If the response is, "Isn't that person overwhelmed with himself?" smile obliquely like Mona Lisa and serve them a nice cup of tea.

Loving yourself for your goofy, selfish, moody, and annoying self is home.

World peace begins there.

Number 5: 75% cocoa chocolate isn't actually food.

(Laughter) Best use is as bait in a snake trap or to balance a wobbly chair leg.

It was never considered edible.

Sixth -- (laughter) Writing.

Every writer you know has a really bad first draft, but they keep their butts in their chairs.

That's the secret of life.

That's probably the main difference between you and them.

they just do it.

They do so by prior arrangement with themselves.

They do it as an honorable duty.

They tell a story that passes through them, bit by bit, day by day.

When my brother was in fourth grade, his term paper on birds was due the next day, but he hadn't started yet.

So my father sat down with my brother with Audubon's books, paper, pencils, and Brad--for those who were a little younger and remembered Brad--and said to my brother, "One bird at a time, do it, buddy.

Read about Pelican, then write about Pelican in your own voice.

And find out about kogarala and tell us about them in your own voice.

Then goose. ”

So the two most important things about writing are: It's one-by-one and a really bad first draft.

If you don't know where to start, remember that whatever happens to you is yours and you need to tell it.

If people want you to write warmer, they should have had a better attitude.

(Laughter) (Applause) If one day you wake up and you haven't written your own story, your memories, your visions, your songs, your innermost being, your truth, your version, you're going to feel like hell.

That's really all you can offer us, and it's also why you were born.

7: Publishing and temporary creative success must recover from it.

They kill as many people as they don't.

They hurt, hurt, and change you in ways you can't even imagine.

The most depraved and evil people I have ever known are best-selling male authors.

Still, going back to the beginning of all truths being paradoxical, it is also a miracle that my work is published and my story is read and heard.

Quietly abandon the illusion that publications heal you, that they fill the hole in you like Swiss cheese.

Can not do that.

It won't.

But it is possible to write.

So does singing in a choir or bluegrass band.

The same goes for painting community murals, bird watching, and fostering old dogs that others don't.

Eighth: Family.

Family, no matter how precious and amazing it is, is hard, hard, hard.

See number 1 again.

(Laughter) Sometimes, at family gatherings, murderous or suicidal thoughts suddenly hit me. (Laughter) In any case, especially when any of us get pregnant and give birth, remember that it's a miracle.

Earth is a school of forgiveness.

It starts with forgiving yourself and then better at the dinner table.

That way, you can wear comfortable pants to do this task.

(Laughter.) When William Blake said we were here to learn to bear the rays of love, I knew that your family would play an intimate role in this, even if you wanted to scream and run for your own sweet little life.

But I promise you you can do it.

You can do it, Cinderella, you can do it, and you will be amazed.

9: food.

Try a little better.

I hope you know what I mean.

(laughter) Number 10 -- (laughter) Grace.

Grace is a spiritual WD-40, or water wing.

The mystery of grace is that God loves Henry Kissinger and Vladimir Putin and me as much as he loves your new grandchildren.

go figure.

(Laughter.) The movement of grace transforms us, heals us, heals our world.

To summon grace, say "help me" and buckle up.

Grace finds your exact location, but doesn't leave where it finds you.

And unfortunately, Grace looks nothing like Casper the Friendly Ghost.

But when the phone rings or an email arrives, you can unexpectedly regain your sense of humor about yourself.

Laughter is just divine carbonation.

It helps us breathe again and again, brings us back to ourselves and gives us faith in life and in each other.

And remember - grace always makes the bat last longer.

Eleven: God just means good.

It's actually not that scary.

It means divine or loving vital intelligence, or "cosmic muffin" as we learned from the great "detteriata".

A good name for God is "I am not".

Emerson said the happiest people on earth are those who have learned the lessons of worship from nature.

So go out a lot and look up.

My pastor said I could catch a bee in the bottom of a lidless mason jar because the bees don't look up, they just scurry around bouncing against the glass walls.

go outside look up.

secret of life.

And finally death.

Number 12.

wow i did it.

I can't stand the loss of so few people who can't live without you.

You can never get over these losses, and you shouldn't get over them, no matter what the culture says.

We Christians like to think of death as a major change of address, but in any case, if you don't seal it, the person comes alive again in your mind.

As Leonard Cohen said, "Everything has cracks through which light shines."

That way we can make people feel fully alive again.

Also, people make me laugh out loud at the most inconvenient times. That's big good news.

But their absence can also be a lifelong nightmare of homesickness for you.

Grief and friends, time and tears will heal you to some extent.

Tears moisten, baptize and moisturize you and the ground you walk on.

Do you know what God said to Moses first?

"Take off your shoes," he says.

All the evidence is against because this is a holy place.

Believe it or not, this is the most true thing I know.

Like me, when you're a little older, you realize that death is just as sacred as birth.

Don't worry, get on with your life.

As long as you have the best people around you, almost all deaths are easy and mild.

You are not alone.

They will help you cross towards what awaits us.

As Ram Dass said, "At the end of the day, we're all just walking each other home."

That's all I think, but I'll let you know if I come up with anything else.

thank you.

(Applause.) Thank you.

(Applause) Technology, design, entertainment, etc. are not my areas of expertise, so I was very surprised to be asked to come.

So my realm is like faith and writing, kind of staggering together.

I was surprised, but when I was told that I could give a lecture, I said that I would definitely like to give a lecture.

(Video) If you don't know where to start, remember that everything that happens to you is yours and you are the one to tell it.

Anne Lamott: People are so scared in America these days, they really feel doomed. I just wanted people to have a sense of humor about it and understand how it doesn't matter.

If you take action, do something really healthy or loving or friendly, you will have loving and friendly feelings.

Imagine bending over a desk with tiny dials and walking into a room with hundreds of people, a control room, shaping the thoughts and feelings of a billion people.

This may sound like science fiction, but it actually exists today.

I know because I was in one of those control rooms once.

As a design ethicist at Google, I studied how to ethically guide people's thinking.

Because what we don't talk about is how a handful of people working for a handful of tech companies, through their choices, guide the thinking of a billion people today.

Because when they design how it works and what you see in your feed when you pull out your phone, it's scheduling little blocks of time in our heads.

When you see the notification, it schedules you to have thoughts that you probably didn't intend to.

Swiping through that notification will probably schedule you to spend a little time getting hooked on something you didn't mean to get hooked on.

When we talk about technology, we tend to talk about it as this blue sky opportunity.

It can go in any direction.

I want to get a little serious here and talk about why it's going in a very particular direction.

Because it doesn't evolve randomly.

There's a hidden goal that drives the direction of every technology we make, and that goal we focus our attention on.

Because all news sites, TED, elections, politicians, games, and even meditation apps have to compete for one thing: our attention, and it's limited.

And the best way to get people's attention is to know how someone's mind works.

And there are a number of persuasion techniques that I learned in college in a lab called the Persuasion Techniques Lab for Getting People's Attention.

A simple example is YouTube.

YouTube wants to make the most of your time.

So what do they do?

The next video will autoplay.

And let's say it worked very well.

They are increasing people's time little by little.

Well, if you were Netflix, you would look at this and say, 'I'm losing market share at this point, so I'm going to autoplay the next episode.

But if you're Facebook, you say it's shrinking all my market share, so now it should autoplay all the videos in your news feed before waiting for you to click play.

So the Internet is not evolving randomly.

The reason this situation feels like it sucks us in is because of this competition for attention.

we know how this goes.

Technology will not be neutral, it will be a race to the bottom of the brainstem for who can get it.

Let's take the example of Snapchat.

In case you didn't know, Snapchat is the most popular way for US teenagers to communicate.

So, if you're like me and use texting to communicate, Snapchat is for teens, and 100 million young people use it.

And they invented a feature called Snapstreaks that shows the number of consecutive days two people have communicated with each other.

In other words, what they did was give them something they didn't want to lose.

Because if you're a teenager and you have 150 days in a row, you don't want it to go away.

And think about the little blocks of time it's destined for in children's minds.

This is not theoretical. We know that when kids go on vacation, they'll give their passwords to up to five friends to keep their snapstreaks going, even if they can't.

And since they have about 30 of these things, they have to endure just taking pictures and pictures of walls and ceilings to get through the day.

I mean, they're not actually having a conversation.

We tend to think of this as, oh, they're just using Snapchat the way we gossip on the phone.

probably okay.

Now, what this misses is that back in the 1970s, when you were just gossiping on the phone, there weren't a hundred engineers on the other side of the screen who knew exactly how your psyche worked and what caused each other to double bind.

Now, if this makes you a little angry, be aware that the thought is just floating around in your head.

We don't choose outbursts, so anger is also a very good way to get your attention.

It happens to us too.

And if you're the person in charge of your Facebook newsfeed, whether you want it or not, you can actually benefit when anger strikes.

Because anger doesn't just schedule reactions for you in emotional time and space.

We want to share that anger with others.

So we want to hit share and say, "Can you believe what they said?"

So anger is very effective at getting your attention, and if Facebook gave you the choice to show you an anger feed or a mild newsfeed, you would want to see it because it would be more effective at getting your attention, not because someone consciously chose to do so.

And the newsfeed administration office is not responsible to us.

It is only responsible for maximizing attention.

Also, because of the advertising business model, it's the responsibility of the person who can afford to pay the most to actually walk into the control room and say, "That group over there, I want to schedule this idea in their minds."

So the most vulnerable people can be precisely targeted for lies directly.

And since this is profitable, the situation is only going to get worse.

I am here today because the cost is very clear.

I don't know of any more pressing issues, as this issue lies beneath all other issues.

It's not just taking our attention and taking away our agency to live the life we ​​want, it's changing the way we talk, changing our democracy, changing our ability to have the conversations and relationships we want with each other.

And it affects everyone. Because a billion people have one of these in their pocket.

So how do we fix this?

We need to make three fundamental changes in technology and society.

The first is that we need to recognize that we are persuasive.

Once we begin to understand that our minds may have small thoughts and small blocks of time scheduled that we didn't choose, wouldn't we want to use that understanding to protect ourselves from the way such things happen?

I think we need to see ourselves in a fundamentally new way.

It's like a new era in human history, like the Enlightenment, but more like a kind of conscious Enlightenment that we might be able to persuade and defend.

Second, as the world becomes better and more compelling over time, we need new models and accountability systems to keep those in the control room accountable and transparent about what we want.

The only form of ethical persuasion that exists is when the goals of the persuader coincide with those of the persuaded.

That includes questioning big issues, such as the advertising business model.

Finally, we need a design renaissance. Because once you have this view of humanity, you can manipulate the timelines of a billion people. Please try to imagine. Some people have certain desires about what they want to do, what they want to think, what they want to feel, how they want to be informed. And we're all just being dragged in these other directions.

And a billion people are being pulled in all these different directions.

Now imagine a whole design renaissance trying to adjust the exact and most powerful way to spend time to bring these timelines to life.

Two things are involved. One is to protect ourselves from timelines we don't want to experience and thoughts we don't want to happen. That way, when such an event happens, we don't have an event that drives us out. The second is to enable us to achieve the timelines we want.

Let's take a concrete example.

Suppose your friend canceled dinner for you today and you are feeling a little lonely.

So what do you do in that moment?

You open Facebook.

At that moment, the control room designer wants to schedule just one thing: maximizing the amount of time users spend on the screen.

Now, imagine if instead those designers created another timeline that was the easiest way with all the data to help you meet the people you care about in real life.

Consider if reducing all loneliness in society is the timeline Facebook wants to give people.

Or imagine another conversation.

For example, let's say you want to post something very controversial on Facebook. Talking about controversial topics is very important.

And now when you have that big comment box, it's almost asking you, "Which key do you want to enter?"

In other words, you schedule small timelines of what you do continuously on your screen.

And instead, imagine there's another button that says, "What's the most meaningful way to spend your time?"

Then click Host Dinner.

And just below that item was, "Is there anyone who would like to come to dinner?"

So there will still be conversations about something controversial, but you'll do it in the most powerful place on the timeline. That night, a lot of my friends got together at my house to talk about it.

So imagine doing a search-and-replace on all the timelines that are currently convincingly leading us to increased screen time, and replacing all those timelines with what we want in our lives.

You don't have to do it this way.

Imagine if, instead of weakening our attention, we could use all this data and all this power and this new way of looking at humanity to give us superhuman focus, superhuman ability to pay attention to what we care about, and superhuman ability to have the conversations that democracy requires.

The world's most complex challenges don't just need our individual attention.

They demand that we pay attention and adjust it.

Climate change will require that many people be able to adjust their attention in ways that are most empowering.

And imagine creating a superhuman ability to do just that.

Sometimes the world's most pressing and important problems are not the imaginary futures we might create in the future.

Sometimes the most pressing issues are what's in front of us, what's already shaping the thinking of a billion people.

And perhaps, instead of getting excited about new augmented and virtual reality and great events that might put us in the same competition for attention, maybe we could fix the competition for attention about what's already in the pockets of a billion people.

Perhaps we can fix the minds of children who are being manipulated into sending and receiving empty messages instead of getting excited about the most exciting new cool and flashy educational app.

(Applause.) Perhaps, instead of worrying about a hypothetical future runaway artificial intelligence that maximizes for one purpose, we might be able to solve the runaway artificial intelligence that already exists today: the news feed that maximizes for one purpose.

It's like, instead of fleeing to colonize new planets, you can repair planets that are already inhabited.

(Applause.) Solving this problem is critical infrastructure for solving all other problems.

There is nothing in your life or our collective affairs that does not require the ability to direct attention to what is of interest.

At the end of life, all we have is attention and time.

What is meaningful time for us?

thank you.

(Applause) Chris Anderson: Thank you, Tristan. Hey, stay here for a minute.

First of all, thank you.

I know you asked for this talk on short notice, but thank you for spending a rather stressful week putting this talk together.

Some listening may say that what you are complaining about is an addiction and that all the people doing this are really interesting to them.

All of these design decisions have resulted in some very interesting user content.

The world has become more interesting than ever.

What's wrong with that?

Tristan Harris: I think it's very interesting.

One way to check this is for YouTube, for example, to always want to see the next more interesting video.

You want to get better and better at suggesting the next video, but even if you can suggest the perfect next video that everyone wants to see, you'll get better and better at keeping users glued to their screens.

So what's missing in that equation is understanding what the bounds will be.

For example, you might want YouTube to tell you something about sleep.

Netflix's CEO recently said, "Our biggest competitors are Facebook, YouTube and sleep."

So what we need to realize is that human structures have limits and that there are certain boundaries and aspects of our lives that should be respected and respected, and technology might be able to help with that.

(Applause.) CA: So, would you argue that part of the problem here is that we have a naive model of human nature?

Much of this is justified in terms of human preferences. Algorithms exist that do a great job of optimizing for human tastes, but which ones?

There are preferences for things that we think about and really care about, and preferences for things that we simply instinctively click on.

Would it be a step forward if we could embed a more nuanced view of human nature into every design?

TH: Of course. I mean, it seems like all of our technology right now is basically just asking our lizard brain what's the best way to impulsively use your time to do the next smallest thing instead of basically asking what's the most meaningful thing you can do with your life.

What's the perfect timeline that might include something later? Will your last day here at TED be worthwhile for you?

CA: So let's say Facebook and Google and other people originally told us, "Would you like your reflex brain or your lizard brain optimized? It's your choice."

TH: Yes. that would be one way. yes.

CA: You said persuasive, which is an interesting word to me. Because to me there are two different types of persuasion.

What we're trying to do now is reason-thought-argument persuasion, but I think you're mostly talking about a different, more intuitive type of persuasion. That means being persuaded without even knowing what you are thinking.

TH: That's right. The reason I'm so interested in this subject is because I studied in a lab called the Persuasive Technology Lab at Stanford University. There I was teaching [how to recognize students] exactly these techniques.

There are conferences and workshops that teach people all these secret ways to get people's attention and adjust their lives.

And that's why this conversation is so important because most people don't know it exists.

CA: Tristan, you and I know a lot of people from all these companies.

There are actually many people in this room. I don't know about you, but my experience with them is that there is no shortage of good intentions.

People want a better world.

They actually really want it.

And I don't think what you're saying is that they're bad people.

It's a system that really spins out of control and has unintended consequences -- TH: About this race for attention.

It's a typical bottom race where you have to be the center of attention and it's very nerve-wracking.

The only way to get more is to go lower in the brainstem, lower anger states, lower emotional states, and lower lizard brains.

CA: Well, thank you so much for helping us all be a little smarter on this subject.

Thank you Tristan Harris. TH: Thank you.

(applause)

I'm from the South Side of Chicago and when I was in 7th grade I had a best friend named Jenny who lived on the South West Side of Chicago.

Jenny was white. If you know anything about racism in Chicago, you know that there aren't that many black people living on the southwest side of Chicago.

But Jenny was my girlfriend, so we hung out sometimes after school and on weekends.

So one day we were hanging out in her living room and talking about 13 years ago. And Jenny's sister Rosie was also in the room with us and she was sitting behind me playing with my hair and I didn't really think about what she was doing.

But at the end of the conversation, Rosie tapped me on the shoulder.

She said, "Can I ask you a question?"

I said, "Oh, Rosie, of course."

"Are you black?"

(Laughter) The room froze.

silence.

Jenny and Rosie's mother was not far away.

She was in the kitchen and overheard the conversation and was shocked.

She said, "Rosie! You can't ask people that question."

And Jenny was my friend, and I know she was really embarrassed.

I felt a little bad for her, but it didn't really offend me.

I don't think it's Rosie's fault that during the short ten years she lived on the Southwest Side of Chicago on this planet, she wasn't 100 percent sure what black people were like.

that's fair.

But what was more surprising to me, during all the time I've spent with Jenny and Rosie's family, spending time together, playing together, and interacting physically, wasn't until Rosie put her hands in my hair that I thought of asking if I was black.

Only then did I realize how big a role the texture of my hair not only played in affirming my ethnicity, but also how I was viewed by the rest of society.

Garrett A. Morgan and Madame CJ Walker were pioneers in the dark hair care and beauty industry in the early 1900s.

They are best known as inventors of chemical-based hair creams and heat-straightening tools designed to permanently or semi-permanently alter the texture of black hair.

When we think about the history of black people in America, we often think about the heinous acts and the many injustices they experienced as people of color because of their skin color, but in fact, in post-Civil War America, the hair of an African-American man or woman, rather than skin color, was known as the most telling mark of black status.

So before they became staples of the multi-billion dollar hair care industry, our reliance on tools and products like hair relaxers and press combs was more about survival and progress as a race in post-slavery America.

Over the years, we have grown accustomed to the idea that straighter and longer hair means better and more beautiful.

We've become culturally attached to this idea of ​​having what we want to call...

"nice hair"

This essentially means that the looser the curl pattern, the better the hair.

And we've let these institutionalized ways of thinking create a false hierarchy that determines what is considered good grade hair and what isn't.

What's worse is that we have these false ideologies invading our own perceptions, and they continue to infect our cultural identities as African American women even today.

So what did we do?

We made sure to go to the hair salon every 6-8 weeks and from a very early age (sometimes 8, 10 years old) exposed our scalps to strong hair straightening chemicals, resulting in hair loss, baldness, and sometimes even scalp burns.

To maintain a straight look, we fly our hair at temperatures above 450 degrees Fahrenheit almost every day.

Or simply cover your hair with a wig or braid and let your roots breathe in a private area where no one really knows what's going on underneath.

We've incorporated these customs into our own communities, so it's no wonder why today, especially in corporate America, the typical vision of the ideal for professional black women tends to be something like this instead of something like this.

And she certainly doesn't look like that.

In September, a federal court ruled that it was legal for companies to discriminate in hiring employees based on whether they had dreadlocks.

In the incident, a recruiter in Mobile, Alabama is on record as saying, "I'm not saying your job is dirty, but..."

You know what I'm saying "

Well what was she talking about?

Did she think they were ugly?

Or maybe they seemed a little too Afrocentric and black-leaning for her taste.

Or maybe it's not about African centrality, it's just a little too 'urban' for a professional setting.

Perhaps she was genuinely concerned that they would look "scary" and intimidate her clients and their customer base.

All of these words are words too often associated with the stigma attached to natural hairstyles.

this ...

This has to change.

A white paper published by the Deloitte Leadership Center for Inclusion in 2013 studied the concept of workplace coverage based on appearance, advocacy, belonging and alignment among 3,000 people in executive leadership roles.

When it comes to appearance-based covering, the study showed that 67% of women of color use appearance-based covering at work.

Of all respondents who acknowledged reporting based on their appearance, 82% said it was somewhat or very important for their professional advancement.

Well, this is Ursula Burns.

She is the first African-American female CEO of a Fortune 500 company, Xerox.

She is known for her signature look as seen here.

A short, neatly trimmed, well-manicured afro.

Ms. Burns is what we call a "natural girl."

And she's leading the way, showing what's possible for African-American women who want a natural hairstyle while trying to climb the corporate ladder.

But even today, the majority of African American women we look up to as leaders, icons and role models still opt for the straight hair look.

Perhaps it's because they want to and because it feels really great for them. But perhaps, and I'm sure, some of them felt they had to in order to reach the level of success they've achieved today.

Natural hair movement has taken the country by storm and can even be found in some parts of Europe.

Millions of women are exploring what it means to transition to natural hair, shaving off years of dry, damaged ends to restore their natural curl patterns.

I know this because I've been an advocate and ambassador for this movement for about three years now.

After 27 years of exposure to excessive heat and harsh chemicals, my hair was starting to show signs of extreme wear and tear.

It looked broken, thinned and very dry and brittle.

Years of pursuit of the conventional images of beauty we've seen before are finally starting to take a hit.

I wanted to do something about it, so I started the "No Heat Challenge" to refrain from using styling products that add heat to my hair for six months.

And like any good millennial, I documented it on social media.

(Laughter.) I documented how I reluctantly chopped off 3-4 inches of my beloved hair.

I documented when I struggled to master these natural hairstyles, and when I struggled to accept them and think they actually looked good on me.

And I recorded the texture of my hair slowly starting to change.

By sharing this journey openly, I have learned that I am not the only one going through this, there are actually thousands of other women out there who want the same thing.

So they contacted me and said, 'Cheyenne, how did you do that natural hairstyle you saw the other day?

My hair is starting to change, have I started using a new product that seems a little better?"

Or, "What are some natural hair habits I should adopt to slowly regain my hair's health?"

But I also found that there are many women who are paralyzed by fear and are very hesitant to take the first step.

Fear of the Unknown -- Where Are They Now?

How do people with such natural hairstyles feel about themselves?

And the most important thing for them is how other people see them.

Over the past three years, after many conversations with friends and total strangers from around the world, I've learned some really important things about how African American women relate to their hair.

So if you think of a hiring manager in Mobile, Alabama, you'll say, "Not really."

We don't know what you are talking about. ”

But there are some things we do know.

We know that when black women embrace a love of their natural hair, it can help counteract generations of teachings that black in its natural state is not beautiful or something that should be hidden or concealed.

We know that black women express their individuality and experience a sense of empowerment by experimenting with different hairstyles on a regular basis.

We also know that being asked to wear our natural hair at work emphasizes that we are valued and helps us grow professionally and get promoted.

Here's the end.

In a time of racial and social tension, embracing this and other similar movements can help transcend the limitations of the status quo.

So when you see a woman with braids or hair hanging down her back, or notice a colleague who has stopped styling her hair to go to work, don't just approach her and praise her or ask if you can touch her. (Laughs) I really appreciate her.

Let's give her a round of applause.

Heck, if you feel like it, you can give her a high five.

Because this is about more than hairstyles.

It's about self-love and self-worth.

It's about having the courage not to give in to the pressure of the expectations of others.

And the decision to deviate from the norm isn't about defining who we are, it's simply about knowing who we are.

And finally, having courage is easier when you can count on the compassion of others.

Thank you very much for your continued support after today.

thank you.

(applause)

Michael Browning: Engineer, innovator, true inventor and inspirational father.

He had a passion for flying, as evidenced by his somewhat shady departure from the company in the 1970s.

And about 40 years after it was created, a small group of us came together to take on the whole challenge of flying that has inspired people over the years, and do it in a completely different kind of way.

That is the journey I would like to share with you now.

The starting hypothesis was about the human mind and body, but as we've seen here for the last few days, this is an amazing construct.

What if we enhanced that wonderful machine with the right technology?

Where can we get when we approach flight in such a realistic way?

So Denton, my training partner in London, does a much better job than I do when it comes to that sort of thing.

guess what? It's London.

The idea was to augment it.

So how do we strengthen it?

Well we bought one of these.

This is a micro gas turbine.

Since this was the hypocenter, the little kit turned out to be really very impressive, so I had two in the field.

By the way, the real hero here is the woman tending the vegetables in the background. She does an admirable job of trying to ignore us for a while — (laughter) I think the only disappointment is the grass, which we probably hurt pretty badly.

Now understand the thrust when trying to hold level and failing.

The thrust will be about 50 kg.

we were so impressed with it.

We thought we would end up somewhere.

So there is only one sensible way to proceed from there. is to get four.

(Laughter) I have to say, I still love looking back at these.

So I decided to spread the load a little.

The legs are designed to support the load, so why not spread them out a little more?

That point was good.

Harnesses -- Great idea, but as you'll see it didn't really work.

This whole journey was very much about trying things -- (laughter) well, it didn't really work.

You learn by trying things and failing most of the time.

This includes failures due to falls.

As you may have noticed, there are five engines here. One was under maintenance, so don't be discouraged, you can still try it out.

(Laughter) And then I pinched the fuel line.

Once again, I learned a good lesson. We learned never to do the same thing twice.

This was a dead end.

(Laughter) I had three of these on each arm. It's a ridiculous story.

The weight on both arms was 70 kg.

Canceled it again.

(Laughter) But we were starting to make very compelling progress, enough to make us believe that maybe, maybe we could get there.

Look, look -- fascinating.

On paper, one model for each leg and two models for each arm was enough thrust.

And then I did what I'm going to show you. I still love watching this.

This was our first six-second, fairly consistent flight.

(Applause.) That was the point of this effort. "I really don't know if this will work" went to "Oh my God, it works!"

I improved from there, but I fell down many times.

As I say, falling is definitely the best way to learn.

After some time, I started really refining all these layouts.

As you can see, it's stability and control. There are no wires or anything like that. It's a combination of us honing our craft, like putting a Tupperware box in the back for our electronics, and actually learning balance and control.

I'll save your ears for my next short piece and talk about it.

After a while, the sound of the jet engine becomes a little disturbing.

This was just a few weeks ago.

You will find that stability and control are very good. I think this has somewhat validated my initial hypothesis that the human mind and body, if properly enhanced in such a way, can accomplish some pretty amazing things.

I mean, like I said earlier, I'm not thinking about where I'm going to move my arm at that stage.

I just move my arms around like I ride a bike, staring at my goal of where I want to go.

It's a very strange experience.

So where is all this going?

I'll talk about this landing -- I think I'll land on this one.

Well, I don't think anyone is going to Walmart or taking the kids to school wearing something like this for the time being, but the team at Gravity are building amazing technology that makes this look like child's play.

We are working on several things to bring this rare flying experience to a wider audience beyond the events and exhibitions we do.

We are also looking for two and three pilots if there are volunteers.

I have this vision

It might sound bold, but let's just say that with some of the safety kits we're working on to make it doable, one day we might be able to get over the beach, fly up and down that coastline, and climb a little higher.

And over the horizon comes Hercules down the slope.

As it passes by, start picking up speed and see if you can intercept it. It's from the back, not the front. That's wrong. Then try to land backwards.

And as I say, it's a bit further at the moment.

But this is also a very personal journey for me, taking a big step back from here.

Let's go back to that nice photo, or a photo within a photo.

Sadly, my father committed suicide when I was 15, leaving many unfulfilled ambitions.

He was a brilliant inventor and creator of mavericks.

And if he had his head down, if possible, he would, I think, would definitely be smiling at some of the things we've done here.

thank you very much.

(Applause) (Narration) Richard Browning: I'm probably more nervous about doing the demo after this.

I have a lot to do today.

Worst case scenario, you don't get off to a clean start.

Alternatively, unexpected obstacles may occur while you are actually flying around.

This is why we keep it so low. So the worst is, like I said, just looking like a fool and falling off your butt.

So even if it does, you can still enjoy it.

(Music) (Jet engines accelerate) (Cheers)

I will talk about the global refugee crisis. My aim is to show that this crisis is manageable, not insoluble. It is also to show that this is a test for frontline refugees, but also about ourselves and ourselves.

For me, this is more than just a professional obligation. Because I run an NGO that helps refugees and displaced people around the world.

it's personal.

i love this photo

Really handsome guy on the right, that's not me.

It was my father Ralph, who was in London with my father Samuel in 1940.

They were Jewish refugees from Belgium.

They fled the day the Nazis invaded.

And i love this picture too.

A group of refugee children who arrived in England from Poland in 1946.

And in the middle is my mother, Marion.

At the age of 12, she was sent to a new country to start a new life alone.

i know this If Britain hadn't taken in refugees in the 1940s, I certainly wouldn't be here today.

But 70 years later, the wheel has come full circle.

It is the sound of walls being built, vengeful political rhetoric, humanitarian values ​​and principles blazing in the very countries that 70 years ago declared never again to tolerate the statelessness and despair of war victims.

Last year, 24 more people were forced from their homes every minute by conflict, violence and persecution. New chemical weapons attacks in Syria, Taliban riots in Afghanistan, girls kicked out of schools by Boko Haram in northeastern Nigeria.

They are not people who migrate to other countries to get a better life.

They are running for their lives.

It is truly a tragedy that the world's most famous refugee cannot be here today to speak.

Many of you may be familiar with this photo.

The photo showed the body of five-year-old Syrian refugee Alan Kurdi, who died in the Mediterranean Sea in 2015.

He died along with 3,700 others trying to go to Europe.

In 2016, 5,000 people died.

Too late for them, but not too late for millions of others.

It's never too late for people like Frederick.

I met him at Nyarugusu refugee camp in Tanzania.

He is from Burundi.

He wanted to know where he could complete his studies.

He completed 11 years of schooling. He wanted a 12th year.

He told me, "I hope my days don't end in this refugee camp."

And it's never too late for Haldo.

Her parents were Palestinian refugees living in the Yarmouk refugee camp outside Damascus.

Born to refugee parents, she is now a refugee in Lebanon herself.

She works for the International Rescue Committee to help other refugees, but is completely unsure of her future, where it lies, or what it will look like.

This talk will talk about Frederick, Haldo, and millions of others like them, why they are fleeing, how they are staying alive, what help they need, and what our responsibilities are.

I believe this wholeheartedly. The biggest question of the 21st century concerns our obligations to strangers.

Future "you" is about obligations to strangers.

We know better than anyone that the world is more connected than ever, but the great danger is that we will be swallowed up by the divide.

And nothing better puts it to the test than how it treats refugees.

Here's the truth: Last year, 65 million people were forced from their homes by violence and persecution.

If this were a country, it would be the 21st largest country in the world.

Most of them, about 40 million, remain in their own countries, while 25 million are refugees.

That is, crossing the border into a neighboring state.

Most of them live in relatively poor or low-middle-income countries, like Lebanon, where Haldo lives.

In Lebanon, one in four people, or a quarter of the total population, is a refugee.

And refugees stay for a long time.

The average duration of evacuation is 10 years.

I went to the world's largest refugee camp in eastern Kenya.

It was built in 1991-1992 as a "temporary camp" for Somalis fleeing the civil war.

I met Mr. Silo.

And I innocently said to Silo: “Do you think you will ever return to Somalia?”

And she said, "What do you mean go home?"

And when I asked the camp administrator how many of the camp's 330,000 people were born there, the answer was 100,000.

That's what long-term migration means.

Now, the reason for this is deep. Weak states unable to support their own people, the weakest international political system since 1945, and differences in theology, governance, and engagement with the outside world in key areas of the Islamic world.

Now, these are long-term, intergenerational challenges.

That's why I say this refugee crisis is a trend, not a passing.

And it's complicated, and when there's a big, long-running, complicated problem, people think they can't do anything.

When Pope Francis visited the island of Lampedusa off the coast of Italy in 2014, he accused us all and the world of what he called "globalization of indifference."

It's a word that stays in my heart.

It means that our hearts have turned to stone.

Well, I don't understand, please tell me.

Is it permissible to argue with the Pope, even at a TED conference?

But I don't think that is correct.

I think people want to make a difference, but I don't know if there is a solution to this crisis.

And what I want to tell you today is that while the problems are real, so are the solutions.

Solution 1: These refugees need to work in the country they live in, and the country they live in needs huge amounts of financial assistance.

In 2014 in Uganda they conducted a survey. Eighty percent of refugees in the capital, Kampala, were working and did not need humanitarian assistance.

They were helped to find work.

Solution #2: If you are displaced for an extended period of time, educating your children is not a luxury but a lifeline.

Children can bounce back when given appropriate social and emotional support along with literacy and numeracy.

i've seen it myself.

However, half of the world's refugee primary school children have no education at all, and three-quarters of secondary school-aged children have no education at all.

it's crazy.

Solution 3: Most refugees are in urban areas, not camps.

If we were urban refugees, what would you or I want?

I want money to pay my rent and buy clothes.

That is the future of the humanitarian aid system, or an important part of it. Giving people cash can empower refugees and help local economies.

And there is also a fourth solution. This is controversial, but it needs to be discussed.

The most vulnerable refugees need to be given a fresh start and a new life in new countries, including those in the West.

Their numbers are relatively small, hundreds of thousands instead of millions, but the symbolism is huge.

Now is not the time to ban refugees from entering the country, as the Trump administration has proposed.

Now is the time to accept the victims of terrorism.

And remember -- (applause) remember those who ask, "Are they properly tested?"

That's really smart and a good question.

The truth is that refugees arriving for resettlement are subject to more scrutiny than any other person arriving in our country.

So while it is reasonable to ask this question, it is not reasonable to say that refugee is another word for terrorist.

Now what happens -- (Applause) What happens when refugees can't get a job, can't send their kids to school, can't get cash, can't get a legitimate route to hope?

What happens is that they go on a perilous journey.

Two years ago I went to this beautiful Greek island, Lesbos.

This is a home for 90,000 people.

Half a million refugees crossed the island in one year.

And I want to show you what I saw when I drove across to the north of the island. It's a pile of lifejackets for those who made it to shore.

And when I looked closer, I saw a small yellow life jacket for children.

And then I took this photo.

I don't think you can see the letters, but I hope you can read it.

"Warning: drowning cannot be prevented."

So in the 21st century, children are given life jackets to get them to safety if they fall off a boat bound for Europe, even though the jacket won't save their lives.

This is not just a crisis, it is a challenge.

It is a test that civilization has faced for many years.

It is a test of our humanity.

This is a test of who we are and what we represent for us in the Western world.

This is not only a test of our policies, but also of our character.

And refugees are a difficult problem.

They come from far corners of the world.

they are traumatized.

They often follow different religions.

These are the very reasons why we should help refugees, not why we should not.

And that's what speaks for us, so that's why we help them.

It's about clarifying our values.

Empathy and altruism are two of the foundations of civilization.

By putting that empathy and altruism into action, we practice our basic moral beliefs.

And in the modern world, there are no excuses.

You can't say you don't know what's happening in Juba, South Sudan, or Aleppo, Syria.

It's in our smartphones in our hands.

Ignorance is no excuse at all.

Without help, we find that we have no moral compass at all.

It also reveals whether we know our own history.

The reason refugees have rights all over the world is because, after World War II, extraordinary leadership by Western politicians and politicians made them universal rights.

When we destroy refugee protection, we destroy our own history.

This -- (applause) this also reveals the power of democracy as a refuge from dictatorship.

How many politicians have you heard who say, “We believe in the power of example, not the example of our own strength”?

So what we stand for is more important than the bombs we drop.

Refugees seeking refuge see the West as a source of hope and a haven.

Russians, Iranians, Chinese, Eritreans, Cubans, they came to the West for safety.

We take the risk and throw it away.

And there's another thing it reveals about us. It is whether we have humility for our mistakes.

I'm not the kind of person who believes that all the world's problems are caused by the West.

it's not.

But when we make a mistake, we have to recognize it.

It is no coincidence that the United States, the country that takes in more refugees than any other country, takes in more refugees from Vietnam than any other country.

It tells history.

But Iraq and Afghanistan have a more recent history.

Humanitarian action cannot make up for the mistakes of foreign policy, but when we break something, we have a duty to try to help fix it, and that is our duty now.

Remember when I said at the beginning of my talk that I wanted to explain that the refugee crisis is manageable, not insoluble?

that's true. I want you to think in new ways, but I also want you to do something.

If you are an employer, hire refugees.

If this argument convinces you, embrace the myth when family, friends, or colleagues repeat it.

If you have money, donate it to a charity that makes a difference for refugees around the world.

If you're a citizen, vote for politicians who implement the solutions I've been talking about.

(Applause.) Obligations to strangers, in small and large forms, manifest themselves in mundane and heroic forms.

In 1942 my aunt and grandmother lived in German-occupied Brussels.

They received a call from the Nazi authorities to go to Brussels station.

My grandmother immediately knew that something was wrong.

She begged her relatives not to go to Brussels station.

Her relatives told her, ``If you don't go, if you don't listen to what you're told, you'll be in big trouble.''

You can imagine what happened to the relatives who went to Brussels station.

they were never seen again.

But my grandmother and aunt went on holiday ten years ago to a small village south of Brussels and showed up to a local farmer, Monsieur Maurice, a Catholic peasant, asking him to take them in.

And he did so, and heard that seventeen Jews lived in the village by the time the war ended.

As a teenager, I asked my aunt, "Can you take me to see Mr. Morris?"

And she said, "Yes, we can. He's still alive. Let's go see him."

So in 1983 or 84, I think, we went to see him.

And I think it's something only teenagers can do, but when I met him, he was this gray-haired gentleman, I said to him, "Why did you do that?"

Why did you take such a risk? ”

And he looked at me, shrugged, and said in French, "Well then."

"I definitely need it."

It was born in him.

It was natural.

And what I want to tell you is that it should be natural and innate in us too.

Remind yourself that this refugee crisis is manageable, not unsolvable, and that each of us has a personal responsibility to contribute to the solution.

Because this is about us and our values ​​and about saving refugees and their lives.

thank you very much.

(Applause) Bruno Giussani: Thank you, David. David Miliband: Thank you.

BG: That's a strong proposition, and your call for personal responsibility is also very strong, but there's one thought that bothers me. That's it. You mentioned and this is your word. The “extraordinary Western leadership” that led the entire human rights debate to things like the Refugee Convention 60 years ago.

Its leadership came after a great trauma and in a consensual political space. And now we are in a divisive political space.

In fact, refugees have become one of the most divisive issues.

So where does today's leadership come from?

DM: Well, I think it's true that war-forged leadership has a different temperament, a different tempo, and a different perspective than peace-forged leadership.

So my answer is that leadership must come from below, not from above.

So the recurring theme of this week's conference was the democratization of power.

And while we must preserve our democracy, we also need to rejuvenate our democracy.

When people tell me that there is a backlash against refugees, I say this. “No, there is a polarisation. At the moment, fearful people are making more noise than proud people.”

So my answer to your question is that when we mobilize ourselves, we sponsor, encourage and empower leadership.

And I think when you're in a position to seek leadership, you have to look inward and try to mobilize your community and create the conditions for a different kind of settlement.

BG: Thank you David. Thank you for coming to TED.

(applause)

I would like to share with you what I have experienced over the last five years, having had the wonderful privilege of traveling through many of the world's poorest countries.

This sight is common everywhere, with young children looking at their smartphones. Smartphones are having a huge impact even in the poorest countries.

I told the team that we were seeing ambitions rising all over the world.

In fact, it seems to me that the desires come together.

And I asked a team of economists to actually look into this.

Is this true?

Are all the wishes of the world united?

So they looked at Gallup polls and other surveys on life satisfaction, and found that having access to the internet increased satisfaction.

But one more very important thing happens. That means your baseline income, the income you compare yourself to, will also increase.

Now, for example, if a country's baseline income increases by 10 percent relative to the outside world, on average its own income would need to increase by at least 5 percent to maintain the same level of satisfaction.

But as the income percentile goes down, if the baseline income rises by 10 percent, say 20 percent, the income needs to increase even more.

With this growing ambition, the basic question is: Will there ever be a situation, like what happened in South Korea, the country where I was born, where ambition leads to opportunity, dynamism and economic growth?

Or will aspirations meet setbacks?

This is a serious concern, as terrorist incidents increased by 74% between 2012 and 2015.

The number of deaths from terrorism increased by 150 percent.

Two billion people live in fragility, conflict and violence today, and by 2030 more than 60 per cent of the world's poor will live in fragility, conflict and violence.

So how do we meet these aspirations?

Are there new ways of thinking about how we can rise to meet these aspirations?

Because otherwise I would be very worried.

Thanks to access to the internet, aspirations have never been higher.

Everyone knows how others live.

Has our ability to respond to such desires increase as well?

To understand this detail, I would like to tell my own personal story.

This is not my mother, but my mother fled Seoul during the Korean War, at least partly on foot, literally carrying her own sister on her back.

Now, through a series of miracles, my mother and father have won scholarships to go to New York City.

They actually met in New York City and got married in New York City.

My father was also a refugee.

At the age of 19, he left his family in the north of the country and fled across the border, never to see them again.

Well, when they were married and living in New York, my dad was a waiter at Patricia Murphy's restaurant.

Their aspirations have grown.

They knew what it was like to live in a place like 1950s New York City.

Well, my older brother was born, they went back to South Korea, and I remember we had a kind of idyllic life, but what was happening in South Korea at the time, this country is one of the poorest countries in the world, and there was political turmoil.

There was a constant demonstration of students protesting the military regime right next to our house.

And at that time, the World Bank Group, the organization I now lead, had very low expectations of South Korea.

Their thinking was that without foreign aid, South Korea would have a hard time providing more than the bare necessities of life for its citizens.

I mean, South Korea is in a tough spot and my parents have seen what life is like in America.

they got married there. My brother was born there.

And they felt that we needed to go to the United States and come back to give us a chance to achieve their aspirations.

Well, I'm back.

I went to Dallas first.

My father started his dental degree all over again.

And eventually we moved to Iowa.

We grew up in Iowa.

And in Iowa we went through the whole course.

I went to high school, and I went to college.

And then one day, I will never forget, at the end of my sophomore year, my dad picked me up and drove me home and said, "Jim, what are your ambitions?"

what do you want to learn what do you want? "

So I said, 'Dad' -- my mother was actually a philosopher and gave us ideas about protests and social justice, so I said, 'Dad, I'm going to study political science and philosophy and be part of the political movement.'

My father, a Korean dentist, slowly pulled over to the side of the road -- (Laughter) He turned to me and said, “Jim, your residency is over, so you can study whatever you want.”

(Laughter) Well, I've told this story before to a predominantly Asian audience.

no one laughs they just shake their heads.

of course.

(Laughter) (Applause) So, tragically, my father died at a young age, 30 years ago at age 57. how old am i now And my father passed away while I was studying medicine and graduate school. You see, I actually got around this by studying medicine and anthropology.

I studied both in graduate school.

But it was around that time that I met Ophelia Dahl and Paul Farmer.

And Paul and I were on the same program.

We were both studying medicine and doing a doctorate in anthropology at the same time.

And then we started asking some pretty basic questions.

To those who have the wonderful privilege of studying medicine and anthropology - I was born to refugee parents.

Paul literally grew up in a bath in the swamps of Florida.

He liked to call himself "White Trash".

So we took this opportunity and thought, "What do we have to do?"

Given our absurdly sophisticated education, what is our responsibility to the world?

And we decided that we needed to set up an organization.

By the way, there is even a movie made about it.

(Applause.) There's a great movie they made about it called "Bending the Arc."

It was announced at Sundance in January.

Here comes Jeff Skoll.

And we started thinking about what it would take to actually bring our aspirations to the level of the poorest communities in the world.

This was my first visit to Haiti in 1988, and in 1988 we worked out a sort of mission statement. It was to give priority options to people in poor health.

Well, it took a long time, and we became graduate students in anthropology.

We read one of Marx from above and the other from below.

Habermas. Fernand Braudel.

We had to read through everything and come to a conclusion about how we would structure our work.

So we called it "O for the P", a preferential option for the poor.

The most important thing about incentives for the poor is what they are not.

It's not the preferred option for your own sense of heroism.

For your own ideas on how to lift the poor out of poverty, it is not the preferred option.

This is not the preferred option for my organization.

And the hardest part is that it is not the preferred option for the poor.

It is a preferential treatment for the poor.

So what do you do?

Well, Haiti, we started building -- everyone told us the cost-effective thing was to focus on vaccination and possibly feeding programs.

But what the Haitians wanted was a hospital.

They wanted school.

They wanted to provide their children with opportunities that they had heard about from others, such as relatives who had gone to the United States.

They wanted the same opportunities as my parents.

I recognized them.

that's what we did. We built a hospital.

We provided education.

And we did our best to give them a chance.

Well, my experience was really intense at Partners in Health in Carabairo, this community in the slums north of Lima, Peru.

And in this community, we started by actually going to people's homes and talking to people, and we found an epidemic of multidrug-resistant tuberculosis.

Melquiades.

Melquiades was about 18 years old at the time and had very intractable drug-resistant tuberculosis.

Experts around the world, global health experts, all say that treatment of drug-resistant tuberculosis is not cost-effective.

Too complicated. This is too expensive.

It is impossible. Can not do that.

Moreover, they were angry with us. Because it meant that if we could do it, we would have done it too.

who do you think you are

And the one we fought against was the World Health Organization, and perhaps the organization we fought the most against was the World Bank Group.

Well, we did everything we could to convince Melquiades to take the medicine. Because it's really hard. During treatment, Melquiades' family never once said, "Hey, you know, Melquiades is not cost-effective.

Would you like to continue receiving treatment from others? ”

(Laughter.) I hadn't seen Melquiades for about ten years, but a few years ago at our annual meeting in Lima, Peru, the filmmakers found him and gathered here.

(Applause.) He's going to the opening of the movie, so he's become a bit of a media star, but now he knows how to captivate an audience.

(Laughter) But as soon as we won, we won. We won the argument.

Multidrug-resistant tuberculosis should be treated. I heard the same argument about HIV in the early 2000s.

All the world's global health leaders say it's impossible to treat HIV in poor countries.

It's too expensive and too complicated to do.

It's actually easier than treating drug-resistant tuberculosis.

And we were seeing patients like this.

Joseph Young.

Joseph Jeune also never said it was cost effective.

After taking the medicine for several months, this is how he looks.

(Applause.) We call this the Lazarus effect of HIV treatment.

Jocelyn came to us looking like this.

Here's what she looks like a few months later.

(Applause.) Now, I thought our argument, our battle, was with organizations that kept saying it wasn't cost effective.

We were saying, "No, preferential treatment for the poor requires us to increase our desire to meet the poor ourselves."

They said it was a good idea, but not very cost effective.

So I wrote a book, basically against the World Bank, the nerdy way we've run Partners in Health.

We thought it was fundamentally wrong because it insisted that the World Bank should focus only on economic growth and governments should shrink their budgets and cut spending on health, education and social welfare.

And we discussed with the World Bank.

And then something incredible happened.

President Obama has nominated me as President of the World Bank.

(Applause.) Well, when I went to President Obama's team to go through the scrutiny process, they had a copy of Die to Grow and read every page.

And I said, 'OK, that's all, right?

are you gonna drop me ”

He said, "Oh, no, no, I'm fine."

And I was nominated and walked through the door of the World Bank Group in July 2012 with the statement "Our dream is a world without poverty" on the wall.

A few months after that, we actually turned that into a goal. It aims to end extreme poverty and boost shared prosperity by 2030.

That is what we are doing now at the World Bank Group.

I feel like I brought preferential treatment for the poor to the World Bank Group.

(Applause.) But this is TED, so I'd like to share some concerns and then make suggestions.

You know a lot more about the 4th Industrial Revolution than I do, but here's my concern.

Our own data suggests that two-thirds of all jobs currently existing in developing countries will be lost to automation.

Well, you have to make up for those jobs.

One way to supplement these jobs today is to convert community health workers into the formal workforce.

That's what we want to do.

(Applause.) We think the numbers work. As health conditions improve and people enter formal jobs, additional soft skills training can be added to train them to become high-impact workers. And that may be the area that grows the most.

But here's another thing that bothers me. At this point, it is clear that future jobs will be more digitally demanding, and childhood stunting is at stake.

These are photos from Charles Nelson of Harvard Medical School.

And on one side of these pictures, on the left, is a stunted 3-month-old child who is undernourished and understimulated.

And the other, of course, has a normal child. A normal child has all these neural connections.

Now, neuron connections are important. Because that is the definition of human capital.

We now know that these percentages can be reduced.

We can reduce these child stunting rates soon, but if not, how can we compete in the future economy if, say, India, where 38 percent have child stunting, 40 percent of future workers fail to meet their educational goals? And certainly we are concerned about achieving our economic goals in a way that will lead to growth for the country as a whole.

Now what shall we do?

$78 trillion is the size of the global economy.

$8.55 trillion is left in negative interest rate bonds.

So you give your money to the central bank of Germany and then you pay them to keep it.

It is a negative interest rate bond.

$24.4 trillion of ultra-low yielding government bonds.

And 8 trillion literally sleeps in the hands of the rich under very large mattresses.

What we're trying to do is use our own tools. Getting a little geeky, we're talking about first-loss risk debt products, we're talking about risk aversion, blended finance, political risk insurance, credit enhancement. All these things that I learned at the World Bank Group are things that the rich use every day to make themselves richer, but we are not so aggressively using this capital to introduce it for the poor.

(Applause) So, does this work?

Can we actually bring a civilian player into the country and really make things work?

Well, I've done it a few times.

This is Zambia, Scaling Solar.

This is a box-set solution provided by the World Bank and we do everything necessary to attract private sector investors.

In this case, the electricity price in Zambia was 25 cents per kilowatt-hour, but simple things like running an auction and changing a few policies could bring the cost down.

Zambia's minimum bid is 25 cents per kilowatt-hour?

The minimum bid was 4.7 cents per kilowatt hour. It is possible.

(Applause.) But here's my suggestion.

This is by an amazing company called Zipline, they are literally rocket scientists.

They found a way to use drones in Rwanda.

This is how I fly a drone in Rwanda and deliver blood anywhere in the country within an hour.

So we saved lives, this program saved lives -- (Applause) This program made money for ziplining, this program saved Rwanda a ton of money.

That's what we need and you need it too.

All I ask is that you give your brain a little time to think about the technology you're working on, the company you're starting, and the design.

Give it some thought and see if we can come up with such an extraordinary win-win solution.

I would like to talk about one last thing.

I was in Tanzania and in a classroom.

This is me in my class of 11 year olds.

And I asked them, as usual, "What do you want to be when you grow up?"

Two people raised their hands and said, "I want to be president of the World Bank."

(laughter) And just like you, my team and their teachers laughed.

But then I stopped them.

I said, "Look, I want to talk to you.

When I was born in Korea, it was like this.

This is my hometown.

And when I was in kindergarten at the age of three, if World Bank President George David Woods had visited Korea that day and came to my classroom, I don't think I would have thought that there would be a future World Bank President sitting in that classroom.

Never let anyone tell you that you can't be president of the World Bank. ”

Well -- thank you.

(Applause) Let me give you an idea.

I come from the poorest country in the world.

I am the President of the World Bank.

I can't and won't lift the ladder behind me.

This is urgent.

aspirations rise.

Aspirations are rising everywhere.

Everyone in this room, come work with us.

We know we can find solutions like ziplining to help the poor leap into a better world, but it won't happen unless we work together.

For the future 'you', and especially your children, your future depends on how much care and compassion we bring to the future 'us' to provide equal opportunities for all children in the world.

thank you very much.

(Applause.) Thank you. thank you. thank you.

(Applause.) Chris Anderson: I think people would be surprised to hear something like this from the President of the World Bank.

It's kind of cool.

There are many investors and entrepreneurs in this room.

How do you partner with them? What are your suggestions?

Jim Yong Kim: Can I be a bit of a geek?

CA: Be a geek. absolutely. JYK: So here's what we did.

For example, insurance companies will never invest in infrastructure in developing countries because they cannot afford the risk.

So what we did is the Swedish Institute for International Development gave us a little bit of money and then we raised a little more money and we raised $100 million and we had our first loss. So if this thing goes wrong, we'll just eat 10 percent of the loss and the rest of you will be safe.

And that created 90 percent of the triple-B investment-grade tranches invested by insurance companies.

So for us, what we're doing is taking public money and using it to de-risk certain means of bringing people in from the outside.

So everyone with trillions of dollars in cash, come to us. right?

(laughs) CA: And you're specifically looking for investment proposals that create jobs in developing countries.

JYK: That's right. absolutely.

For example, these are the infrastructures that bring us energy and build roads, bridges and ports.

These things are necessary to create jobs, but at the same time, what we're saying is, if you think the technology or business you're working on might not be applicable in the developing world, look at Zipline.

And that zipline incident didn't just happen because of the quality of the technology.

That's because they engaged with the Rwandans early on and used artificial intelligence. Rwanda has excellent broadband environments, but they work completely on their own.

So we can help you with that. Let me introduce you.

We also provide financing. we will help you with that.

CA: How much capital will the World Bank commit to supporting such efforts?

JYK: Chris, you always make me try to do things like this.

We invest $25 billion a year in poor, poorest countries.

And as we invest $25 billion a year over the next three years, we need to think with you about how to use that money more effectively.

So I can't give you specific numbers. It depends on the quality of the idea.

So please bring your ideas to us. I don't think funding will be an issue.

CA: Okay, you heard it from yourself.

Jim, thank you very much. JYK: Thank you. thank you.

(applause)

I visit the future to live.

There is not just one future, but many possible futures, and evidence from those futures can be brought back and experienced today.

Like an archaeologist from the future.

Over the years, many of my travels have brought back something like a synthetically engineered new breed of bee. The book "Pets as Proteins". A machine that lets you get rich by trading genetic data. Lamp powered by sugar. A computer for growing food.

Well, I haven't actually traveled to another future yet.

But my husband, John, and I spend a lot of time in the studio thinking and envisioning different futures.

We are always on the lookout for weak signals, tweets that indicate future possibilities.

Then follow those threads of possibility into the future and ask, "What would it be like to live in this future?"

What do we see, hear and breathe?

Then run experiments, build prototypes, create objects, bring these future aspects to life, make them tangible and tangible, so that you can really feel the impact of their future possibilities here and now.

But this work is not about prediction.

It’s about creating tools—tools that help connect our present and future selves so that we can actively participate in creating the future we want—one that works for everyone.

So how do we do this?

In a recent project called Drone Aviary, I was interested in exploring what it means to live with drones in our cities.

Drones with the ability to see what we can't see, go where we can't, and do it with increased autonomy.

But to understand the technology, it was important to get hands on.

So we built several different drones in our studio.

We gave them names and functions and flew them, and it wasn't without its challenges.

Objects detached, GPS signals failed, and drones crashed.

But through experiments like this, we were able to build a very specific and very empirical slice of one possible future.

Let's go to that future.

Imagine we live in a city with drones like this.

We call it "Night Watch".

They patrol the streets and are often seen in the evening and at night.

Initially, many of us were annoyed by its low, dull hum.

But like anything else, we got used to it.

But what if you could see the world through those eyes?

See how it keeps track of everyone in the neighborhood at all times. Record children playing soccer in no ball zones and mark them as legal nuisances.

(Laughter.) And let's see how they break up this other group of teenagers with the threat of a voluntary injunction.

And then there's a giant floating saucer called Madison.

Its presence is so overwhelming that you can't help but stare at it.

But every time I see it, it feels like it knows me a little more. To keep all the Brian Air ads flashing at me, as if they knew about the vacation I was planning.

I'm not sure if you find this kind of funny or completely invasive.

Return to the present.

We have learned a lot in creating this future.

We will not only explain how these machines work, but also what it feels like to live with them.

Drones like Madison and Nightwatchman aren't yet real in their particular form, but most elements of the drone future are actually very real today.

For example, facial recognition systems are ubiquitous, in our phones, thermostats, and even cameras in our streets, recording everything we do, whether it's an ad we see or a protest we participate in.

These are here, but we often don't understand how they work and what the possible consequences are.

And we see this all around us.

It is difficult even to imagine how the consequences of our actions today will affect our future.

Last year, the UK, where I live, had a referendum, commonly known as 'Brexit', where citizens could vote for the UK to leave or remain in the EU.

And soon after the results came out, a term called 'bregret' began to surface – (laughter) to describe people who voted to leave the EU in protest, without thinking deeply about the potential consequences.

And this disconnect is evident in some of the simplest things.

Let's go out for a drink.

Then decide you don't care for a few more times.

Even if you know you're going to wake up in the morning feeling terrible, justify it by saying, "That's going to be taken care of by the other me in the future."

But in the morning you will find out that future "you" is you.

When I was growing up in India in the late 70's and early 80's, there was a sense that the future needed and could be planned.

I remember my parents had to make some of the simplest plans.

When we wanted a phone for our home, we had to order and wait, and it took nearly five years for it to be installed in our home.

(Laughter) And if you wanted to call your grandparents who lived in another city, you would have to make an appointment for what is called a "trunk call" and wait hours or even days.

And all of a sudden, at 2am, the phone rang and we would all jump out of bed, gather around the phone, scream at it, and discuss general health at 2am.

Today, it can feel like things are happening too quickly. So fast that it may be making it very difficult for us to understand our place in history.

We let the future happen to us because it creates overwhelming uncertainty and anxiety.

We are not connected to that future “we”.

We treat our future selves as strangers and the future as a foreign land.

This is not a foreign land. It unfolds before our eyes and is continuously shaped by our actions today.

We are that future, and we believe it is more urgent and necessary than ever to fight for the future we want.

We have learned in our work that one of the most powerful means of effecting change is when people can directly, tangibly and emotionally experience some of the future consequences of their actions today.

Earlier this year, the Government of the United Arab Emirates invited us to help develop its energy strategy to 2050.

We created this metropolitan model based on government econometric data and visualized different possible futures on it.

As I excitedly guided government officials and members of energy companies to a sustainable future based on our model, one of the participants said, "I can't imagine that in the future people will stop driving and start using public transportation."

And he said, "I can't tell my son to stop driving."

But we were prepared for this reaction.

Working with scientists from the Institute of Chemistry in my home country of India, I have created a rough sample of what the atmosphere will look like in 2030 if our behavior remains the same.

So I walked the group to this object that releases vapors from an air sample.

Just one sniff of harmful polluted air from 2030 highlights important points that no amount of data can provide.

This is not the future you want your children to inherit.

The next day, the government made a major announcement.

They will invest billions in renewable energy.

We don't know what role our future experience played in this decision, but we do know that they changed their energy policy to mitigate such a scenario.

Air from the future can be very effective and tangible, but the trajectory from our present to future outcomes is not always linear.

Even technologies developed with utopian ideals are subject to forces beyond the control of their creators the moment they leave the laboratory and enter the world.

As one of our specific projects, we explored medical genomics, the technology of collecting and using people's genetic data to create personalized medicine.

We asked: What are some of the unintended consequences of tying our genetics to medicine?

To explore this question further, we created a fictitious case and brought the matter to life through 31 carefully crafted pieces of evidence.

So we built illegal genetic clinics, DIY CO2 incubators, and even bought frozen mice on eBay.

Now let's go to the future where this case is unfolding and meet the defendant, Arnold Mann.

Arnold is being indicted by this global biotech giant called Dynamic Genetics. They have evidence that Arnold illegally inserted the company's patented genetic material into the body.

How the hell could Arnold do that?

It all started when Arnold was asked to submit the saliva samples included in this saliva kit to the NHI (National Health Insurance Service in the United Kingdom).

When Arnold received his health insurance bill, he was shocked and horrified to find that the premiums were higher than he and his family could afford.

A state algorithm scanned his genetic data and found the risk of chronic health conditions in his DNA.

So Arnold had to start paying today for the potential costs of future illness—or potential future illness.

In a moment of terror and panic, Arnold slipped through the city into the dark shadows of this illegal clinic for treatment. The treatment modifies his DNA, making him less dangerous to state algorithms and making insurance affordable again.

But Arnold was caught.

And so began legal proceedings in Dynamic Genetics v. Mann.

In realizing this future, it was important to us that people could touch, see and feel its possibilities. Because such immediate and close encounters prompt people to ask pertinent questions, such as, "What does it mean to live in a genetically determined world?"

Or who might claim ownership of my genetic data and what they might do with it?

If this sounds a little outlandish or far-fetched, today a little-known bill known as HR 1313 (The Employee Health Program Maintenance Act) is passing through the US Congress.

The bill proposes to amend the Genetic Information Nondiscrimination Act, commonly known as GINA, allowing employers to ask all employees for family medical history and genetic data for the first time.

Those who refuse will face heavy penalties.

In the works I've introduced so far, whether it's drones or genetic crimes, these stories paint worrisome futures meant to help us avoid those futures.

But what about the inevitable?

Today, we seem to be in trouble, especially with climate change.

So what we want to do now is prepare for that future by developing tools and attitudes that help us find hope, hope that inspires action.

We are currently experimenting in the studio.

It's a work in progress.

We explore a future where the Western world moves from an age of abundance to an age of scarcity, based on projections of climate data.

We imagine living in a city of the future, with constant flooding, supermarket shortages, economic instability, and broken supply chains.

How can we not only survive but thrive in such a world?

What kind of food can we eat?

To really get into these questions, we're building this room in a 2050 London apartment.

It's like a little time capsule we took back from the future.

I stripped it down to the bare minimum.

We had to let go of everything we had lovingly kept in our homes: flat-panel TVs, internet-connected refrigerators, and artisanal furniture.

Instead, we build food computers out of discarded, salvaged and repurposed materials, turning today's waste into tomorrow's dinner.

For example, we just finished building our first fully automatic fogponics machine.

It uses the technology of Fogponics, which allows things to grow quickly without using water or soil, just supplying fog as nutrients.

We are now successfully growing tomatoes.

However, you will need more food than you can grow in this small room.

So what else can you get out of this city?

insect? Pigeon? Fox?

Earlier, we brought back air from the future.

This time, we bring an entire room from the future, a room full of hope, tools, and tactics for taking positive action in hostile situations.

Spending time in this room, the room that may become our home in the future, makes the impact of climate change and food insecurity feel more direct and tangible.

What we learn through these experiments, practices, and people involved is that creating tangible experiences can bridge the gap between today and tomorrow.

By placing ourselves in a range of possible futures and by openly embracing the uncertainty and discomfort that such actions can bring, we have the opportunity to imagine new possibilities.

We can find an optimistic future. we can find a way forward. We can move beyond hope into action.

It means we have a chance to change direction, a chance to have our voices heard, a chance to write ourselves into the future we want.

Other worlds are also possible.

thank you.

(applause)

In 1987, tens of thousands of people flocked to Saudi Arabia for the annual Hajj pilgrimage.

But what began as a celebration has sparked a health crisis. Just days after the pilgrimage, more than 2,000 meningitis cases spread across Saudi Arabia and other countries.

The outbreak was so violent that it was thought to have sparked a wave of deadly meningitis epidemics that eventually infected tens of thousands of people worldwide.

Meningitis is inflammation of the meninges, the three tissue layers responsible for protecting the brain and spinal cord.

What makes meningitis so dangerous compared to other diseases is how quickly it can enter a person's body.

In the worst cases, death can occur within a day.

Fortunately, this is rare in patients treated early.

There are three main forms of the disease: fungal, viral, and bacterial, with the latter being the most deadly to date and the focus here.

Bacterial meningitis is usually transmitted by breathing in small particles of mucus or saliva that are airborne when an infected person sneezes or coughs.

It can also be transmitted by kissing, smoking, sharing toothbrushes, and eating utensils.

Some infected people have the disease without showing symptoms, which causes the disease to spread rapidly to others.

When bacteria enter the nose, mouth, or throat, they pass through the surrounding membranes and into the bloodstream.

From there, bacteria have quick access to body tissues, including a membrane called the blood-brain barrier.

It is a dense network of cells that separates blood vessels from the brain and blocks out all but certain particles such as water molecules and some gases.

But in a way scientists are still trying to understand, meningococci can trick barriers through.

In the brain, bacteria rapidly infect the meninges.

This causes the body's immune response to overdrive, causing inflammation, fever, and severe headaches.

As the swelling of the meninges worsens, the neck begins to stiffen.

Swelling of the brain interferes with its normal function, causing symptoms such as hearing loss and extreme light sensitivity.

Increased intracranial pressure can be confusing and is one of the hallmarks of the disease.

After a few hours, the rapidly growing bacteria begin releasing toxins, causing sepsis (septicemia).

This destroys blood vessels, seeps blood, forms what initially looks like a rash, and develops into a large, discolored blotch under the skin.

At the same time, these toxins burn oxygen in the blood, reducing the amount that reaches major organs such as the lungs and kidneys.

This increases the likelihood of organ failure, spreading sepsis and increasing the risk of death.

This sounds scary, but doctors are so good at treating meningitis that going to a hospital can greatly reduce the risk of an adult dying from meningitis.

However, the longer it is left untreated, the more likely it is to lead to permanent damage.

The risk of amputation increases when reduced oxygen levels cause cell death in extreme parts of the body such as fingers, toes, arms and legs.

Meningitis can also cause long-term brain damage and memory loss if bacterial toxins accumulate in the brain and cause cell death.

Prompt treatment, or even prevention, is therefore important.

That's why most countries have vaccines that protect against the disease in its most deadly form.

They are usually given to people at greatest risk, such as young children, people with weakened immune systems, and people who gather in large groups at risk of meningitis.

In addition to these rallies, cases occur worldwide, although meningitis is most common in an area called the Meningitis Belt, which stretches across Africa.

If you think you or someone you know has meningitis, see a doctor as soon as possible. A quick act may save your life.

My name is Katrina Spade. I grew up in a medical family where it was common to talk about death and dying at the dinner table.

But I didn't go into medicine like many of my family members.

Instead, I went to architecture school to study design.

And while there, I became interested in what happens to my body after I die.

What would my closest and dearest do to me?

Therefore, even if the existence and fact of your own death does not depress you, the state of current funeral practices will.

Nearly 50 percent of Americans now choose a conventional burial.

Traditional burials begin with embalming. In embalming, funeral staff drain the bodily fluids and replace them with a mixture designed to preserve the body and give it a lifelike shine.

After that, as you know, the body is buried in a coffin in a concrete-enclosed grave in the cemetery.

All in all, US cemeteries are buried with enough metal to build the Golden Gate Bridge, enough wood to build 1,800 single-family homes, and enough formaldehyde-containing embalming solutions to fill eight Olympic-size swimming pools.

Additionally, cemeteries around the world are reaching capacity.

After all, selling land to someone forever doesn't make much business sense.

(laughs) Whose idea is that?

Depending on where you live, you may not be able to buy land no matter how much money you have.

As a result, cremation rates rose rapidly.

In 1950, if you suggested incinerating your grandmother after she died, you probably would have been kicked out of your family's deathbed.

Today, however, nearly half of Americans choose cremation because it's easier, cheaper, and more environmentally friendly.

I used to think cremation was a sustainable form of processing, but let's think about it for a second.

Cremation destroys the potential that we have to give back to the earth after death.

It uses an energy-intensive process to turn corpses into ash, pollute the air, and contribute to climate change.

In total, cremations in the United States emit a staggering 600 million pounds of carbon dioxide into the atmosphere each year.

The really scary truth is that the one thing most of us would never do on this planet is poison the planet.

It's like making a way for, accepting, and denying death to a status quo where we, as humans, distance ourselves from nature as much as possible.

Our modern funeral rites are designed to prevent the natural processes that occur in the body after death.

In other words, they are meant to keep us from decaying.

But the truth is that nature is really, really good at dying.

we've all seen it.

When organic matter dies in nature, microbes and bacteria break it down into nutrient-rich soil to complete its life cycle.

In nature, death creates life.

When I was in architecture school, I thought about all this and made plans to redesign Deathcare.

Can we build systems that are beneficial to the planet, using nature as a guide rather than something to be feared?

Earth friendly?

After all, that planet sustains our life form for life.

And while I was pondering this, the phone rang.

It was my friend Kate.

She asked, "Hey, have you heard of a farmer composting a whole cow?"

And I thought, "Hmm."

(Laughter.) It turns out that farmers on agricultural facilities have been practicing what's called anti-mortality composting for decades.

Mortality composting is the taking of nitrogen-rich animals and covering them with a carbon-rich co-composting material.

Being an aerobic process, it requires oxygen and it also needs plenty of water.

In the most basic setting, cows are covered with several feet of carbon-rich wood chips and left outdoors in the wild, with wind providing oxygen and rain providing moisture.

After about nine months, only nutrient-rich compost remains.

Meat is completely decomposed, as are bones.

know.

(Laughter) So I would definitely call myself a disassembly nerd, but I'm far from a scientist. And one way I know this to be true is that I often refer to the composting process as "magical."

(Laughter) Basically, all we humans have to do is create the right environment for nature to do its job.

It's like the opposite of antibacterial soap.

We welcome microbes and germs with open arms rather than fighting them.

These tiny, amazing creatures break molecules down into smaller molecules and atoms, which are incorporated into new molecules.

In other words, the cow transforms.

It's no longer a cow.

It circulates and returns to nature.

look? magic.

You can probably imagine a light bulb going off in my head after receiving that call.

I started designing a human-to-dirt system based on the principle of composting when livestock die.

Five years later, the project has grown in ways I could never have imagined.

We have created a scalable, reproducible, non-profit city model based on the science of composting that increases the mortality of livestock that turns humans into soil.

We have partnered and collaborated with experts in soil science, decomposition, alternative mortality care, law and architecture.

We have raised funds from foundations and individuals to design a prototype of this system. We have also heard from tens of thousands of people around the world that they would like to take advantage of this option.

OK。

Over the next few years, our goal is to build the first full-fledged human composting facility in Seattle.

(Applause.) Imagine that. Part of a park, part of a funeral home, part of a memorial to loved ones, a place where we can reconnect with the cycles of nature and treat bodies with kindness and respect.

Infrastructure is simple.

Inside the vertical core, the bodies and wood chips undergo accelerated natural decomposition, or composting, and are turned into soil.

When a person dies, their remains are taken to a human composting facility.

After wrapping the deceased in a simple shroud, friends and family carry the corpse to the top of the core where the natural decomposition system is located.

In the laying ritual, the body is slowly placed on the core and covered with wood chips.

This initiates a gradual transition from human to earth.

Over the next few weeks, your body will naturally decompose.

Microorganisms and bacteria break down carbon and then protein to create new material, a rich soil-like soil.

This soil is used to grow new life.

Ultimately, you too may be a lemon tree.

(Applause) Yes, thank you.

(Applause.) Who's thinking of lemon meringue pie right now?

(laughs) Lemon drop?

something strong?

Thus, in addition to housing the center, these buildings also serve the function of supporting grief by providing space for memorial services and end-of-life planning.

The potential for reuse is enormous.

Old churches and factory warehouses can be transformed into places that create soil and respect life.

We want to bring back the ritual aspects that have faded over the last 100 years with rising cremation rates and declining interest in religion.

Our Seattle facility serves as a model for these locations around the world.

We hear from communities in South Africa, Australia, the UK, Canada and beyond.

We create design toolkits to help others design and build facilities, including technical specifications and regulatory best practices.

We want to help individuals, organizations and in the future local governments design and build facilities in their own cities.

The idea is that each of these places should look and feel completely different, even though the systems inside are the same.

They are actually meant to be designed for the areas in which they live and the communities they serve.

Another idea is to have support staff on hand to help families care for and prepare the bodies of their loved ones.

We are banishing embarrassing and power-sapping practices and building a system that is beautiful, meaningful and transparent.

We believe that access to environmentally friendly dying care is a human right.

You know the old saying that if you can compost cows, you can compost people?

(Laughter) After all, it's true.

Since 2014, we have been working with the Western Carolina University School of Forensic Anthropology on a pilot project in the North Carolina Hills.

The bodies of the six donors are covered in wood shavings, oxygen supplied by the wind, and microbes and bacteria doing their job.

With this pilot program, we are able to prove that it is possible to turn a human body into dirt using the amazing power of natural decomposition, and we are collaborating with other universities.

Soil scientists at Washington State University are doing research into composting amalgam fillings into teeth anyway so they can understand what happens to the mercury in them.

Next, we plan to begin experiments to determine what happens to chemotherapy drugs and pharmaceuticals during the composting process and whether additional remediation is required.

By the way, composting, especially this type of composting, generates a lot of heat.

A week after we began composting the body of our fifth donor, the temperature inside the pile of wood chips reached 158 degrees Fahrenheit.

Imagine harnessing that heat to generate energy or comforting grieving people on a cold day.

The death care revolution has begun.

It's a fun time to live.

thank you.

(applause)

I remember the first time I found out I was going to speak at the TED conference.

I ran down the hallway to one of the classrooms to inform the students.

"What about you guys?

I was asked to give a TED talk. ”

The reaction was not what I expected at all.

The whole room fell silent.

"A TED Talk? I mean, the kind of talk you made us watch with guts?"

Or are you a scientist who's done really great things with robots?"

asked Muhammad.

"Yes, that's right."

"But Coach, those guys are really important and smart people."

(Laughter) “I know that.”

"But coach, why are you talking? You hate public speaking."

"I think so," I admitted, "but it's important to talk about us, about your journey, and about mine.

people need to know. ”

The students at the refugee-only school I founded decided to finish with words of encouragement.

"Good! Better, Coach."

(Laughter) There are 65.3 million people who have been forcibly displaced from their homes by war and persecution.

The largest number, 11 million, is from Syria.

33,952 people are displaced from their homes every day.

The majority remain in refugee camps, where conditions are by no one's definition humanitarian.

We are complicit in the corruption of mankind.

I've never seen numbers so high.

This is the largest number of refugees since World War II.

Now let me tell you why this issue is so important to me.

i am arab i am an immigrant

I am Muslim.

I have also spent the last 12 years of my life working with refugees.

Oh, and I'm gay too.

It's really popular these days.

(laughs) But I am a refugee daughter.

My grandmother fled Syria in 1964 during the first Assad regime.

She was three months pregnant when she packed her suitcase, loaded her five children, and drove to neighboring Jordan. I didn't know what would happen to me and my family.

Grandfather didn't think it was that bad, but decided to stay.

A month later, he followed her after her brothers were tortured and the factory was taken over by the government.

They rebuilt their lives from scratch and eventually became independent and wealthy Jordanian citizens.

Eleven years later I was born in Jordan.

It was very important for my grandmother to know our history and journey.

I was eight years old when she first took me to a refugee camp.

I didn't understand why.

I didn't understand why it was so important to her that we go.

I remember her saying, “Play with the children,” as we entered the camp holding her hand while she was visiting with the camp women.

I didn't want to

These kids were nothing like me.

they were poor they lived in camps.

I refused.

She knelt next to me and said firmly, "Go."

And don't come back until you're done playing.

Never think that people are inferior to you or that you have nothing to learn from others. ”

I went there reluctantly.

I didn't want to disappoint my grandmother.

I spent some time playing football with the camp kids and then came back a few hours later.

We came out of the camp and excitedly told her how much fun we had and how wonderful the children were.

“Haram!” he said in Arabic. "Poor people."

“We have haram,” she said, using another sense of the word, to say that we sin.

"Don't feel sorry for them. Trust them."

It wasn't until I left my home country and moved to the United States that I realized the power of her words.

After college, I applied for and was granted political asylum on the grounds of my social group membership.

What some people may not realize is that in some countries, being gay is punishable by death.

I had to give up my Jordanian nationality.

It was the hardest decision I've ever made, and I had no other choice.

The point is, when faced with a choice between home and survival, the question "Where are you from?" becomes important. Very heavy load.

A Syrian woman I met recently in a refugee camp in Greece best described this by recalling the exact moment when she realized she had to flee Aleppo.

"I looked out the window and saw nothing.

It was all rubble.

There were no shops, no streets, no schools. Everything is gone.

I've been in my apartment for months, hearing bombs falling and watching people die.

But I always thought that this situation would get better, no one could force me to leave, no one could take my home away from me.

And I don't know why it was that morning, but when I looked outside, I realized that if I didn't leave here, my three young children would die.

So we left.

We left because we had to, not because we wanted to.

I had no choice," she said.

When you're homeless, when you're rejected by your country of origin because of fear or persecution, or when the city you grew up in is utterly destroyed, it's a little hard to believe you have a place.

I didn't feel like I had a home.

I was no longer a Jordanian citizen, but neither was I an American.

Even now, I felt a sense of loneliness that cannot be expressed in words.

After college, I desperately needed to find a place to call home.

I moved from state to state and ended up in North Carolina.

Kind people who took pity on me offered to pay my rent and buy me food and a suit for my new job interview.

It only made me feel even more isolated and helpless.

It wasn't until I met Miss Sarah, a Southern Baptist, that I began to believe in myself that she accepted me from the rock bottom and gave me a job.

Sarah ran a diner in the mountains of North Carolina.

I thought she would ask me to run the restaurant because of my privileged upbringing and my Seven Sisters education.

I was wrong.

I started washing dishes, cleaning toilets and working on the grill.

I humbled myself. I learned the importance of hard work.

But most importantly, I felt valued and accepted.

I celebrated Christmas with her family and she tried to keep Ramadan with me.

I remember being so nervous to come out to her. After all, she was a Southern Baptist.

I sat down on the couch next to her and said, "Sarah, you know I'm gay."

Her reaction is something I will never forget.

"That's fine, honey. Just don't be a slut."

(Laughter) (Applause) I eventually moved to Atlanta, but I was still trying to find a home.

Three years later, my journey took a strange turn when I met a group of refugee children playing soccer outside.

I made a mistake and entered this housing complex, but I saw children playing soccer outside.

They were barefoot playing with tattered soccer balls and stones that looked like goals.

I was looking at it for about an hour, but after that I was smiling all the time.

The boys reminded me of my hometown.

They reminded me of when I grew up playing football on the streets of Jordan with my brothers and cousins.

I ended up joining their game too.

They were a little skeptical about including me. Because, according to them, girls do not know how to play.

But obviously I did.

I asked them if they ever played for a team.

They said they hadn't done it yet but would love to.

I gradually persuaded them to form the first team.

This group of children gives me crash courses on refugees, poverty and humanity.

Three brothers from Afghanistan, Louhulla, Nuorla and Zabiullah, played a big role in it.

Arriving late to practice one day, I found the field completely empty.

I was really worried.

My team loved practice.

They never stopped practicing.

As I got out of the car, two children rushed out from behind the trash can, waving desperately.

"Coach, Lou got hit. Jumped.

There was blood everywhere. ”

"What do you mean? What do you mean he got hit?"

"The bad boys came and beat him, coach.

everyone has left. they were all scared. ”

We jumped in my car and drove to Lou's apartment.

I knocked on the door and Noor opened it for me.

"Where's Lou? I want to talk to him, but I want to make sure he's okay."

"Coach, he's in the room. He's refusing to come out."

i knocked on the door.

"Lou, come out. I have something to talk to you about.

I need to see if I'm okay or if I need to go to the hospital. ”

he came out

He had a large cut to his head, a split lip, and was physically shaking.

As I looked at him, I asked the boys to call their mother because they needed to go to the hospital together.

they called their mother.

she came out

I turned my back on her and she started screaming in Persian.

The boys fell to the ground laughing.

I was very confused because there was nothing wrong with it.

They explained to me that she said, 'You said your coach is a Muslim and a woman.

From behind, I looked like neither to her.

(laughter) “I am a Muslim,” I said, turning to her.

Recite the Muslim Declaration of Faith, "Ašhadu ʾan lā ʾilāha ʾilla (A)llāh".

Confused, and perhaps somewhat relieved, she realized that yes, I, the unveiled woman who played the American, were indeed Muslim.

Their family had fled the Taliban.

Hundreds of people were murdered in their villages.

Their father was kidnapped by the Taliban, but returned months later in his normal form.

The family fled to Pakistan, where the two older boys, aged 8 and 10 at the time, weaved carpets for 10 hours a day to support their families.

They were very excited to learn that their resettlement to the United States had been approved. That's the lucky 0.1 percent who can.

They hit the jackpot.

Their story is nothing special.

Every refugee family I have worked with has experienced this in some way.

I work with children who have seen their mothers raped and their fathers' fingers cut off.

A child witnessed a bullet hit in the head of a grandmother who refused to be taken as a child soldier by the rebels.

Their journey is unforgettable.

But what I see every day is hope, resilience, determination, love for life, and gratitude for being able to rebuild their lives.

One night I was at the boys' apartment when their mother came home after cleaning 18 hotel rooms in one day.

As she sat down, Nour rubbed her leg and said he would take care of her when she graduated.

She smiled tiredly.

"God is good. Life is good. We are lucky to be here."

Over the past two years, anti-refugee sentiment has grown.

it's global.

Because we are doing nothing to prevent it, and nothing to stop it, the number continues to grow.

Stopping refugees from entering our country should not be a problem.

The problem shouldn't be forcing them to stay away from their stuff.

(Applause) Sorry.

(Applause.) How much more suffering, how much more suffering must we accept?

How many more people need to be kicked out of their homes before we can say, "Enough!"

100 million?

Not only do we shame, condemn and reject atrocities that have nothing to do with them, we re-traumatize them when we should be welcoming them to our country.

We strip them of their dignity and treat them like criminals.

A few weeks ago I had a student in my office.

She is from Iraq.

she broke down in tears.

"Why do they hate us?"

"Who hates you?"

"Everyone hates us because we are refugees and we are Muslims."

In the past, I have been able to reassure my students that the majority of people in the world do not hate refugees.

But this time I couldn't.

I couldn't explain to her why someone had tried to strip her mother's hijab while she was grocery shopping, why the opposing team's players called her a terrorist and told her to go back to where she was.

I couldn't reassure her that her father's ultimate life sacrifice to serve in the U.S. military as an interpreter would make her more important as an American citizen.

We accept only a small number of refugees in the world.

We reset less than 0.1 percent.

That 0.1 percent benefits us more than they do.

I am stunned by how dirty and shameful the word “refugee” is considered.

They have nothing to be ashamed of.

We have seen progress in every aspect of life except humanity.

65.3 million people were displaced from their homes by the war, the highest number in history.

We are the ones to be ashamed of.

thank you.

(applause)

I would like to offer you a new perspective.

It sounds grand, and it's true.

I left Ireland yesterday morning.

I traveled alone from Dublin to New York.

But the design of airports, planes and terminals has little independence at 105cm tall.

For Americans, that's 3 feet 5 inches.

I was guided through the airport by an airline assistant in a wheelchair.

I no longer need to use a wheelchair, but the airport's design and lack of accessibility make it my only mode of transportation.

With my carry-on bag under my feet, I was wheeled through security, pre-clearance, and arrived at the boarding gate.

I use the airport's accessible services because most terminals were not designed with me in mind.

Let's take security as an example.

I am not strong enough to lift the carry bag from the ground to the merry-go-round.

I stand at eye level with it.

And those who work in that space for safety can't help me or do it for me.

Design inhibits my autonomy and independence.

But traveling in this size isn't all bad.

Legroom in economy is the same as in business class.

(Laughter) I often forget that I am a small person.

It is the physical environment and society that remind us of it.

Using a public restroom is an excruciating experience.

I entered a private room, but I couldn't reach the door key.

I am creative and resilient.

Look around to see if there are any trash cans that you can turn over.

Is it safe?

not much.

Sanitary and hygienic?

Absolutely not.

But the alternative is even worse.

If that doesn't work, use your phone.

This gives me another 4-6 inches of reach and I try to close the lock with my iPhone.

I imagine this isn't what Jony Ive had in mind when he designed the iPhone, but it works.

Another way is to approach strangers.

I sincerely apologize and ask that you guard outside the door of my private room.

They do and I am grateful but completely frustrated. And I hope they didn't realize I left the bathroom without washing my hands.

The sink, soap dispenser, hand dryer, and mirror are all out of reach, so I carry hand sanitizer with me every day.

Accessible bathrooms are kind of an option now.

In this space, you can reach your door locks, sink, soap dispenser, hand dryer, and mirror.

However, I can't use the toilet.

It is purposefully designed to be high enough for wheelchair users to move smoothly.

This is a nice and much-needed innovation, but what does it mean when the world of design describes new projects and ideas as accessible?

Who has access?

And whose needs are not being met?

Now, the bathroom is one example of how design affects my dignity, but the physical environment also affects me in more casual ways. Even something as simple as ordering a coffee.

I admit it now.

I drink too much coffee

My order is the Skinny Vanilla Latte, but I'm thinking of skipping the syrup.

But coffee shops are poorly designed, at least for me.

As I stand in line next to the pastry rack, the barista calls out the next order.

"Next!" they shout.

they can't see me

The person next to me in line points out my presence and everyone is confused.

I order ASAP and go get my coffee.

Now let's think about it.

where do they put it?

It is high and has no lid.

Reaching for coffee after paying is an incredibly dangerous experience.

But design also influences the clothes I like to wear.

I want clothes that reflect my personality.

Hard to find in children's clothing stores.

And often women's clothing requires too many modifications.

I want shoes that affect my maturity, professionalism and sophistication.

Sneakers with Velcro straps and light-up shoes were provided instead.

Now, I'm not totally against glowing shoes.

(Laughter) But design also influences something as simple as sitting in a chair.

Inability to gracefully transition from standing to sitting.

Due to the design height standards of the chair, I am aware that I may fall on all fours just by sitting on the chair.

But while design influences me, whether it's a chair, a bathroom, a coffee shop, or a piece of clothing, I rely on and benefit from the kindness of strangers.

But not everyone is so kind.

When strangers point to me, stare at me, smile, call me by name, or take a picture of me, I am reminded that I am a small human being.

This happens almost every day.

The rise of social media gave me the opportunity and platform to speak out as a blogger and activist, but it also made me fear that I might become a meme or viral sensation without my consent.

So let's take a minute now and say something clear.

The word "dwarf" is a slander.

It evolved from the days of PT Barnum's circuses and freak shows.

Society has evolved.

So should our vocabulary.

Language is a powerful tool.

It does more than name our society.

shape it.

I am incredibly proud to be a little human and to have inherited achondroplasia.

But what I am most proud of is being Sinead.

Achondroplasia is the most common form of dwarfism.

Achondroplasia is translated as "no chondrogenesis".

I have short limbs and an achondroplasic face, forehead and nose.

Arms are not fully extended, but elbows can be licked.

I'm not showing you that.

Achondroplasia occurs in approximately 1 in 20,000 live births.

Eighty percent of dwarfs are born to two parents of average height.

That means anyone in this room could have a child with achondroplasia.

Yet I inherited my illness from my father.

I would like to show you a photo of my family.

My mother is of average height, my father is short, and I am the eldest of five children.

I have 3 sisters and 1 brother.

They are all of average height.

I am incredibly lucky to be born into a family that nurtures my curiosity and tenacity, protects me from the unkindness and ignorance of strangers, and gives me the resilience, creativity, and confidence I need to survive and manipulate my physical environment and society.

The exact reason I am successful is because I was and still am a beloved child, and I am still a beloved child with a lot of sass and sarcasm, but still a loved child.

In giving you insight into who I am today, I wanted to offer you a new perspective.

I wanted to challenge the idea that design is just a tool to create function and beauty.

Design has a great impact on people's lives, every life.

Design is not only a way we can feel part of the world, but it is also a way we can protect human dignity and human rights.

Designs can also expose groups whose needs have not been considered.

So today I want to question your perceptions.

Who are we not designing for?

How can we spread their voices and experiences?

What are the next steps?

Design is a great privilege, but it also comes with a greater responsibility.

I want you to open your eyes

Thank you very much.

(applause)

It's time to talk.

Calm down and start.

Once upon a time, a parent duck sat patiently on its nest of eggs, waiting for them to hatch.

Then one day she felt something move under her.

Pachi, Pachi!

She was filled with happiness and watched the eggs hatch one by one.

I don't know about you, but story time was always one of my favorite times of the day when I was little.

I used to love reading when my two sons were little.

It's a special time when a parent and child together get completely engrossed in a mystical kingdom, a fantasy animal, or a scruffy little duck that turns into a swan.

Well, for some kids, yes, but for others, they don't have a parent nearby to read to them.

I would like to talk about Sophie.

Sophie is 5 years old and lives with her parents.

One day, I hear a knock on the door.

Sophie heard many screams. her mom is crying

She saw the police take her father away.

Sophie is scared. She starts crying too.

Several weeks pass.

Sophie doesn't know what happened to her father.

When she asks her mother, she gets angry.

So she stopped asking questions.

Sophie is waiting.

She really misses her father.

Every day she rushes home from school, thinking he might come back.

Many nights she cries herself to sleep.

Kids at school start making fun of her.

they call her name

Someone's mom heard that Sophie's dad is in prison.

Sophie pretends to be sick so she doesn't have to go to school.

And her teacher can't understand why she is so behind in schoolwork.

After a long, long time for Sophie, a letter arrived.

It's from her father.

The writing is so dirty.

Mother cries when she reads the letter, but reads a little to Sophie.

He said okay and misses them.

It's a short letter.

Sophie said she wanted to visit her father wherever he was.

But her mother says it's too far there to afford to travel.

Then one day the phone rings.

"Sophie, come talk to Daddy."

Dad sounds different from afar.

I can't talk too long, and anyway, it seems to be noisy wherever I am.

And Sophie doesn't know what to say to him.

Well, as the story goes, it's not a very good story.

In the UK, 200,000 children experience the shame and loneliness of their parents' prisons.

200,000.

This is more than the number of children affected each year by their parents' divorce.

And that can have a very serious effect on the children of prisoners.

They can have problems at school and are three times more likely to have mental health problems.

In so many ways, children become the unintended victims of their parents' crimes.

In so many ways, children are overlooked as victims of their parents' crimes.

Until November of last year, I was imprisoned and serving time on fraud charges.

I was unfaithful and paid the fine.

Before that, I worked as a lawyer for 30 years.

I had a happy, stable upbringing, a good education, and a happy marriage, and I am happy to say that I still do.

I have two grown sons.

When they were growing up, I did my best to be by their side as much as I could.

And I was attentively interested in what they did.

I used to read to my sons every night, and ironically, our favorite story was "The Robbery Bill."

(Laughter.) But going to prison, it quickly became clear that my background was very different from most prisoners.

Few of the men I met had a decent education.

In fact, many associated education with humiliation and failure.

I can say directly that prison is inhuman.

Prisoners pack, close, close in...

just to survive.

And this can be devastating for families.

In fact, it can be very difficult to keep in touch with family members from prison.

And if a child manages to meet a parent in prison, it must undergo the same rigorous search as an adult.

They walk in the same line of detectors and are sniffed out by the same sniffer dogs, all because some children unwittingly carry drugs and mobile phones.

And when they make it safely to see their parents, they may be shy, tight-lipped, or upset, tired from the long journey.

And it's not easy for parents who may not be getting along.

For these and other reasons, more than half of inmates lose contact with their children and families.

How can we help inmates keep in touch with their families?

When I was an inmate at Channingswood Prison, I started working for a charity called Storybook Dad.

Storybook Dads started in 2003. That's when private prison worker Sharon Berry realized that many prisoners wanted to stay in touch with their children.

So, with some fairy tale books in hand, she began helping the prisoners read and record the stories and send them to the children.

It wasn't a new idea. New ideas like this are rare.

Great idea.

However, it was an immediate success.

You may be wondering, "How is story recording done in prison?"

Is it hard for inmates?

Can we do something challenging?

Well, the process of selecting, reading, and recording stories can be very difficult for prisoners.

Prisons are harsh and prisoners cannot afford to show weakness or signs of weakness.

But this, this recording process, this can be uncomfortable and upsetting, and sometimes everything goes a little too far.

And prisoners often cry.

We cry because we regret having lost the lives of our children.

They cry because they are ashamed of having let their family down.

I cry because I don't know how to read books to my children.

But when inmates come to us, we provide a one-on-one private space so they no longer need to be tough and can use their weaknesses as strengths when dealing with children.

I remember one prisoner who came to the record.

He was a big, strong man and had a reputation for being tough.

He came as relentlessly as ever.

But that facade began to crumble as the recording room door closed behind him.

He pulled a messed up piece of paper out of his pocket and quietly began to read what he had written as a message to his two young children.

his hands were shaking.

Then, in a surprisingly quiet voice, they began singing their favorite lullaby.

You know, there wasn't much he could do from behind prison to show his children that he misses them and loves them.

But he could.

Once recorded, it is sent to Storybook Dad's production unit at Channingswood Prison in Devon.

And that's where I worked.

I was trained, along with other prisoners, to edit and produce recordings sent from prisons all over the UK.

Remove mistakes from your recordings and add sound effects and music with audio and video software.

And the experience and skills gained by prison editors will be useful in future jobs.

Once the recording is complete, it will be converted to a CD or DVD and sent to your family so your children can watch it whenever they want.

And they often listen to these recordings or watch them at bedtime or in the car...

Some even take it to school to show it to their friends.

These recordings show children that they are loved and missed.

And they show prisoners that as parents they can do something for their children.

Remember Sophie?

Well, one day just before Christmas, a package arrived. This was in it.

Let's listen together.

(Video) Santa: Come on Comet! Come on Cupid! Come on Donner and Blitzen!

Charlie: That's his reindeer, isn't it?

Santa: That's his reindeer, yes.

Up, up, high, high, over land, over sea they galloped.

They passed through a magical Northern Lights -- you want to see the Northern Lights, right?

Charlie: I think it looks a bit like that snowman's belly.

Santa: I guess so.

That's a cool snowman.

Charlie: It's really cool, I love it.

Santa: They visited every child in the world and left a present for each one.

In a blink of an eye they were back at Frogsbottom Field.

(Charlie laughs) Santa: Do you think that's funny?

Charlie: I want to live in Frogsbottom Field!

Santa: Where do you live in the Frogsbottom Tree?

Charlie: No, I live in this tree.

It made everything look like Christmas.

Santa: That's good, it is.

well done, well done

Charlie: Thank you!

(laughs) Alan Crickmore: Sophie and her mom have heard it three times and haven't laughed so much in a long time.

They can tell he's okay, he loves them, and the next time he calls Sophie has a lot to talk about: "What does Charlie the Chimpanzee eat?"

Dad, can you tell me another story soon? ”

Since its inception in 2003, Storybook Dads has continued to grow.

Currently working as Storybook Dads and Storybook Moms in over 100 prisons in the UK.

98% of inmates who participated said their relationship with their children improved.

And since 2003, over 60,000 DVDs and CDs have been sent to prisoner children.

For Sophie's family, and thousands of families just like them, Storybook Dads has been a lifeline.

For some inmates, this was the first time they started building relationships with their children.

Also, some people who are not good at reading are so impressed with what they have achieved that they attend educational classes to improve their reading comprehension.

Let us return to the story of the Ugly Duckling.

But this time, I want to play a recording made by a prisoner. This is because the power of our activities is condensed in this recording.

The prisoner was an Irish tourist who was illiterate.

And he wanted to send the story home for his daughter's birthday.

With the help of mentors and clever editing, something magical happened.

This is an excerpt from a live recording, with the prisoner reading the story phrase-by-phrase at a time.

(Audio) Mentor: He had nowhere to hide.

Owen: He had nowhere to hide.

Mentor: So one day he ran away.

Owen: Then one day he ran away.

Mentor: He ran until he came to a large swamp.

Owen: He runs until he comes to a large swamp.

Mentor: Where wild ducks used to live.

Owen: It's where the wild ducks used to live.

AC: This is a recording. Excerpts of recordings with mentor's voice and added sound effects and music.

(Audio) Owen: He had nowhere to hide.

Then one day he runs away.

He ran until he came to a large swamp inhabited by wild ducks, and he lay in the bush for two weeks.

(music) (duck crowing) Wild ducks and geese come to see him.

"You look so ugly," they said, laughing at him.

(duckling) The ugly duckling escaped from the great swamp.

(duckling) AC: And this is how he ended the story: (audio) Owen: He wasn't an ugly duckling at all.

Over the winter he grew into a beautiful white swan.

The other swans saw him and thought how beautiful he was.

"Come with me," they said.

And he did.

(Birds chirping) Well, Tiara, I hope you enjoy reading this story as much as I enjoyed reading it.

I can't wait to be with you again and hold you in my arms.

I love you, your dad, Owen.

With so much love, I miss you with all my heart.

Goodbye now, my love. bye bye.

(music) (music ends) AC: He cried when he heard the recording in his cell before sending it to his daughter.

And this is a very common reaction among prisoners, and for the first time they realize they can do something for their child that they never thought they could do.

They are connected in the most fundamental way through the medium of storytelling.

And Sophie wants "The Gruffalo" next time.

(laughter) (applause)

"These are times when the human soul is put to the test," said Thomas Payne.

And they're testing us now.

This is a fateful moment in Western history.

We have seen divisive elections and social divisions.

We have witnessed a rise in extremism in politics and religion, all fueled by anxiety, uncertainty and fear about a world that is changing faster than we can bear it, and the sure knowledge that it will change even faster.

I have a friend in Washington.

I asked him what it was like to be in America during the recent presidential election.

he said to me "It's like a guy sitting on the deck of the Titanic with a glass of whiskey in his hand saying, 'I know you asked for ice—(laughter) but that's ridiculous.'" So what can each of us do to face the future without fear?

I think there is.

And perhaps one way to understand that culture or era is to understand that asking, "What do people worship?"

People have worshiped the sun, stars, storms, and many other things.

Some worship many gods, some worship one god, and some do not worship at all.

In the 19th and 20th centuries, people worshiped the nation, the Aryan race, and the communist state.

what do we worship?

Future anthropologists will consider the books we read about self-development, self-actualization, and self-esteem.

They will see how we talk about morality as being true to ourselves, how we talk about politics as a matter of individual rights, and this wonderful new religious ritual that we have created.

do you know that

The so-called "selfie".

And I think they come to the conclusion that in our time it is Self, I, I that we worship.

And this is great.

it is liberating. It is empowering. That's excellent.

But remember, biologically, we are social animals.

We have spent most of our evolutionary history in small groups.

We need face-to-face interactions that learn the choreography of altruism and produce spiritual things like friendship, trust, loyalty and love that compensate for loneliness.

With too much “I” and too little “we”, we can find ourselves vulnerable, fearful and lonely.

It's no coincidence that MIT's Sherry Turkle called the book she wrote about the impact of social media "Alone Together."

So I think the easiest way to protect the future "you" is to strengthen the future "we" in three dimensions. Our relationship, our identity, our responsibility.

Let's think about relationships first.

Please forgive me if I'm getting too personal here.

Once upon a time, a long time ago, I was a 20-year-old college student studying philosophy.

I was obsessed with Nietzsche, Schopenhauer, Sartre and Camus.

I was filled with ontological uncertainty and existential anxiety.

It was the best.

(Laughter.) I was so self-obsessed and just knowing that was so uncomfortable, but one day across the courtyard I found all the girls who weren't me.

She was shining in the sun.

She exuded joy.

I found out her name was Elaine.

we met We talked.

we got married

And 47 years later, with 3 kids and 8 grandchildren, I can honestly say it was the best decision of my life. Because it's people who are different from us that make us grow.

That's why I think we have to do it.

Google filters, Facebook friends, the problem of reading news on a narrowcast instead of broadcast means that we are surrounded almost entirely by people just like us, with the same opinions, opinions and even prejudices.

And Harvard University's Cass Sunstein showed that when you're surrounded by like-minded people, you become more extreme.

I think we need to renew face-to-face encounters with people who are not like us.

I think it is necessary to understand that it is possible to remain friends despite strong disagreements.

Through these direct encounters, we come to realize that even those who do not look like us are just human beings just like ourselves.

And indeed, every time we extend a hand of friendship to someone who is not like us, of a different class, creed, or color, we heal one of the wounds in the world.

That is our relationship.

The second is our identity.

Let's do a thought experiment.

Have you been to Washington? Have you ever seen a memorial?

Really charming.

The Lincoln Memorial and Gettysburg Address on one side and the Second Inaugural Memorial on the other.

You go to the Jefferson Memorial, the text screed.

Martin Luther King Memorial, a dozen quotes from his speeches.

I didn't know they read obituaries in America.

Now, if you go to the equivalent in London's Parliament Square, you'll find that the monument to David Lloyd George contains the three words "David Lloyd George."

(Laughter) Nelson Mandela got two points.

Churchill can only get one. Churchill.

(Laughter.) Why the difference? I will tell you the reason for the difference.

America has always been a land of immigrants, and we needed to establish our identity by telling the stories we learned in school, read at monuments, and heard over and over again in presidential inaugural addresses.

Britain wasn't a country of immigrants until recently, so you might have taken identity for granted.

The problem is that two things happened that shouldn't have happened at the same time.

First of all, the West, even America, has stopped telling the story of who and why we are.

And at the same time, immigration is increasing like never before.

So when you tell stories and your identity is strong, you can welcome strangers, but when you stop telling stories, your identity becomes weaker and you feel threatened by strangers.

And that's bad.

I tell you, the Jews have been dispersed and exiled for two thousand years.

We never lost our identity.

why? For at least once a year, at Passover, we told our stories, taught them to our children, ate the unleavened bread of affliction, and tasted the bitter herbs of slavery.

So we never lost our identity.

As a collective, I think we have to get back to telling our stories of who we are, where we come from, and what ideals we live by.

And when that happens, we will be strong enough to welcome strangers and say, "Come and share our lives, share our stories, share our aspirations and dreams."

That's who we are in identity.

And finally, our responsibility.

do you know anything?

My favorite phrase in politics in general is a very American phrase. "We are the people".

Why "We the People"?

Because it says we all share collective responsibility for our collective future.

And that's how things really are and how they should be.

Have you noticed how magical thinking is taking over our politics?

So we say all you have to do is elect this strong leader and he or she will solve all the problems for us.

Believe me, it's a magical thought.

And then there are the extreme right, the extreme left, the extreme religious and the extreme anti-religious, the extreme right dreaming of a golden age never seen before, the extreme left dreaming of a utopia that will never come true, and those religious and anti-religious alike who are convinced that only God or the absence of God can save us from ourselves.

That's also the idea of ​​magic. Because the only one who can save us from ourselves is our people, all of us.

And as we do, and as we move from our politics to the politics of all of us together, we rediscover these beautiful, counterintuitive truths. In other words, a nation is strong when it cares for the weak, rich when it cares for the poor, and invincible when it cares for the weak.

That's what makes a great nation.

(Applause) So here's my simple suggestion.

It might just change your life, or it might help change the world.

Perform a search-and-replace operation on the text in your mind, and when you come across the word “me,” replace it with the word “other.”

Therefore, it is not self-help but other-help. Respect for others, not self-respect.

Then you will begin to feel the power of this text, which for me is one of the most moving in all religious literature.

"Though I walk through the valley of the shadow of death, I fear no evil, for you are with me."

We can face any future fearlessly if we know we are not alone.

Let's strengthen the future "us" together for the sake of the future "you".

thank you.

(applause)

That's why I love making tools and sharing them with people.

I remember when I was a kid, the first tool I built was actually a microscope I made by stealing lenses from my brother's glasses.

He wasn't all that excited.

But maybe it's because of that moment that I'm still making microscopes 30 years later.

Moments like this are the reason I built these tools.

(Video) Girl: I have black stuff in my hair -- Manu Prakash: This is a school in the Bay Area.

(Video) MP: The living world far exceeds our imagination of how things actually work.

(Video) Boy: Whoa!

MP: Yes -- what!

I had no idea that this would become such a universal term.

Over the past two years, my lab has built 50,000 Foldscopes and shipped them to children, free of charge, in 130 countries around the world.

This year alone, with the help of our community, we plan to ship 1 million microscopes to children around the world.

what does it do?

From Kenya to Kampala to Kathmandu to Kansas, people from all over the world form inspiring communities to learn and teach.

One of the amazing things I love about this piece is the sense of community.

There is a child in Nicaragua teaching others how to identify dengue-carrying mosquitoes by looking at larvae under a microscope.

There are pharmacologists who have come up with new ways to detect placebo everywhere.

There is a girl who wondered, "What is Kirakira really like?"

And discovered the physics of glitter crystal formation.

There is an Argentinian doctor who is going to use this tool for field cervical cancer screening.

And you really found a kind of flea dug into the heel of my foot a centimeter deep.

Now, you might think these are anomalies.

But there is a way out of this madness.

I call this "thrifty science". The idea is to share scientific experience, not just information.

Remember, there are 1 billion people on this planet who live without roads, electricity, and therefore health care, without any infrastructure at all.

There are also 1 billion children living in poverty on this planet.

How can we inspire them to become the next generation of solution makers?

We have healthcare workers who fight infections and protect us with minimal tools and resources.

So, as a lab at Stanford University, I see this in the context of frugal science and building solutions for these communities.

We often think that diagnostics can be done off-grid under trees.

Today I'm going to show you two examples of the new tools.

One of them starts from Uganda.

In 2013, I made a small observation while on a field trip to detect schistosomiasis using a foldscope.

I saw a centrifuge being used as a door stopper in a clinic far away.

So literally, a door stopper.

So I asked them, and they said, "Oh, actually, we don't have electricity, so this junk can be used as a door stopper."

For those of you who don't know, the centrifuge is the ultimate tool for sample processing.

Separate components of blood or bodily fluids so that pathogens can be detected and identified.

However, centrifuges are bulky, expensive (about $1,000), and very difficult to perform in the field.

And of course, without power it will not work.

Sound familiar?

So we started thinking about solving this problem and I came back - kept thinking about toys.

now ...

I have a few here.

I started with a yo-yo, but...

And I'm not very good at throwing yo-yos.

Since these objects rotate, I wondered if I could actually use the physics of these objects to build a centrifuge.

This was probably my worst throw ever.

But once you start exploring the world of toys, you might start to notice. We tried spinning tops and then encountered this wonder in the lab.

Pinwheel, Buzzer, and Randle.

It has several strings and a small disk that rotates when pressed.

How many of you played with this as a kid?

This is called a button on a string.

Well, probably 50% of you.

What you didn't realize is that this little object is the oldest toy in human history...

5000 years ago.

We have found the remains of this object hidden on Earth.

Ironically, we don't really understand how this little thing works.

That's when I get excited.

So we went back to work and wrote down some equations.

Given the applied input torque, the resistance of this disc, and the torsional resistance of these strings, we should be able to solve this mathematically.

This is not the only equation in my talk.

Read the mathematics on page 10 and you can actually write down the complete analytical solution for this dynamic system.

And then comes what we call "Paperfuge".

That's my postdoctoral fellow, Saad Bumra, co-inventor of Paperfuge.

And on the left you will see all the centrifuges you are about to replace.

This little object you see here is a disk, some strings and a handle.

And when you rotate it or press it, it will start spinning.

Now, do the math, if you calculate the rpm of this object, you should be able to reach 1 million rpm mathematically.

Well, the human anatomy has a little twist. Because the resonant frequency of this object is about 10 hertz, and if you've ever played a piano, you can't go higher than a few hertz.

The maximum speed achieved with this object is neither 10,000 nor 50,000 rpm, but 120,000 rpm.

This corresponds to a G-force of 30,000.

You would think what kind of force you would experience if I were to pin you here and rotate it.

One of the elements of such a tool is that it is diagnostic.

So here's a quick demo. Here is the moment when you prick your little finger and a tiny drop of blood comes out.

If you don't like blood, you don't have to watch it.

Here is a small lancet.

These lancets are available everywhere and are completely passive.

And when I was eating breakfast today...

It didn't hurt at all.

OK, I'll take a small capillary with a drop of blood in it. This drop of blood has the answer. That's why I'm interested in it.

It might actually tell me if I have malaria right now.

Take the capillary out a bit and you will see it start to penetrate.

I'll take some more blood.

And that's enough for now.

Put this capillary tube into the clay and seal it.

The sample is now sealed.

Get the sample and mount it on Paperfuge.

A small piece of tape to create a sealed cavity.

The sample is now completely sealed.

And you are ready to spin.

You are pushing and pulling this object.

I'm going to load this...

And you will see the object start rotating.

Unlike ordinary centrifuges, it is a counter-rotating centrifuge.

It goes back and forth, comes and goes...

And now I'm charging it up and I can see it gaining momentum.

And now, I don't know if you can hear it, but if you do this for 30 seconds, you should be able to separate all the blood cells and the plasma.

And those blood cell to plasma ratios -- (applause) Already, if you look here, and focus here, you should be able to see the volumes the blood and plasma have separated.

And that ratio tells me if I might be anemic.

One aspect of that is building different kinds of Paperfuge.

With this, you can run it a bit longer to identify the malaria parasites, and you can identify the malaria parasites that are present in the blood, and you can separate them with something like a centrifuge and detect them.

Another version of this allows nucleic acids to be isolated for on-site nucleic acid testing.

Here's another version that can isolate bulk samples, and finally a new version that we're working on to be able to implement full multiplex testing for such objects.

In other words, sample preparation and chemical reaction are done in the same object.

now ...

That's fine, but when you start thinking about this, you should share these tools with people.

One of the things we did was we just got back from Madagascar. This is what a malaria clinical trial looks like -- (Laughter) you can do it over a cup of coffee.

But most importantly, this is a village six hours from any road.

We are in a room with one of the elderly people in the area and a medical worker.

It's the job part that really excites me the most. It's a smile that allows us to share a simple but powerful tool with the world.

Now, I forgot to mention that it cost me 20 cents to make all of this.

Now that we have more time left, let's talk about the latest invention in our lab. (smile)

It's called "Abuzz". The idea is that all of you can help us fight mosquitoes. Please help us track down the enemy.

They are enemies because they cause malaria, Zika, chikungunya and dengue.

But the problem is that you don't really know where your enemies are.

There is no world map showing where mosquitoes are.

So we started thinking about this.

There are 3,500 species of mosquitoes and they are all very similar.

Some of them are so identical that even entomologists cannot distinguish them under a microscope.

But they have an Achilles heel.

This is how mosquitoes flirt.

A male chasing a female.

They are actually talking to each other on the flapping frequency.

(Buzz) So they have a signature.

I found myself using a regular phone, a $5-$10 flip phone. How many of us remember what this object is?

(Laughter) We can record these acoustic signatures from mosquitoes.

I will explain how to do this in detail.

I caught a mosquito outside.

Unlike Bill [Gates], I'm not going to let them go.

(Laughter) But here's how to record.

Just tap to fly.

Test it first -- you can actually hear it.

And when I took a cell phone with a mic, I found that the mic was already so good that even a regular phone could pick up this close range signal.

I'm running out of time, so let me play the recording I made a day ago.

(Mosquito buzzing) This is a fascinating sound you have heard before.

One of the reasons for this is that you can do this with a regular mobile phone, so you can map mosquito species.

We used Garake to map one of the largest acoustic databases containing 25–20 species of mosquitoes carrying human pathogens.

And from this data and machine learning, anyone who uploads this data can identify and know the odds of what kind of mosquito they are actually dealing with.

We call it Abuzz. For those who want to sign up, please visit the website.

Finally, let me talk about something very important and dear to me.

One of today's challenges is that we have a terrible problem.

We have endless populations without access to healthcare, climate change, or biodiversity loss.

And we expect science to provide answers.

But before I leave the theater today, I want you to promise me one thing.

We will make science accessible not only to those who can afford it, but also to the other billion who cannot.

Make science and scientific literacy a human right.

The moment you share that tingling sensation of discovery with another child, that child becomes the next group to actually solve the problem.

thank you.

(applause)

I am a journalist and an immigrant.

And these two conditions define me.

I was born in Mexico, but spent more than half my life reporting in the United States, a country built by immigrants.

As a reporter and a foreigner, I have learned that neutrality, silence and fear are not the best options, neither in journalism nor in life.

Neutrality is often an excuse for us journalists to hide our real responsibility.

What is that responsibility?

It is about questioning and challenging those in power.

That's what journalism is for.

That's the beauty of journalism. It is about questioning and challenging those in power.

Of course, we have a duty to report reality as it is, not as we wish it to be.

In that sense, I agree with the principle of objectivity. So if the house is blue, we say it's blue.

If there are 1 million unemployed, say 1 million.

But neutrality does not always lead to truth.

Even if I were unambiguously methodical and presented both sides of the news item—Democrats and Republicans, liberals and conservatives, government and opposition—in the end, there is no guarantee, nor any of us, that we will know what is true and what is not.

Life is more complicated, and I believe journalism should reflect just that complexity.

To be clear, I refuse to be a tape recorder.

I didn't become a journalist to become a tape recorder.

I know what you mean. "No one uses tape recorders anymore," he said.

(Laughs) In that case, I take out my phone, press the record button, and refuse to point it in front of me, as if I were at a concert, like a fan of a concert.

That's not true journalism.

Contrary to what many people think, journalists are constantly making value judgments, ethical and moral judgments.

And we are always making very personal and very subjective decisions.

Example: What if you were invited to cover a dictatorial regime like Augusto Pinochet in Chile or Fidel Castro in Cuba?

Are you only going to report what your generals and commanders want, or are you going to confront them?

What if in your country or the country next door, students disappeared, hidden graves turned up, millions of dollars disappeared from the budget, and former presidents were now magically millionaires?

Could you please report only the official version?

Or what if you were assigned to cover the presidential election of a First Power country and one of the candidates made a racist, sexist or xenophobic comment?

that happened to me.

And I want to tell you what I did, but before I do, let me explain where I came from so that my reaction can be understood.

I grew up in Mexico City, the eldest of five children, and my family couldn't afford all of my college tuition.

So I studied in the morning and worked in the afternoon.

Finally, I got the job I always wanted: a TV reporter.

It was a big chance.

But when I was working on the third story, I ended up criticizing the president and questioning the lack of democracy in Mexico.

In Mexico, elections were constantly rigged from 1929 to 2000. The incumbent president will choose his successor himself.

It's not a true democracy.

To me, exposing the president seemed like a great idea, but to my boss -- (Laughter) my boss didn't think it was such a great idea.

At the time, the Los Pinos presidential office was directly censoring the media.

In addition to being in charge of the show I worked for, my boss was also in charge of the soccer team.

I always thought he was more interested in goals than news.

He censored my report.

He asked me to change the content and I said no. So he put another journalist on this article and wrote what I had to say.

I didn't want to be a censored journalist.

I don't know where I got my strength from, but I wrote a letter of resignation.

And when I was 24, still 24, I made the hardest, most transcendent decision of my life.

Not only did I quit the TV show, but I had also decided to leave the country.

I sold my car, my battered little red Volkswagen, raised money to say goodbye to family, friends, streets, my favorite hangout, tacos lol, and bought a one-way ticket to Los Angeles, California.

I am now one of the 250 million immigrants in the world.

Ask immigrants about their first day in a new country and you will find that they remember everything perfectly, like a movie with background music.

In my case, when I arrived in Los Angeles, the sun was setting, but I was able to carry everything I had: a guitar, a suitcase, some documents, etc., with both hands.

I haven't experienced that feeling of total freedom since.

And I survived on what little I had.

I got my student visa. I was studying

I ate a lot because I only had lettuce and bread.

Finally, in 1984, I got my first job as a TV reporter in the United States.

And the first thing I noticed was that in the United States, my colleagues were brutally criticizing then-President Ronald Reagan, but absolutely nothing happened. No one censored.

And I thought: I love this country.

(Laughter) (Applause) And it's been that way for over 30 years. I have complete press freedom and have been treated equally despite being an immigrant. Until, out of the blue, I was tasked with covering the recent US presidential election.

On June 16, 2015, the future presidential candidate of the United States said Mexican immigrants were criminals, drug traffickers and rapists.

And I knew he was lying.

I knew he was wrong. The reason is very simple. That means I'm a Mexican immigrant.

And we are not.

So I did what any other reporter would do. I wrote him a handwritten letter requesting an interview and sent it to his tower in New York.

The next day, when I was at work, I suddenly started getting hundreds of calls and text messages on my cell phone. Some of them were more offensive than others.

I didn't know what was going on until a friend came to my office and said, "Your mobile number has been posted online."

they actually did it.

Here is the letter they sent to where I gave my number.

Is it okay if I don't write it down? I have already changed.

(Laughter) But I learned two things.

First, never, never give your cell phone number to Donald Trump.

(Laughter) (Applause) The second lesson was that at that point you have to stop being neutral.

Since then, my mission as a journalist has changed.

I confronted the candidate and showed him that he was wrong and that what he said about US immigration was not true.

Let's give some numbers.

Ninety-seven percent of illegal immigrants in the United States are good people.

Fewer than 3 percent have committed a serious crime, or what we call a “felony” in English.

In comparison, 6 percent of Americans have committed a serious crime.

The bottom line is that illegal immigrants are much better behaved than American citizens.

I made a plan based on that data.

Eight weeks after they released my cell phone number, I got a press conference pass for the candidate who is gaining momentum in the polls.

I decided to go head-to-head with him.

but ...

Things didn't go as I had planned. Watch: [Donald Trump Press Conference, Dubuque, Iowa] (Video) Jorge Ramos: Mr. Trump, I have a question about immigration.

Donald Trump: Who's Next? Yes, please.

DT: Sorry, I wasn't called. sit down. sit down!

JR: I am a reporter. As an immigrant and US citizen, I have the right to ask questions.

DT: No, it's not. JR: I have the right to ask -- DT: I'm going back to Univision.

JR: Here's the question: You can't deport 11 million people.

You can't build a 1900 mile wall.

Children cannot be denied citizenship in this country.

DT: Please sit down. JR: So with those ideas -- DT: You weren't called.

JR: I'm a reporter, don't touch me.

Guard 1: Please don't disturb me. you are disturbing

JR: I have the right to ask questions. G1: Yes, in order. In turn, sir.

Guard 2: Do you have a press license?

JR: I have that right -- G2: Where? JR: Over there.

Man: Whoever comes out, don't come out.

G2: Just wait your turn.

Man: You are very rude. it's not about you.

JR: It's not about you -- Man: Get out of my country!

Man: It's not about you.

Man: Well...anything. No, Univision. it's not about you.

JR: It's not about you. It's about the United States.

(Applause) (End of applause) Whenever I see that video, my first thought is always that hate is contagious.

As you may have noticed, after the Candidate says, "Go back to Univision," this is cipher. What he says to me is, "Get out of here."

One of his aides, not knowing that I was an American citizen, told me to "get out of the country" as if I had permission.

After watching this video over and over again, I also believe that in order to break free from neutrality, and for it to be a real breakthrough, you have to learn how to let go of fear and say, "No, I'm not going to be quiet."

I'm not going to sit

And I'm not going to leave ”

The Word "No" -- (Applause) "No" is the most powerful word in any language and always precedes significant changes in our lives.

And I think there's a lot of dignity and a lot of respect in being able to step back and push back and say 'no'.

Elie Wiesel, Holocaust survivor, Nobel Peace Prize laureate, and sadly just recently passed away to us, said some very wise words. "We have to take sides.

Neutrality only helps the oppressor, never the victim. ”

and he is completely right.

We journalists have a duty to take sides in certain situations. In cases of racism, discrimination, corruption, lying to the public, dictatorships and human rights, we need to set aside neutrality and indifference.

Spanish has a great word for the attitude a journalist should take.

The word is "contrapoda".

Essentially, we journalists should stand on the opposite side of those in power.

But if you sleep with a politician, go to the governor's son's christening or wedding, or want to be the president's friend, how are you going to criticize a politician?

Whenever I am tasked with interviewing a powerful or influential person, I have two things in mind. If I didn't ask this difficult and uncomfortable question, no one else would. And never see this person again.

So I don't want to make a good impression or build a connection.

After all, if I had to choose between being a friend or foe of the president, I would always choose to be the foe.

Finally: I know it's a difficult time both as an immigrant and as a journalist, but now more than ever we need journalists who are ready to put their neutrality aside at any moment.

Personally, I feel like I've spent my life preparing for this moment.

When I was censored when I was 24, I learned that neutrality, fear and silence are often accomplices to crime, abuse and injustice.

And being an accomplice to power is never good journalism.

Now, at 59, I can only hope that I have some of the courage and mental clarity that I had at 24, and never stay silent again.

thank you very much.

(Applause.) Thank you.

(applause)

All right, let's upload a picture of the Earth.

The earth is really amazing.

I'm a geologist, so I'm pretty excited about this, but the Earth is wonderful.

It's powerful, dynamic, and ever-changing.

It's a pretty exciting place to live.

But today, I would like to share with you my perspective as a geologist on how understanding the Earth's past can help inform and guide the decisions we make today about how to live sustainably on the surface of our planet.

In this way, many interesting things are happening on the surface of the earth.

I'd like to zoom in a little here and talk a little bit about one of the things that's going on.

Material is constantly moving around the surface, and one of the big things that happens there is that material from high mountains is eroded, transported, and deposited in the ocean.

And this process is always going on and has a huge impact on how the landscape works.

An example of this is here in South India. India has some of the highest mountains in the world. In this satellite image, rivers can be seen carrying material from those mountains to the ocean.

You can think of these rivers like bulldozers.

They're basically trying to take these mountains and push them down towards the sea.

Here is an example.

So let's zoom in a little.

I would especially like to talk about rivers.

We can see the beautiful patterns that rivers make when they wash matter into the ocean, but these patterns are not static.

These rivers are violently swaying and hopping and can have a huge impact on our lives.

One example is the Kosi River.

The Koshi River has a wonderful C-shaped path, which emerges from the great mountains of Nepal and carries a large amount of material, a large amount of sediment, which is eroding from the high mountains, and spreads across India, carrying this material.

So let's zoom in on this area and talk a little bit about what happened in Kosi.

This is an example of how dynamic these systems can be.

This is a satellite image from August 2008. This satellite image is colored so that vegetation and plants appear green and water appears blue.

Again, you can see the C-shaped path that this river follows as it exits Nepal.

And now it's monsoon season.

August is monsoon season in this part of the world, and anyone living near a river is at least not immune to flooding and the associated dangers and inconveniences.

But in 2008, something interesting happened and the river behaved very differently.

The flood occurred in a very unusual way.

The Kosi River flows through here, but from time to time these rivers carry sediment with them, causing some sort of blockage, and these blockages can actually change the course of the river dramatically.

So this satellite image is only two weeks old.

This is the previous path, the C-shaped path. You can see that it is no longer blue.

But what we have now is this blue passage that cuts through the middle of our vision.

What happened was that the Kosi River jumped over the embankment. For reference, the scale bar here is 40 miles.

This river has moved over 30 miles very suddenly.

So this river clogged up and jumped over the bank.

Here is an image after about a week. You can see that these are the previous trails. You can see this jumping process continuing as the river recedes from the main stream.

So you can imagine that in a landscape like this where rivers move frequently, understanding when, where and how they jump is very important.

However, such processes are also taking place in familiar places.

In other words, the United States has the Mississippi River, which drains most of the continental United States.

It pushes matter out of the Rocky Mountains and Great Plains.

Drain it, move it across America, and dispose of it in the Gulf of Mexico.

This is the course of the Mississippi River as we know it today, but it did not always flow in this direction.

With the geological record, we can reconstruct where things were in the past.

For example, this red area is where the Mississippi River is known to have flowed and deposited material about 4,600 years ago.

Then, about 3,500 years ago, we moved along the course shown here in orange.

And it kept moving, and it kept moving.

This is about 2,000 years ago, 1,000 years ago, 700 years ago.

And it was only as recently as 500 years ago that it occupied the roads we know so well today.

These processes are therefore of great importance, especially here, in this delta region, where the Mississippi river-dive event builds land at the land-sea interface.

This is truly valuable real estate, and deltas like this are some of the most densely populated areas on the planet.

Understanding the dynamics of these landscapes, how they formed and how they will continue to change in the future is therefore of great importance to the people living there.

Therefore, the river also shakes.

These are bigger leaps like the ones we've been talking about.

I would like to introduce some of the movement of the river here.

So we dive into the Amazon basin. There is also a large river system here that drains, moves, tills, and carries material across South America and dumps it into the Atlantic Ocean.

If you zoom in here you can see a nice winding river path.

Again, they're really beautiful, but again, they're not static.

These rivers meander and sway.

Using satellite imagery from the last 30 years or so, we can really monitor how these change.

So take a moment and observe the bends and curves of this river. Then you will find that the river does not stay in the same place for long.

It changes, evolves and distorts its patterns.

Looking at this area in particular, I want you to notice that there is something like a completely blocked loop in the river.

It sounds like a cracking whip, and at some point it breaks off from the current of the river.

For reference, again, at this location, the river changed course for 4 miles in one to two seasons.

In other words, the landscape on the earth where we live is constantly shaking as this material is eroded from the mountains and transported to the sea.

They are constantly changing and we need to be able to understand these processes so that we can manage these landscapes and live sustainably.

But that's hard to do when the only information we have is what's happening on the surface today.

right? Not many observations.

For example, we only have 30 years of satellite imagery.

Further observations are needed to further understand these processes.

In addition, we need to know how these landscapes respond to climate change and land-use changes as we continue to occupy and modify the Earth's surface.

That's where stone comes in.

So when rivers flow, sand, clay and rock debris can get caught on the ground as materials are bulldozed from the mountains to the sea.

And stuff that gets stuck in the ground gets buried, and over time, it accumulates large, thick sediments that eventually turn into rocks.

What this means is that you can go to places like this with large, thick sedimentary rock stacks and go back in time to see what the landscape looked like in the past.

By doing this, we can reconstruct and understand how the Earth's landscape evolves.

This is also very useful, as the Earth has some kind of epic history. right?

This video is a paleogeographic reconstruction of only the first 600 million years of Earth's history.

Now, please give me a little time here.

You can see that as the plates moved, the climate changed and the sea level changed. Also, there are many different types of landscapes and different types of environments that you can return to. If you have a time machine, you can go back and look. We actually have a time machine because we can see the rocks deposited during these times.

So with this example, I would like to take you to a particular time in Earth's past.

About 55 million years ago, a truly sudden warming event occurred, releasing large amounts of carbon dioxide into the Earth's atmosphere, causing rapid and fairly extreme global warming events.

And when I say warm, I mean pretty warm, and there were things like alligators and palm trees all the way up to Canada in the north and Patagonia in the south.

So even though this was a pretty warm period, it happened really suddenly.

What we can do, therefore, is to trace back the rocks that were deposited at that time and reconstruct how the landforms changed in response to this warming event.

Come on, it's a rock.

(Laughter) There's a pile of stones here.

The yellow blobs here, this is actually a river of fossils, and these are sediments deposited 55 million years ago, exactly like this cartoon I showed you.

As geologists, we can observe these up close and reconstruct the landscape.

Here's another example.

The yellow blobs here are rivers of fossils.

There is one more thing on top of that.

We can go and explore, we can make measurements and observations, we can measure features.

For example, the features I highlighted there indicate that this particular river is probably about 3 feet deep.

About 55 million years ago, you could have waded across this pretty stream.

The reddish stuff above and below these channels is ancient soil deposits.

We can therefore observe them to understand what was inhabiting and growing on the terrain, and to understand how these rivers interacted with the floodplains.

So how these rivers flowed and what the landscape looked like can be examined in detail and reconstructed with some degree of concreteness.

So when you do this in this particular place at this time of year, looking at what happened before this rapid warming event, the river looked like it was carving a path from the mountains to the sea, perhaps similar to what I have shown in the Amazon basin.

But rivers will change dramatically as soon as this climate change event begins.

Suddenly they became much wider and began to glide back and forth over the landscape more easily.

Eventually the river returned to a state similar to what it was before this climate change happened, but it took a long, long time.

We can therefore go back in time to make such reconstructions and understand how the Earth's landscape has changed in response to such climate change and land-use events.

So part of the way rivers change, and why their patterns and movements change, is because hotter climates bring extra water to the surface, moving more sediment and eroding more sediment, which changes the behavior of rivers, among other things.

Ultimately, therefore, as long as the surface of the earth is our home, we must carefully manage the resources and risks involved in living in a dynamic environment.

And I think the only way we can do that in a truly sustainable way is by including information about how landscapes evolved and behaved in the Earth's past.

thank you.

(applause)

Well, a few years ago, I heard an interesting rumor.

Apparently, the president of a major pet food company attends the annual shareholder meeting with a can of dog food.

And he was eating a can of dog food.

And this was his way of convincing them that if it was good enough for them, it was good enough for their pets.

This strategy is now known as "dogfooding" and is a common strategy in the business world.

Not everyone goes for dog food, but businessmen will use their products to show what they feel - that they have confidence in the product.

This is now widely practiced, but I think what's really interesting is when you find exceptions to this rule, the cases of companies and business people who aren't using their products.

In fact, there's one industry where this happens quite regularly and that's the screen-based technology industry.

So when it released the iPad in 2010, Steve Jobs described it as an "extraordinary" device.

"Best browsing experience ever. Much better than a laptop, much better than a smartphone.

It's an unbelievable experience. ”

A few months later, he got a call from a New York Times reporter and made a long phone call.

At the end of the call, the journalist posed a kind of softball question.

He told him, "Your kids will love the iPad."

There's an obvious answer to this, but Jobs' statement really took journalists by surprise.

He was very surprised, because "they had never used it."

We limit the amount of technology our children use at home. ”

This is very common in the tech world.

In fact, right in Silicon Valley, there's a school called Peninsula Waldorf School, where they don't introduce screens until eighth grade.

What's really interesting about this school is that 75% of the kids who go there have parents who are high-level Silicon Valley tech executives.

So when I heard about this, I thought it was funny and amazing, and I thought, let's think about how the screen is affecting me, my family, the people I love, and the general public.

So for the past five years, as a professor of business and psychology, I've been studying the impact of screens on our lives.

First, I want to talk about what that time is like, focusing on how much time they are taking away from us.

Shown here are the average 24-hour working hours at three different historical points in time. 2007, 10 years ago, 2015, and indeed my data collection was just last week.

And many things haven't changed that much.

We sleep about seven and a half to eight hours a day. Some say it's gone down a bit, but it hasn't changed much.

We work eight and a half to nine hours a day.

We spend about 3 hours a day doing survival activities such as eating, bathing and caring for children.

Then this blank space remains.

It's our personal time.

That space is very important to us.

It is the space in which we carry out our activities to become individuals.

It's a place where hobbies are born, where intimate relationships are born, where people get serious about their lives, get creative, and go back in time to see if their lives have been meaningful.

We get some of that from our work, too, but when people look back on their lives and think about what their lives were like at the end of their lives, notice the last words they say. They are talking about a moment that happened in that white personal space.

Therefore it is sacred. it's important to us.

Now what I'm trying to do is show how much of that space is taken up by the screen over time.

That's about it for 2007.

That was the year Apple introduced the first iPhone.

After 8 years, that's it.

Well, that's it.

It's the amount of time we spend our free time in front of our screens.

This yellow area, this lighter part, is where the magic happens.

That's where your humanity lives.

And now it's in a very small box.

So what do we do about this?

Now the first question is what does that red space look like?

Of course, screens are miraculous in many ways.

I live in New York, most of my family live in Australia, and I have a 1 year old son.

The way I was able to introduce them to him is through a screen.

You couldn't do it in exactly the same way 15 or 20 years ago.

So there is a lot to be gained from them.

One thing you can do is ask yourself, "What's going on in the meantime?"

How good are the apps we use?

And some get rich.

If you stop someone using an app and say, "Tell me how you're feeling," they'll tell you that they feel pretty good about these apps—those focused on relaxation, exercise, weather, reading, education, and health.

They spend an average of 9 minutes a day on each of these.

These apps greatly reduce their happiness.

About half of the people interrupted and said, "What do you think?"

They say they don't feel good about using them.

Interestingly, people spend 27 minutes a day on each of these: dating, social networking, gaming, entertainment, news, web browsing.

We spend 3x the time on apps that don't satisfy us.

That doesn't seem very wise.

One of the reasons we spend so much time on these apps and make us unhappy is that they take away our cue to stop.

In the 20th century, stop signs were everywhere.

They were built into everything we did.

A stop signal is basically a signal that it's time to move on, do something new, do something different.

And think about newspapers. When you eventually get to the end, fold the newspaper and put it aside.

The same is true for magazines and books. When you reach the end of the chapter, you are asked to consider whether you would like to continue.

When you are watching a program on TV, eventually the program ends and you have a week before the next program starts.

There were signals to stop everywhere.

But the way we consume media today is such that there is no stopping it.

Twitter, Facebook, Instagram, email, text messaging, news, endless news feeds, it's all bottomless.

And you can go on and on when checking all sorts of other sources.

So we can get a hint of what to do from Western Europe. Western Europe seems to have a lot of very good ideas at work.

Here is an example. Dutch design company.

And what they did is put the desk up to the ceiling.

And at 6pm every day, no matter who I'm texting or what I'm doing, my desk goes up to the ceiling.

(Laughter) (Applause) This space turns into a yoga studio four days a week and a dance club one day a week.

Which one you stick with is really up to you.

But this is a nice stopping rule. Because this would mean that, in the end, everything would stop and there would be no way to work.

German automaker Daimler has another brilliant strategy.

When you go on vacation, instead of saying, "This person is on vacation and I will contact you," say, "This person is on vacation and I deleted your email.

This person will never see the emails you send. ”

(Laughter) "You can reply to the email in a few weeks, or you can email someone else."

(Laughter) So -- (Applause) You can imagine what it's like.

You go on vacation, and you are actually on vacation.

The people who work for this company actually feel that their work is on hiatus.

But of course, that doesn't tell us much about what we should do in our own lives at home. So I would like to make some suggestions.

It's easy to say no phone between 5 and 6pm.

The problem is that 5pm and 6pm look different on different days.

I think a better strategy is to have a specific opportunity every day to do a specific thing, have dinner, etc.

Sometimes alone, sometimes with others, sometimes in a restaurant, sometimes at home, the rule I have adopted is to never use a mobile phone at the table.

Far away, as far away as possible.

Because we are really bad at resisting temptation.

But all the temptations can be avoided with a stop cue by your phone moving away every time dinner starts.

It hurts at first.

I had terrible FOMO.

(laughs) I had a hard time.

But what happens is that you get used to it.

Overcoming withdrawal symptoms in the same way you quit drugs can make your life more colorful, richer, more interesting, and better conversational.

You really connect with the people you are with.

I think this is a great strategy and I know it works. Because when people do this, and I've tracked down a lot of people who have tried this, it expands.

They find it very comfortable and only start doing it for the first hour in the morning.

They start putting their phones in airplane mode on weekends.

That way your phone is still a camera, but it's no longer a phone.

This is a very powerful idea, and we know that people feel much better about their lives when they put it into practice.

So what's the takeaway here?

The screen is a miracle. I said it before and I think it's true.

But the way we use them is a lot like driving down a long road at very high speed, and you're in a car that's hard to reach the brake pedal with the accelerator pressed to the floor.

you have a choice.

For example, you can take snaps from your window across beautiful seascapes. It's a simple matter. Or take the trouble to pull over to the side of the road, step on the brake pedal, get out of the car, take off your shoes and socks, take a few steps in the sand, feel the sand under your feet, walk to the sea, feel the sea on your ankles.

Now that you've soaked up the experience and left your phone in the car, your life will be richer and more meaningful.

thank you.

(applause)

I'm a climatologist and I hate the weather.

I've spent so much time in California that I feel strongly that the weather should be an option.

(Laughter) So I don't want to experience clouds, much less study them.

But the clouds seem to follow me wherever I go.

The problem is that clouds are a big challenge for climate science.

We don't know how they will react as the planet warms, but hope may lie in the uncertainty.

Maybe, just maybe, the clouds will slow global warming, giving us a little more time to act. That would be very convenient now.

I mean, if clouds can save the planet, I can put up with a few more cloudy days.

Well, we are sure of a few things.

Carbon dioxide is a greenhouse gas, and we emit a lot of it, heating the earth.

The case has been resolved.

But I still go to work every day.

It turns out there's a lot we don't understand about climate change.

In particular, it doesn't answer what seems to be a very basic question.

We know it will be hot, but we don't know how hot it will actually be.

Now, this is a really simple question, but if you give me a time machine in your life, please answer it.

But let's be honest, if I had a time machine, I wouldn't be hanging out at this particular point in history.

So to see the future, we have to rely on the output of computer simulations, climate models like this one.

Now, in my work and on the Internet, I meet a lot of very attractive people who like to say that all climate models are wrong.

And I mean, no kidding!

seriously? I get paid to complain about climate models.

But we don't want our model to be perfect.

We hope they are useful.

I mean, think about it. It is a computer simulation that can accurately reproduce everything in reality.

It's not a climate model. That's the Matrix.

So the model is not a crystal ball.

They're research tools, and how they're wrong can actually tell us a lot.

For example, various climate models can largely capture the warming seen so far.

But fast forward to the end of the century in a business-as-usual scenario, and climate models no longer agree.

Yes, they are all warming. It's just basic physics.

But some of them predict a catastrophe more than five times the warming we have already experienced.

And some are literally more sober.

So why do climate models disagree about how warm it will get?

Well, that's in large part because they don't agree on what the future holds for the cloud.

That's because computers, like me, hate clouds.

Computers hate the cloud. Because the cloud is very large and very small at the same time.

Clouds form when minute water droplets or ice crystals coalesce around small particles.

But at the same time they cover two-thirds of the earth's surface.

To model clouds really accurately, we need to track the behavior of all water droplets and dust particles throughout the atmosphere, and we don't have computers powerful enough to do that.

So instead, you have to make trade-offs. You can zoom in and get an accurate picture of the details, but you don't know what's going on around the world. Alternatively, you can sacrifice realism on small scales for the big picture.

There is currently no single correct answer or perfect method, and different climate models make different choices.

Now, clouds are so important in regulating the Earth's temperature that it's a shame that computers are wrestling with them.

In fact, if all the clouds were to disappear, we would experience severe climate change.

But without clouds, would it be warmer or colder?

The answer is both.

To be honest, I'm not an expert in observing clouds.

I don't have a favorite cloud type.

But I also know that clouds come in all shapes and sizes.

Low, thick clouds like this are great for blocking the sun and ruining your barbecue, but high, wispy clouds like this cirrus let most of the sun through.

Sunny days are always the same, but each cloudy day has its own clouds.

And it is this diversity that makes it so difficult to understand the global impact of the cloud.

So taking a selfie can be very helpful to see the overall effect of clouds.

It amazes me that you can see the Earth from space, but you can't see it all.

Clouds block the view.

that's what they do.

These low, thick clouds provide very effective shade.

They give back about 20 percent of what the sun sends us.

That's a waste of a lot of solar power.

In other words, low clouds provide powerful shade and keep the planet cool.

However, the effects of clouds do not stop there.

Our planet has a temperature, and like anything with a temperature, it gives off heat.

We radiate thermal energy into space, which can be seen in the infrared.

Clouds again obscured the view.

That's because there are high clouds in the upper atmosphere and it's very cold there.

And this means that very little heat is lost to space.

But at the same time they block the heat rising from the planets below.

The Earth is trying to cool down, but high clouds are getting in the way.

The result is a very strong greenhouse effect.

Clouds therefore play this very large and dual role in the climate system.

Low clouds act like sunshades, cooling the earth, and high clouds act like greenhouses, warming the earth.

Its sunshade is a little more powerful.

So if we could get rid of all the clouds tomorrow (just to be clear, I'm not advocating that), the Earth would be much warmer.

Obviously not all clouds disappear.

But climate change is change.

The following are possible. How will clouds change due to global warming?

But remember that clouds are very important in regulating the Earth's temperature, both warming and cooling it.

As such, even small changes in cloud cover can have significant effects.

So you can ask, "What effect do clouds have on global warming?"

And there may be room for hope.

If global warming causes changes in clouds, reducing the greenhouse effect or increasing the shading effect, the cooling power of the clouds will be enhanced.

That would run counter to global warming, and that's what happens in climate models that predict relatively modest warming.

But climate models struggle with clouds and this uncertainty, and it goes both ways.

Clouds may prevent global warming.

It can even make things worse.

We now know that climate change is happening visibly: rising temperatures, melting ice sheets, and changes in rainfall patterns.

And you may wonder if you can see it even in the clouds.

But here's another disappointment. Clouds are very difficult to see.

Everyone in the Pacific Northwest seems to be saying, "I have some suggestions."

(Laughter.) And folks, we looked it up.

(Laughter) But to do climate science, you have to look at every cloud everywhere for a very long time.

That's the difficulty.

Well, nothing sees clouds like a satellite. Not even the British.

(Laughter) And fortunately, like me, there are satellite observations of clouds going back to the 1980s.

But these satellites were designed with weather in mind, not climate.

They hadn't been in it for a long time.

Therefore, we need to do climate science to get information on long-term trends.

The output of multiple satellites with different field of view angles and orbits and with different camera equipment must be stitched together.

As a result, there are gaps in our knowledge.

But even this very cloudy situation is starting to give us hints of what might happen in the future.

Looking at the observation results, I noticed that the clouds were moving.

As the temperature of the planet increases, tall clouds rise.

They migrate to the cooler upper layers of the atmosphere. This means that even if the earth heats up, the clouds above will not heat up.

They are kept at approximately the same temperature.

Therefore, heat loss to space does not increase.

But at the same time, the Earth is trapping more heat from the warming Earth.

This will enhance the greenhouse effect.

Clouds in the sky are exacerbating global warming.

Clouds are also moving in another dimension.

Atmospheric circulation, the large-scale movement of air and water in the atmosphere, is changing, and clouds are changing with it.

On a larger scale, clouds appear to move from the tropics toward the poles.

It's like having your grandparents upside down.

And this is important. Because if your job is to block the incoming sunlight, you'll be more effective in the tropics than in high latitudes under that intense tropical sun.

Therefore, if things continue as they are, global warming will become even worse.

And what we haven't found, despite years of searching, are signs to the contrary.

There is no observational evidence that clouds slow global warming significantly.

The earth does not intend to lower the heat by itself.

Well, there is still uncertainty here.

I don't know what the future holds.

But we send our kids there and they never come back.

I want them to be prepared for what they are about to face. That's why it's so important to keep Earth observation satellites on the ground and to employ a diverse, cloud-averse, bright and talented workforce to improve our climate models.

But uncertainty is not ignorance.

We don't know everything, but we know nothing, we know how carbon dioxide works.

I started my career as an astrophysicist, so you can believe me when I say that this is the most amazing place in the universe.

Other planets may have liquid water.

There is whiskey on earth.

(Laughter) (Applause) We are very lucky to live here, but let's not force our luck.

I don't think clouds will save the planet.

I think it's probably up to us.

thank you.

(applause)

I had no idea at the time that superheroes would become such a big part of my life.

As a child, I looked at them and saw everything that I was not.

They had big muscles, supermodel looks, and incredible cosmic powers.

And, I?

I've never felt strong like this, except that my hair is short and curly.

I've always been a ball of nervous, soft energy, and like the school bullies, superheroes didn't seem to have much room for that.

So I stayed away.

And who needs a superhero when surrounded by Puerto Rican women from the Bronx?

(Laughter.) My Tia was a police officer and paramedic, Abuela was a seamstress and sold jewelry on the street, and my mom had a master's degree in education and taught kindergarten in New York City public schools for over 30 years.

So the superheroes were around the dinner table with me.

I don't know how much time you've spent with Puerto Rican women from the Bronx, but we're also some of the best storytellers in the world.

And I sat at my grandmother's dining room table listening to the women of my family tell wild and rambunctious stories about life in the Bronx.

And I wanted to be them.

But I wasn't tough like them either.

So, for the most part, I listened, absorbed it, found myself drawn to the soft threads of their story, and wrote it down.

The funny, the goofy, the sweet, these are the things that got me into storytelling, and I wrote a young adult novel called Juliet Takes Your Breath, about a chubby, queer Puerto Rican girl from the Bronx who struggles with sexuality, family, and identity.

And with the help of Juliet, Marvel Comics asked me to write a solo series about America Chavez, the first Latino lesbian superhero ever.

yes!

(cheers) (laughter) Listen, okay.

Created by Joe Casey and Nick Dragotta for the Marvel miniseries Vengeance, America Chavez has been in the Marvel Universe for over seven years.

She's tough, Latina, and she's strong enough to break through a portal to another dimension.

(laughs) You know what?

(Laughter) And people were so excited because finally someone who shares her identity — queer and Latina — would write her story.

And I saw that, didn't I?

I also saw young Latinas in survival mode as I turned to America.

Because her mother sacrificed herself to the universe when she was a child and she has lived alone ever since.

No wonder she had to be tough.

And that connection, the connection of having to be tough, weighed heavily on me.

As I said earlier, I'm from the Bronx, and the Bronx is hard, as hard as passing sidewalk monuments or avoiding police towers on the way to the train.

When bad things happen, people are like, 'Oh, we gotta keep it up. We gotta keep the track.

don't cry. Don't let it get to you. ”

And my mom, Tías, Abuela and the others never saw them resting or investing in self-care in the slightest.

And what about their software? It never left the house.

That was the first thing I wanted to give America, what I wished I could have given Abuela and Tias, and what I am about to give my mother. It was permission to calm down.

It's okay to sit in silence and go on a journey just to discover ourselves, we may collapse and fall in pain, we may have to ask for help, it's okay, it's good for us to be vulnerable.

But look, I didn't come up with this kind of compassion or healing out of nowhere, so when it came to America's story, I wanted to give her room to be human, to mess around, and find softness on her own.

So she had to quit her day job. do you understand what i'm saying?

I had to give her a superhero vacation (laughs). And the first thing I did was enroll her in the Sonia Sotomayor College of Justice.

(Laughter.) (Applause.) Because where else would she feel safe, represented, and liberated other than the first college dedicated to Puerto Rican women appointed to the U.S. Supreme Court?

And her first class was "Galactic Revolutionaries and You", America was so excited, she was ready to show off her strength, she was ready to show off her portal punch skills (laughs), and I immediately stripped her of that safety net.

And I limited her power, changed her location, shook her world. That's what college is like (laughs), especially if you're alone.

But I didn't want America to be alone for long, so her homework failed completely and she ended up on the battlefield with the X-Men.

(Laughter.) Because when I was in college, Reverend Kerry Brown Douglas was my mentor and I knew America Chavez needed a mentor.

And who better to mentor America Chavez than Storm, the first black female superhero and one of the most powerful members of the X-Men?

nobody, who it is

(Laughter) And Storm teaches America how to quiet her mind in the Star Portal, and when America quiets her mind, she opens up a dimension and in that silence she can listen to anything and everyone.

And no one offered her silence and deep meditation as a way to become powerful.

And though at first she rejected it, with Storm's encouragement it clicked, America quieting the world around her and she leaned into a deep vulnerability.

I mean, she and Storm even hug.

know.

Because my mentors loved me and encouraged me to find out more about myself and my ancestors. How do you know what that means when you're 19?

I didn't learn about our people's history in college.

I learned about the history of the people who sat on my grandmother's lap when she pulled out a photo album. My grandmother named everyone who was here and everyone who is still on the island.

So obviously I had to crash-land Grandma on America Chavez, not just Grandma. A big, strong, luchador grandma who loved her so much that she took her to the plains of her ancestors. There, America Chavez could see the history of his people unfolding in the skies.

Then America sees her grandmother's birth planet, Planeta Fuertna, sees it being invaded, and sees her grandmother and mother flee.

And she also witnesses the joy they experience when their new homes openly accept them and offer them great care.

She sees great pain dealt with with even greater compassion, which is juxtaposed with the tremendous strength of her family.

So wherever I could, I wrote her little love notes for her and all the other queer kids of color who were trying to be respectable.

For example, when you lose yourself, dig deeper into your ancestry. Because there you will find fragments.

It also reminds us that soft is not a path to hide, hide, silence, or cower.

Software also encourages us to hold ourselves accountable.

Kind of like when America went into World War II and confronted Hitler and she knocked him out to the ground...

(Laughter.) Who knew it would take America Chavez to punch the Nazis in 2018 like Captain America did in 1941?

(Laughter) (Applause) (Laughter) Even then, that justified act knocked her down a little bit, so I had her hook up with her best friend, discuss her feelings, go on a road trip, and sing 'Just a Girl' by No Doubt aloud.

(laughter) And when the evil corporation Midas took control of Sotomayor and threatened to ban the portal, nearly destroying America...

Her ancestors reach out to her...

Because they know she needs to heal.

And that explosive care, that healing, is what gives her the fuel to defeat Midas and reclaim herself.

See, there's a myth that you have to be alone, you have to be tough...

no use for us.

America Chavez is a total superhero, but she still needed a support team to find herself.

And she needed that kindness, the type of kindness that was rooted in compassion, yet so focused on justice and liberation.

For it is in that space where softness and weakness meet strength that we transcend our everyday selves and become something greater, more sublime, perhaps even transcendent.

thank you.

(applause)

Just over a year ago, for the third time in my life, I ceased to exist.

I had a minor surgery and my brain was flooded with anesthetics.

I remember the feeling of alienation and disintegration and coldness.

And I came back, sleepy and disorientated, but there I was.

Now, when you wake up from a deep sleep, you may find yourself confused about the time or worried that you will oversleep, but the basic passage of time, the basic sense of continuity between then and now, is always present.

Waking up from anesthesia is completely different.

I could have stayed 5 minutes, 5 hours, 5 years, or even 50 years.

It just wasn't there.

It was complete oblivion.

Anesthesia - it's modern magic.

It turns a person into an object, and we hope to become a person again.

And in this process lies one of the greatest remaining mysteries of science and philosophy.

How does consciousness arise?

Somehow, within each of our brains, the activity of billions of neurons, each a tiny biological machine, combines to generate conscious experiences.

And not just a conscious experience, but your conscious experience here and now.

How does this happen?

It is very important to answer this question, because the consciousness of each of us is everything.

Without it there would be no world, no self, no self at all.

And when we suffer, whether it is from mental illness or from pain, we suffer consciously.

And if we can experience joy and suffering, what about other animals?

Are they aware of it too?

Are they self-conscious, too?

And as computers get faster and smarter, perhaps it won't be long before my iPhone becomes aware of its own existence.

In fact, I think the chances of conscious AI becoming a reality are quite remote.

I think so because my research has shown that consciousness has less to do with pure intelligence and more to do with our true nature as living, breathing organisms.

Consciousness and intelligence are two very different things.

You don't have to be smart to suffer, but you probably have to live.

In the story I am about to tell you, our conscious experience of the world around us and ourselves within it is a kind of controlled hallucination that occurs with, through, and for our living body.

Now, you may have heard that we know nothing about how the brain and body produce consciousness.

Some even say it is completely beyond the scope of science.

In fact, however, there has been an explosion of scientific research in this area over the last 25 years.

Come to my laboratory at the University of Sussex and you'll find scientists from all walks of life, and sometimes even philosophers.

We are all trying to understand together how consciousness arises and what happens when consciousness goes awry.

And the strategy is very simple.

I want you to think about consciousness in the same way that we started thinking about life.

People used to think that the nature of life could not be explained by physics and chemistry, that life must be more than just mechanism.

But people don't think so anymore.

As biologists tackled the task of explaining the properties of living systems (metabolism, reproduction, homeostasis, etc.) in terms of physics and chemistry, the basic mystery of what life was began to fade, and people stopped proposing life force or magic-like solutions.

As with life, so is consciousness.

Once we begin to explain its nature in terms of what is going on in the brain and body, the vague mystery of what consciousness is should begin to disappear.

At least that's the plan.

Let's get started.

What is the nature of consciousness?

What should the science of consciousness try to explain?

So today I would like to think about consciousness in two different ways.

All around us are experiences of a world full of sights, sounds and smells, multi-sensory, panoramic, 3D and fully immersive inner cinema.

And there is a conscious self.

A concrete experience of being you or being me.

The protagonist of this inner movie and perhaps the aspect of consciousness that we all cling to most strongly.

Let's start with our experience of the world around us and the important idea of ​​the brain as a predictive engine.

Imagine that you are the brain.

You're trapped inside a skull full of bones, trying to make sense of what's in the world.

There is no light inside the skull. No sound.

All you have to keep going is the flow of electrical impulses, whatever they are, that are only indirectly related to things in the world.

Perception, or understanding what is there, must therefore be a process of informed speculation, and the brain combines these sensory signals with prior expectations and beliefs about the way the world is to form its best guesses about the causes of those signals.

The brain does not hear sounds or see light.

What we perceive is our best guess about what is in the world.

Let's give some examples of all this.

You may have seen this illusion before, but I want you to think again.

Looking at these two patches, A and B, you should see completely different shades of gray.

But it is actually the exact same shade.

And I can explain this.

If you show the second version of the image here and join the two patches with the gray bar, you can see that there is no difference.

Exactly the same shade of grey.

If you still don't believe me, I'll join them across the bar.

It's a solid gray block, but it doesn't make any difference.

This is nothing magical.

It's the same gray, but if you take it off again, it looks different again.

So what's going on here is that the brain is tapping into a pre-existing expectation deeply embedded in the circuitry of the visual cortex that shadows darken the appearance of surfaces, making B appear brighter than it actually is.

Here is another example. This shows how the brain can use new predictions to quickly change what we consciously experience.

Listen to this.

(distorts his voice) Sounds weird, doesn't it?

Listen again and see if you get anything.

(distorted voice) It's still strange.

Now listen to this.

(Recorded) Anil Seth: I think Brexit is a really bad idea.

(laughter) I do that too.

So you heard some words there, right?

Listen to the first note again. Try playing it again.

(distorted voice) Right? So it became possible to hear the words there.

Good luck again.

(distorted voice) So what's going on here?

What is surprising is that the sensory information entering the brain has not changed at all.

The only thing that changes is the brain's most accurate guess at the cause of that sensory information.

And it changes what you consciously hear.

All of this gives a slightly different perspective on the basis of the brain's perception.

Perception depends less on signals coming into the brain from the outside world, but just as much, if not more, on perceptual predictions flowing in the opposite direction.

We don't just passively perceive the world, we actively create it.

The world we experience comes from the inside out as much as it does from the outside in, if not more.

Let me give you another example of this perception as an active constructive process.

Here, we combined immersive virtual reality and image processing to simulate the effects of overly strong perceptual predictions on experience.

In this panoramic video, we turned the world (in this case the Sussex Campus) into a psychedelic playground.

We processed the footage using an algorithm based on Google's Deep Dream to simulate the effects of overly strong perceptual predictions.

In this case, go see the dog.

And it turns out that this is very strange.

If the perceptual anticipation is too strong, as here, the results closely resemble the kind of hallucinations people might report in degenerative conditions, or perhaps psychoses.

Now, let's think about this for a moment.

If hallucinations are a kind of uncontrolled perception, then perception here and now is also a kind of hallucination, but a controlled hallucination in which the brain's predictions are suppressed by sensory information from the world.

In fact, we all hallucinate all the time, even now.

But when we agree on hallucinations, we call them reality.

(Laughter) Now I would like to say that the experience of you being yourself, the particular experience of being you, is also a controlled hallucination produced by the brain.

This is a very strange idea, don't you think?

Sure, optical illusions can fool my eyes, but how could I be fooled about what it means to be me?

For most of us, the experience of being a person is so familiar, unified, and continuous that we can't help but take it for granted.

But it shouldn't be taken for granted.

In fact, there are many ways in which we experience being Self.

There is the experience of having a body and the experience of being a body.

You have the experience of perceiving the world from a first-person perspective.

There is the experience of trying to do something and of being the cause of what is happening in the world.

And then there is the experience of being a unique human being, built from rich memories and social interactions, that is persistent and unique over time.

Many experiments have shown, and psychiatrists and neurologists are well aware that all the different ways in which we experience ourselves can fall apart.

What this means is that the basic background experience of being a unified self is a rather fragile structure of the brain.

Another experience, like any other, deserves an explanation.

Now let's get back to our physical self.

How does the brain create the experience of being and having a body?

Well, the same principle applies.

Your brain makes its best guess as to what is part of your body and what is not.

And there is a beautiful neuroscience experiment to explain this.

And unlike most neuroscience experiments, this one can be done at home.

Only one of these is required.

(laughs) And a few paintbrushes.

In the rubber hand illusion, a person's real hand is hidden from view and the fake rubber hand is placed in front of the person.

Then stroke both hands simultaneously with a paintbrush while the figure gazes at the fake hand.

Well, for most people, after a while it leads to a very creepy feeling that the fake hand is actually part of their body.

And the idea is that matching seeing and feeling touch with an object that looks like a hand and is roughly where the hand should be is evidence enough for the brain to make its best guess that the fake hand is actually part of the body.

(Laughter) So you can measure all sorts of smart things.

You can measure skin conductance or startle response, but you don't have to.

It's clear that the man in blue has assimilated the fake hand.

This means that even our experience of what our bodies are is a kind of best guess, a kind of hallucination controlled by the brain.

There is one more thing.

We not only experience our body as an object in the world from the outside, but we also experience it from the inside.

We all experience the feeling of being our own body from within.

The sensory signals coming from the inside of the body continue to convey various information to the brain, such as the state of the internal organs, heart, and blood pressure.

This kind of perception, which we call interoception, is rather overlooked.

But it is very important. Because the awareness and regulation of the internal state of the body keeps us alive.

This is another version of the rubber hand illusion.

This is from our lab in Sussex.

And here people see a virtual reality version of their hands. It flashes red with or to the heartbeat and comes back.

And when it flashes in time with the heartbeat, people get a stronger sense that it's actually part of their body.

So the experience of having a body is deeply rooted in our inner awareness of our body.

There is one last thing I would like you to note. What we experience from the inside of our bodies is very different from our experience of the world around us.

When I look around me, the world seems to be full of things - tables, chairs, rubber hands, people, and you - even my own body in the world, which I perceive as an object from the outside.

But my experience from inside my body is nothing like that.

You don't realize that there is a kidney here, a liver here, a spleen here...

I don't know where the spleen is, but it's there somewhere.

I do not perceive my inner self as a thing.

In fact, I don't experience them much unless I fail.

And I think this is important.

Awareness of the body's internal state is not about understanding what is there, but about controlling and regulating, maintaining physiological variables within narrow limits that are compatible with survival.

We perceive objects as sources of sensations when the brain uses prediction to figure out what's there.

When the brain uses predictions to control and coordinate things, we experience how well or how poorly that control works.

Therefore, our most basic experience of being a self, of being a physical organism, is deeply rooted in the biological mechanisms that keep us alive.

And when we follow this idea to the end, we begin to see that all our conscious experiences, because they all depend on the same mechanisms of predictive perception, all stem from this basic motivation to stay alive.

We experience the world and ourselves with, through and through our living bodies.

Let's put things together step by step.

What we consciously see depends on our brain's best guesses about what's out there.

The world we experience is not just from the outside to the inside, but from the inside to the outside.

The rubber hand illusion shows that this applies to our experience of what our bodies are and what is not.

And these self-associated predictions rely heavily on sensory signals coming from deep within the body.

And finally, the experience of being the embodied self is more about control and regulation than understanding what's out there.

So the world around us and our experience of ourselves within it is a kind of controlled hallucination that has been shaped over millions of years of evolution to keep us alive in a world full of dangers and opportunities.

We predict ourselves to exist.

Here are three things that all of this means.

First, just as we can misperceive the world, we can misperceive ourselves if our prediction mechanisms go wrong.

Understanding this opens up many new possibilities in psychiatry and neurology, as it allows us to go beyond simply treating symptoms such as depression and schizophrenia, and ultimately to elucidate their mechanisms.

Second, what it means to be me, however clever and sophisticated, cannot be reduced or uploaded to a software program running on a robot.

We are living, biological animals whose conscious experiences are shaped at every level by the biological mechanisms that keep us alive.

Just making a computer smarter doesn't make it sentient.

Finally, our own inner universe, our way of being conscious, is just one of the possible ways of being conscious.

And even human consciousness in general is just a small area in the vast space in which consciousness can exist.

Our personal selves and the world are unique to each of us, but they are all based on biological mechanisms shared with many other living beings.

Now, these are radical changes in the way we understand ourselves, but I think we should celebrate them. Because, as is often the case in science, from Copernicus - we are not the center of the universe - to Darwin - we are related to all other living things - to modern times.

A deeper understanding creates a greater sense of wonder, a greater realization that we are part of nature and not separate from the rest of it.

and ...

When the end of consciousness comes, there is nothing to fear.

There is nothing.

thank you.

(applause)

About once every 100 years, a giant star somewhere in our galaxy can run out of fuel.

This happens after millions of years of heat and pressure fuse the star's hydrogen into heavier elements such as helium, carbon, nitrogen, and even iron.

It can no longer generate enough energy to maintain its structure and collapses under its own gravitational pressure, causing a supernova explosion.

This star ejects most of its interior into space, seeding the galaxy with heavy elements.

But what this catastrophic eruption left in its wake may be even more remarkable. It is a ball of matter so dense that atomic electrons collapse from quantum orbits to the depths of the nucleus.

The death of that star means the birth of a neutron star. Neutron stars are among the densest known objects in the universe and are laboratories in the strange physics of supercondensed matter.

But what is a neutron star?

Think of protons and electrons merging into neutrons inside a compact ball, forming a frictionless liquid called a superfluid surrounded by the Earth's crust.

This material is incredibly dense, equivalent to the mass of a fully loaded container ship squeezed into a human hair, or the mass of Mount Everest in the space of a sugar cube.

Deep in the crust, neutron superfluids are squeezed out of lasagne into spaghetti-like shapes, forming a variety of phases that physicists call "nuclear pasta."

Massive progenitors of neutron stars often rotate.

When a star, which is typically millions of kilometers wide, collapses, it compresses to a neutron star just about 25 kilometers in diameter.

However, the angular momentum of the original star is preserved.

That is, a neutron star spins much faster than its parent star for the same reason that figure skaters spin faster when they incorporate their arms.

The fastest neutron star on record rotates more than 700 times per second. This means that a point on its surface orbits through space at more than one-fifth the speed of light.

Neutron stars also have the strongest magnetic fields of any known celestial body.

This magnetic concentration forms a vortex and emits a beam from the magnetic poles.

Because the poles are not always aligned with the star's axis of rotation, the rays rotate like a beacon on a lighthouse and appear to flicker when viewed from Earth.

We call them pulsars.

The detection of one of these fascinating blinking signals by astrophysicist Jocelyn Bell in 1967 was, in fact, an indirect method of discovering neutron stars in the first place.

The ferocious rotation of an aging neutron star slows down over a period of billions of years as it radiates energy in the form of electromagnetic waves and gravitational waves.

But not all neutron stars disappear so quietly.

For example, we observed a binary star system in which a neutron star co-orbits with another star.

A neutron star can eat its lighter companion star and devour its more loosely bound atmosphere before finally collapsing into a black hole catastrophically.

Many stars exist as binary star systems, but only a few of them are neutron star binaries. There, two neutron stars waltz and orbit around each other, destined to eventually merge.

When they finally collide, they send gravitational waves through space-time, like ripples from a stone thrown into a still lake.

Einstein's general theory of relativity predicted this phenomenon over 100 years ago, but it wasn't directly verified until 2017, when the gravitational-wave observatories LIGO and VIRGO observed colliding neutron stars.

Other telescopes all received gamma-ray bursts and flashes from the same collision, followed by X-rays and radio signals.

It has become the most studied event in the history of astronomy.

It has produced a wealth of data that has helped pinpoint the speed of gravity, underpin important theories of astrophysics, and provide evidence for the origin of heavy elements such as gold and platinum.

Neutron stars have not yet given up all their secrets.

LIGO and VIRGO have been upgraded to detect more collisions.

It helps us find out what else the spectacular demise of these dense, pulsating, rotating magnets can tell us about the universe.

In ancient Greece, everyone from slaves to soldiers to poets to politicians had to make big decisions about life's most important questions, such as "Should I get married?"

or "Should I set out on this voyage?"

Or "Should our troops march into this territory?"

They all examined the oracle.

Here's how it worked. When you ask her a question and you kneel, she goes into a trance.

It will take a few days, but eventually she will get out of there and give you her prediction as an answer.

From ancient Chinese oracle bones to ancient Greece to the Mayan calendar, people have longed for prophecies to know what would happen next.

Because we all want to make the right decisions.

I don't want to miss anything.

The future is terrifying, so it's much better to know that you can make decisions with some degree of certainty about the outcome.

Well, we have a new oracle, and its name is Big Data, or 'Watson', 'Deep Learning', or 'Neural Nets'.

And these are the kinds of questions we ask the oracle now, like, "What is the most efficient way to transport these cell phones from China to Sweden?"

Or, "What are the chances of my child being born with a genetic disorder?"

Or, "How many sales can you predict for this product?"

i have a dog Her name is Elle and she hates rain.

And I tried everything to untrain her.

But I failed at this, so every time before I go for a walk I have to consult an oracle called Dark Sky to get a very accurate weather forecast for the next 10 minutes.

she is very kind

All of this makes our Oracle a $122 billion industry.

Well, despite the size of this industry, revenues are surprisingly low.

Investing in big data is easy, but leveraging it is hard.

Over 73% of big data projects aren't even profitable, and some executives come to me and say, "We are going through the same thing.

We invested in big data systems, but our employees aren't making better decisions.

And they don't come up with more groundbreaking ideas. ”

I'm a tech ethnographer, so this is all very interesting.

I study patterns in how people use technology and advise companies. One of my areas of interest is data.

So why can't more data lead to better decisions, especially for companies that have all the resources to invest in big data systems?

Why can't it be easier for them?

So I've seen that struggle.

In 2009, I took a research position at Nokia.

And at the time, Nokia was one of the world's largest cell phone companies and dominated emerging markets like China, Mexico, and India, and I was doing a lot of research on how low-income people used technology in those countries.

And I spent a lot of time in China learning about the informal economy.

So I did something like a street vendor selling dumplings to construction workers.

Or doing fieldwork, spending nights and days in internet cafes, hanging out with young Chinese people, understanding how they use games and mobile phones, and how they use them during their migration from rural to urban areas.

Through all this qualitative evidence that I have been gathering, it is beginning to become very clear that big changes are about to take place among low-income Chinese.

Even if you're surrounded by advertisements for luxury items like luxury toilets, who wouldn't want one? --And apartments, cars, etc. Through our conversations with them, it turns out that the ads that actually attracted them the most were those for the iPhone, which promised a gateway to this high-tech life.

And even when I lived with them in urban slums like this one, I saw people investing more than half of their monthly income in buying mobile phones, but increasingly they were "shanzhai", affordable knockoffs of iPhones and other brands.

It is very easy to use.

I will do the work.

And after years of living with immigrants, working with them, and really doing everything they do, I started piecing together all these data points, from the seemingly random like selling dumplings to the more obvious stuff like tracking how much they spend on cell phone bills.

And we were able to create a more holistic picture of what was going on.

And that's when I started to realize that even the poorest people in China want smartphones and would do almost anything to get one.

Remember, the iPhone just came out, it was 2009, so that was about eight years ago, and Android was just starting to look like the iPhone.

And a lot of very smart and pragmatic people said, 'Those smartphones, it's just a fad.

Who wants to carry something heavy that drains the battery quickly and breaks every time you drop it?”

But I had a lot of data and was very confident in my insights, so I was very excited to share them with Nokia.

But it wasn't big data, so Nokia wasn't convinced.

They said, "We have millions of data points, but we don't see any indication that anyone wants to buy a smartphone. And 100 data sets, despite their diversity, are too weak for us to take seriously."

And I said, "Nokia, you are right.

Of course I don't know this. We're sending out the survey on the assumption that people don't know what a smartphone is, so of course we won't get back any data on people wanting to buy a smartphone in the next two years.

Your research and methodologies are designed to optimize existing business models, and I'm looking at new human dynamics that haven't happened yet.

We look outside the market dynamics to help us stay ahead of the market. ”

Well, do you know what happened to Nokia?

Their business has fallen off a cliff.

This is the price of losing something.

It was immense.

But Nokia is not alone.

I see organizations constantly discarding data because it is not derived from, or does not fit, a quantum model.

But it's not Big Data's fault.

That's how we use big data. It's our responsibility.

Big Data's reputation for success comes from quantifying very specific environments such as power grids, delivery logistics, and genetic codes when quantifying within more or less contained systems.

But not all systems are so neatly housed.

If you're quantifying and your system is more dynamic, especially in systems involving humans, the forces are complex and unpredictable, and I don't know how to model these well.

When we predict something about human behavior, new factors emerge because the situation is always changing.

That is why it is a never-ending cycle.

Even if you think you know something, the unknown comes in.

That is why relying solely on big data increases the chances of missing something and creating the illusion that we already know everything.

And what makes this contradiction difficult to understand, or even to understand it, is that we have this phenomenon that I call quantification bias. This is the unconscious belief that we value the measurable over the unmeasurable.

And we often experience this kind of thing at work.

Maybe we work with colleagues like this. Or maybe your entire company is like this. People are so obsessed with numbers that they can't see anything outside of them, even when the evidence is presented in front of them.

This is a very attractive message. Because there is nothing wrong with digitizing. I am very satisfied actually.

Looking at an Excel spreadsheet, even if it's a very simple one, can be very comforting.

(Laughter) It's like, "Yes! The formula worked. Everything is OK. Everything is under control."

But the problem is that quantification is addictive.

And if you forgot it, or had nothing to constrain it somehow, it's very easy to just throw the data away because it can't be represented as a number.

It's all too easy to fall into a silver bullet mentality, as if there is some easy solution.

Because this is a moment of great danger for any organization. Because often the future we need to predict is that tornado hitting us outside the barn, not in that haystack.

There is no greater risk than being blind to the unknown.

You may end up making the wrong decisions.

It could miss something big.

But we don't have to go down this road.

It turns out that an ancient Greek oracle hides a secret key that shows us the way forward.

Now, recent geological studies have shown that the Temple of Apollo, where the most famous oracle sat, was actually built on two earthquake faults.

And these faults released these petrochemical gases from beneath the Earth's crust, and the Oracle literally sat right on top of these faults, sucking up huge amounts of ethylene gas that were these fissures.

(laughs) It's true.

(Laughter) That's all true, and that's what caused her to babbling and hallucinating and going into a trance.

She was as high as a kite!

(laughter) So how could you get useful advice from her in this situation?

Now, can you see the people surrounding the oracle?

Do you see people picking her up because she's a little annoying?

Can you see the man to your left holding an orange notebook?

Yes, they were temple guides, working in partnership with the oracle.

When the Inquisitor comes and kneels, it's time for the temple guides to get down to business. Because after asking her a question, they observe their emotional state and then ask additional questions like, "Why do you want to know this prophecy? Who are you?"

What are you going to do with this information? ”

Temple ushers then take this more ethnographic and more qualitative information to interpret the oracle's babbling.

So Oracle didn't exist by itself, and big data systems don't exist by themselves.

Just to be clear here, I'm not saying big data systems are consuming lots of ethylene gas or giving invalid predictions.

Quite the opposite.

But my point is, just like the oracle needed temple guides, so do our big data systems.

They need people like ethnographers and user researchers who can collect so-called thick data.

This is the precious, non-quantifiable human data of stories, emotions, and interactions.

This is the kind of data I've collected for Nokia, the sample size is very small, but it's incredibly meaningful.

And what makes it so thick and meaty is the experience of understanding the human story.

And it helps you see what your model is missing.

Thick data bases business questions on human questions. So merging big and thick data creates a more complete picture.

Big data can provide insights at scale and make the most of machine intelligence. Thick data, on the other hand, can help make the most of human intelligence by bridging the loss of context that comes with making big data available.

And when you actually integrate the two, it becomes really fun to work with. It's no longer just manipulating the data you've already collected.

You can also work with uncollected data.

You can ask why. "Why is this happening?"

Well, when Netflix did this, it opened up a whole new way of transforming business.

Netflix is ​​known for its very good recommendation algorithm, and gave a $1 million prize to anyone who could improve it.

And there were winners too.

However, Netflix has found that the improvements are only incremental.

So to really find out what's going on, they hired ethnologist Grant McCracken to gather a wealth of data insights.

And what he discovered was something that was not initially seen in quantitative data.

He discovered that people love to watch in one breath.

In fact, people didn't even feel guilty about it.

they enjoyed it.

(Laughter) So Netflix was like, 'Oh, this is new insight.

So they turned to their data science team and were able to extend this big data insight with quantitative data.

And after testing and testing it, Netflix decided to do something very simple but impactful.

Instead of offering the same show in different genres or multiple different shows with similar users, they just offer more of the same show, they said.

Makes it easy to watch.

And they didn't stop there.

They redesigned the entire viewing experience and did all these things to really encourage binge watching.

This is why people and friends disappear for entire weekends at once to watch shows like "Master of None."

By uniting big and thick data, we have not only improved our business, but also transformed the way we consume media.

And now, their stock price is projected to double in the next few years.

But it's not just about getting more video views or more smartphone sales.

For some, especially marginalized people, integrating rich data insights into algorithms can mean life or death.

Police departments across the country are using big data for predictive policing, setting bail and sentencing recommendations in ways that reinforce existing biases.

The NSA's Skynet machine learning algorithm may have contributed to the deaths of thousands of Pakistani civilians from misreading the metadata on their mobile devices.

As everything in our lives becomes automated, from cars to health insurance to employment, we can all be subject to quantification biases.

Well, the good news is that we've come a long way from breathing ethylene gas to make predictions.

We have better tools, so let's use them better.

Integrate big data and thick data.

Take the oracle with you to the temple guide. Whether this work is done in a company, a nonprofit, a government, or even software, everything matters. Because it means we work together to make better data, better algorithms, better outputs, and better decisions.

This way you can make sure you don't miss anything.

(applause)

If you've been thinking about and trying to make sense of US politics for the past year or so, you might have come up with something like the following three propositions. First, partisanship in the United States has never been this bad. Second, it was geographically spatialized for the first time. We are divided between the coastal areas that want to look outward and the heart of the country that wants to look inward. And thirdly, there is nothing we can do about it.

What brings me here today is that while all three of these propositions sound reasonable, they are all untrue.

In fact, partisanship in the United States dates back to the early days of the republic.

It has been geo-spatialized in much the same way it is now, and has been frequent throughout U.S. history.

And finally, and most importantly by far, we do have special mechanics designed to manage factional disagreements and inter-partisan conflicts.

That technology is the constitution.

And this is an evolved, nuanced, lithely designed being with the specific purpose of teaching us how to manage disagreements between factions when possible, and providing us with techniques to overcome that disagreement when it is possible.

Now, to tell this story, I want to go back to a pivotal moment in American history. That is the moment when factional discord and inter-partisan rivalry were born.

Indeed, there was a moment of birth, a moment in American history when partisanship solidified.

The central figure in that story is James Madison.

And the minute this started, James Madison was on board.

He himself was an Einstein of constitutional thought, not only of the United States Constitution, but of more global constitutional thought, and, of course, he knew it.

In just three years, from 1785 to 1788, he conceived, theorized, designed, passed, and ratified the United States Constitution.

And to give you a little bit of a sense of what the feat really was, Madison didn't know it at the time, but today the same constitutional technique he invented is still being used 230 years later in places like Canada, India, South Africa, and Brazil, not just in the United States.

Therefore, in a very wide range of contexts around the world, this technology remains the dominant, most used and most effective technology for managing governance.

At that moment, Madison believed that solving this problem would allow the country to run smoothly, believing that he had designed a technology that minimized the consequences of factions and was non-partisan.

Notably, he opposed political parties and thought he had drafted a constitution that made them unnecessary.

He had a lot of help in the final marketing stages of the Constitution project from someone you may have heard of, Alexander Hamilton.

Well, Hamilton was everything Madison didn't have.

When Madison was restrained, he was passionate.

He was pansexual and Madison didn't speak to a woman except once until he was 42, after which he married Dolly and lived happily for the next 40 years.

(Laughter) Frankly, Hamilton is the kind of person who writes hip-hop musicals. (Laughter) And Madison is not the kind of person who writes hip-hop musicals.

(Laughter) I mean, any kind of musical.

But together they were a rather unlikely combination, producing a Federalist document that provided a constitutional justification and, as I said, a highly effective and wildly successful marketing plan.

With the new government in place, Hamilton took over as Treasury Secretary, but he had very specific ideas in mind.

And that was to do to financial institutions and infrastructure exactly what Mr. Madison did to the Constitution.

Again, all his contemporaries knew it.

One of them told Madison, who shouldn't have liked him so much, that Hamilton was the Newton of infrastructure.

The idea was very simple.

Hamilton would give the United States a national bank, perpetual bonds (“immortal,” as he puts it), and a manufacturing policy that would allow trade and manufacturing rather than agriculture, which historically has been the nation's main wealth.

Madison completely rioted.

And in this crucial and important decision, he not only told the world that his old friend Hamilton was wrong and was adopting the wrong policies, but he actually began to argue that Hamilton's ideas were unconstitutional, violating the very nature of the Constitution they drafted together.

Hamilton reacted as expected.

He declared Madison a "personal and political enemy" -- in his words.

As such, the two founders, formerly close friends, close allies and partners, then began to develop animosity.

And they did it the good old way.

First, they set up a political party.

Madison originally founded a political party called the Democratic-Republican Party, or "Republican Party" for short, while Hamilton founded a political party called the Federalist Party.

These two parties have adopted extreme and exaggerated positions on national politics.

To give a clear example, Madison, who always believed that the country had manufacturing, trade, and agriculture, began attacking Hamilton as the kind of financial market instrument that Hamilton himself intended to put in charge of the country.

It was an exaggeration, but Madison came to believe it.

He also attacked city life, said the coast was corrupt, and that what people should do was to look to the heart of the country, the peasants, the essence of the Republican virtue, and to return to the values ​​that made America great, specifically the revolutionary values: low taxes, agriculture, and less trade.

Hamilton responded by saying that Madison was naive and childish, and that his goal was to transform the United States into a primitive dictatorship, a self-sustaining, global, and utterly powerless nation.

(Laughter) They were both serious, and there was some degree of truth in their claims. Because both sides were grossly exaggerating the other's opinion in order to wage war.

They started newspapers so that for the first time in American history, the news people received came entirely through a Republican or Federalist lens.

how does this end?

Well, after all, the Constitution has done its job.

But it worked in a surprising way that Madison herself didn't fully anticipate.

First, there was a series of elections.

And the first two times out of the box, the Federalists destroyed the Republicans.

Madison was astonished.

Of course, he blamed the media.

(Laughter.) And in a rather innovative way—Madison, by all accounts, was innovative—the reason the press was so federalist was because the advertisers were all federalists, and they were coastal merchants funded by Britain, who had ties to federalism.

That was his first explanation.

But despite the fact that the once-in-governmental Federalists had actually enacted legislation criminalizing criticism of the government—which happened in the United States—the Republicans fought back, and Madison began to emphasize the freedom of speech and the ability of civil society to organize into the Bill of Rights.

And sure enough, across the country, a small local group called the Democratic-Republican Party formed to protest against the federalist-held hegemony.

Ultimately, the Republicans were able to win the national election. It was the year 1800.

Madison became secretary of state, his friend and mentor Jefferson became president, and indeed they succeeded over time in putting the Federalist Party out of business altogether.

that was their goal.

So why?

It happened because there were some features in the constitutional structure that actually governed factions the way they should have been in the first place.

what were they?

One of them, and most importantly, is freedom of speech.

This was a revolutionary idea at the time.

In other words, the government can be said to be terrible even if it loses power.

2. Civil society organizations.

The ability to bring together private groups, individuals, political parties, etc. that organize to bring about radical change.

Perhaps most important was the separation of powers, a special element of the constitution.

An important aspect of the separation of powers, then and now, is the concentration of government in the center.

Right-wingers and left-wingers alike can be elected to public office in the United States with the help of their neighbors.

After all, it turns out that you can't really govern unless you enlist your centers.

There are midterm elections that happen incredibly soon after a president takes office.

They drive the president to the middle road.

Another feature that tends to drive presidents who actually want to take things to the center is the structure in which the president doesn't really govern or rule, but can only propose laws that other people must agree to.

And if you look at today's newspapers, you can see these principles still in full force.

No matter how the president is elected, he cannot do anything unless he first follows the rules of the constitution. Because otherwise, courts will rise, as has happened not only recently, but indeed at times in US history.

And furthermore, a president needs people who know he needs to win elections from centrist voters to pass laws: elected officials to back his policies.

Without it, nothing much happens.

So the gist of this short trip into the history of partisanship is: Partisanship is real. It's profound. It's very powerful and terribly upsetting.

But the design of the Constitution is more than partisan.

Where we can, we can manage partisan conflicts, and only where we can actually overcome partisan divisions and create compromises.

Technology like this worked for the founders, it worked for their grandchildren, it didn't work during the Civil War moment, but then it started working again.

And it worked for our grandparents and parents, and it will work for us.

(Applause) So what you have to do is very simple.

Stand up for what you believe in, support the organizations you care about, speak out on issues that matter to you, participate, make a difference, speak your mind and do it with respect, knowledge and confidence. It is only by working together that constitutional technologies can accomplish their intended tasks.

Stand up for what you believe in. But take a deep breath while doing it.

No problem.

thank you.

(applause)

There was a fire nine days ago.

My archive: 175 films, 16mm negatives, all my books, my father's books, photographs.

I was a collector, a big man, a big man.

It's gone.

I just looked and didn't know what to do.

I mean, was this—I was mine?

I live in the present all the time - I love the present.

I care about the future.

And I was taught weird things as a kid, like you have to make something good out of something bad.

You have to create good things out of bad things.

This was no good! Oh, I—I coughed. I was sick.

That's my camera lens. The first one was shot for a Bob Dylan movie 35 years ago.

That's my feature film. "King Murray" won an award at the 1970 Cannes Film Festival. It's the only print I have.

That's my document.

It was a few minutes, 20 minutes.

An epiphany hit me. something hit me

“You have to make something good out of the bad,” I started telling friends, neighbors, and my sister.

By the way, it's "Sputnik". I ran it last year too.

"Sputnik" was downtown and negative. had not been touched.

These are some of the ones I used in the Sputnik feature film, which opens in downtown New York in two weeks.

I called my sister. I called my neighbors. I said, "Come and dig."

That's me at my desk.

It was a desk made over 40 years.

You know, everything.

That's my daughter, Jean.

she came She is a nurse in San Francisco.

"Dig it up," I said. "piece.

I want a piece piecemeal. ”

I came up with this idea. Life in Fragments, this is where I started my next project.

that's my sister I am a big collector of snapshots and she took great care of them.

And these are some of the photos that said there was something good about burnt photos.

I did not know. I looked at it and said, "Wow, this could be better than this." Here are my suggestions for Jimmy Doolittle. I made that movie for TV.

It's the only copy I have. fragment of it.

thinking about women.

So I started saying: "Hey, you're doing too much!"

You can cry about this,' but it didn't.

Instead I said, 'I'm going to make something out of it, and maybe next year...' And thank you for this moment on this stage with so many people who have already given me so much comfort, I just say to the TEDsters: I'm proud of me. I'm trying to take something bad and change it and make something good out of all these parts.

It's an original photo of Arthur Leipzig, which I loved so much.

I was a big record collector, but the record never came out. Remember, the film will burn. The film will burn.

So this was a 16mm safety film.

There are no more negative elements.

It was a letter from my father telling me to marry the first woman I married when I was 20.

That's my daughter and I.

she's still there Actually she is there this morning.

That's my house.

My family lives at the Hilton Hotel in Scotts Valley.

My wife, Heidi, didn't accept it as much as I did.

my kids Davey and Henry.

My son Davey was in the hotel for two nights.

So what I want to tell you in three minutes is that I appreciate the opportunity to share this with you. i will be back. I love being at TED.

I came to live it and I live it.

This is the view from our outside window in Santa Cruz in Bonny Doon, just 55 miles from here.

thank you everyone.

(applause)

I would like to introduce my mother.

(Laughter.) I don't think it was what you expected, nor was it what I expected. And thankfully, before I hugged the Asian man, I realized he wasn't my mother. Because it was so embarrassing.

Recognizing people is not my forte due to a genetic visual impairment that has no correction or cure.

As a result, I am legally blind, but I am more optimistic and preferable to being "blind".

(Laughter.) And I have a right to be labeled "disabled."

I hate when the word disabled is used to describe people.

It erupts in an undermining mindset that completely ignores abilities, abilities, and possibilities, instead prioritizing what is broken or missing.

The point of view can be obvious.

What can I do for him that he cannot do for himself?

Perhaps she will need accommodation that other employees of this company do not need.

Sometimes hidden prejudices come through softly.

"Wow, Susan, look back at everything you've done in your career and life.

Why did you do that when you're visually impaired? ”

(laughter) I'm failing at being disabled.

(Laughter) So, in the spirit of encouraging the pervasive failure of people around the world and asking the so-called normal people to take a break, here are five tips for failing as a disabled person.

Tip 1: Know your psychic powers.

The best teams I've led in my career so far have been based on superpowers, and we've even given ourselves fancy titles like the 'Pillars of Outstanding Insight'.

"Biscuit butterler"

(Laughter.) "Voice of reason."

We have achieved great results because we have relied on our strengths, our greatest strengths.

My inability to recognize my mother allows me to adapt smoothly, absorb and accurately process a vast amount of cues, find out what is important, judge multiple processes and possibilities for any situation I find myself in, and choose the one that makes the most sense. All this within seconds.

I see what other people don't see.

Some people think it's psychic, but my real psychic is bouncing off glass walls (lol) and making my friends walk around with kale between their teeth.

(laughs) It's true. Please don't eat lunch or dinner with me.

Tip 2: Be very skilled, very skilled at making mistakes.

Confidence in your superpowers is just as important as FUBAR.

It's "emphasized beyond recognition" for all of you millennials.

(Laughter) Here's a good example.

In one of the biggest sports arenas in the world (lol) but anywhere, when you accidentally walk into the men's restroom, it's not a good idea to say, 'Don't worry, everything here is too small to see' (lol).

I really hope that's not true.

I'm serious Better to just walk out and make them think you're drunk.

(laughs) Tip 3: Know that everyone has some kind of disability. For example, when you catch a cold and lose your sense of smell, it is only after drinking that you realize that the milk in your coffee was sour.

Just recently, a woman approached me looking excited.

She couldn't find the bakery she was looking for.

When I gestured in the direction I thought she should go, "There are no shops on this side of the street, so it's best to cross the street."

"There it is.

All I needed was another eye. ”

(Laughter) I just let her hold it.

I wanted to say that if you think logically, pay attention, and stay calm, you'll be fine, but who the hell am I?

Tip 4: Point out other people's faults.

This is best reserved -- very important note -- this is best reserved for people you know well. Because random strangers usually don't appreciate the moment they are taught.

A few years ago, my parents and I went to see Radio City's high-kick dancers The Rockets.

I leaned over my father.

"The two Rockets on the left are not kicking straight."

"Yes, it is."

"No, it's not."

"Yes, and how do you know?

I can not see it. ”

But I know what a straight line looks like.

I took pictures during the trip and presented him with evidence to prove I was right.

he saw the picture

I leaned further.

"Who is disabled now?"

Tip 5: Pursue bold goals.

Turn your expectations upside down, push your limits off the cliff, and meet your demise.

There's a college football linebacker who blitzes, tackles and recovers fumbles with one hand.

There is a teacher with Down Syndrome who has successfully passed on his knowledge and inspired countless students.

And my long list includes cycling from Kathmandu, Nepal to Darjeeling, India on the back seat of a two-seater bike.

It's going to be an exciting 620-mile adventure, and I'm sure I have blurry photos to show it off.

(laughter) Oh, before that, I forgot to introduce my mother.

you have to.

And here she is. Just like I appear to me from a crowd of people looking for her.

Or are you an Asian man?

thank you.

(applause)

cancer.

Many of us have lost family, friends and loved ones to this horrific disease.

I think some people in the audience are cancer survivors or are currently battling cancer.

I dedicate my heart to you.

The word is often associated with emotions such as sadness, anger, and fear, but we have good news from the front lines of cancer research.

In fact, we are beginning to win the battle against cancer.

In fact, we are at the crossroads of three of the most exciting developments in cancer research.

The first is cancer genomics.

A genome is the organization of all genetic information encoded by DNA within an organism.

In cancer, changes in DNA called mutations cause the cancer to spiral out of control.

About ten years ago, I was part of the team at Johns Hopkins University that mapped the first cancer mutations.

We did this first for colorectal cancer, breast cancer, pancreatic cancer, and brain cancer.

Since then, more than 90 projects in 70 countries around the world have worked to understand the genetic basis of these diseases.

Today, tens of thousands of cancers have been elucidated down to their molecular details.

The second revolution is precision medicine, also known as “personalized medicine”.

Instead of one-size-fits-all methods that can treat cancers, there are entirely new classes of drugs that can target cancers based on their unique genetic profiles.

A number of tailor-made drugs, called targeted therapies, now exist, and many more are in development, to help doctors customize treatments for patients.

The third exciting revolution is immunotherapy, which is really exciting.

Scientists have been able to harness the immune system in the fight against cancer.

For example, there are ways to find the switched off switch in cancer, and new drugs can turn the immune system back on to fight cancer.

There are also ways to take immune cells from the body, train them, manipulate them, and put them back into the body to fight cancer.

It's like science fiction.

When I was a researcher at the National Cancer Institute, I had the privilege of working with pioneers in this field and saw firsthand their progress.

It was pretty amazing.

Over 600 clinical trials have now been initiated and are actively recruiting patients to explore all aspects of immunotherapy.

These three exciting revolutions are underway, but unfortunately, this is only the beginning and there are still many challenges ahead.

Let's take the example of a patient.

This is a patient with skin cancer called melanoma.

That's terrible. Cancer disappeared everywhere.

But scientists have been able to map the mutations in this cancer and prescribe specific treatments that target one of the mutations.

And the results are almost miraculous.

The tumor seems to have almost melted away.

Unfortunately, this is not the end of the story.

This photo was taken a few months later.

The tumor has recurred.

The question is why?

The answer is tumor heterogeneity.

Let me explain.

Even a cancer as small as a centimeter in diameter has over 100 million different cells.

Although these different cancers are genetically similar, they have minor differences that make them prone to different drugs.

So even if you have a highly effective drug that kills almost all cells, there may be a minority population that is resistant to that drug.

This is the population that will eventually come back and take over the patient.

So the question is what to do with this information.

The key, therefore, is to apply all these exciting advances in cancer therapy as soon as possible, as soon as possible, before these resistant clones emerge.

The key to cancer and cancer cure is early detection.

And we know it intuitively.

Early detection of cancer leads to a better prognosis, and the numbers are clear.

For example, in the case of ovarian cancer, only 17 percent of women are alive after 5 years if the cancer is detected at stage 4.

However, more than 92% of women will survive if this cancer is detected early in Stage 1.

But the sad fact is that only 15 percent of women are detected at Stage 1, while the vast majority of 70 percent are detected at Stages 3 and 4.

We desperately need better cancer detection mechanisms.

The current best methods of screening for cancer fall into one of three categories.

The first is a medical procedure such as a colonoscopy for colorectal cancer.

The second is protein biomarkers such as PSA for prostate cancer.

The third is imaging techniques such as mammography for breast cancer.

Medical procedures are the gold standard. However, they are highly invasive and require extensive infrastructure to implement.

Protein markers are effective in some populations but are not very specific in some situations, resulting in a large number of false positives and requiring unnecessary work-ups and unnecessary steps.

Imaging modalities are useful in some populations but expose patients to harmful radiation.

Also, it is not applicable to all patients.

For example, mammography is problematic for women with dense breasts.

What we need, therefore, is a method that is non-invasive, has a light infrastructure, is highly specific, has no false positives, does not use any radiation, and can be applied to large populations.

More importantly, we need a method that can detect cancer before it reaches 100 million cells in size.

Does such technology exist?

Otherwise I wouldn't give a talk here.

We are happy to tell you about this latest technology that we have developed.

At the heart of our technology is a simple blood test.

The blood circulation system may seem like a mundane thing at first glance, but it is essential for us to live, supplying oxygen and nutrients to cells and removing waste products and carbon dioxide.

There is an important biological insight here. Cancer cells grow and die faster than normal cells. And when the cancer cells die, the DNA is shed into the blood system.

Since we know the characteristics of these cancer cells from various cancer genome sequencing projects, we can detect these cancers early by looking for their signals in the blood.

So instead of waiting until the cancer is big enough to cause symptoms, dense enough to be seen on imaging tests, or conspicuous enough to be visualized by medical procedures, you can start looking for cancer when it's relatively small by looking for these small amounts of DNA in the blood.

Now let me explain how to do this.

First, as I said earlier, we start with a simple blood test without using radiation or complicated equipment.

The blood is then sent to us and we extract the DNA from it.

Most of your body is healthy cells, but most of the detected DNA comes from healthy cells.

However, less than 1% is derived from cancer cells.

We then use molecular biology techniques to enable us to enrich this DNA for genomic regions known to be associated with cancer, based on information from the Cancer Genomics Project.

This DNA can then be put into a DNA sequencer to digitize the DNA into A, C, T, G and final reads.

The end result is billions of characters of information output by this run.

Statistical and computational techniques are then applied to help find the small signals present that indicate trace levels of cancer DNA in the blood.

So, does this actually work for patients?

There is currently no way to accurately predict which patients will get cancer, so we use the next best population: cancer in remission, and cancer in remission. Specifically lung cancer.

The sad fact is that even with the best medicines available to us today, most lung cancers will recur.

The key, therefore, is whether these cancer recurrences can be detected earlier than standard methods.

We have just completed a large trial investigating this in collaboration with Professor Charles Swanton of University College London.

Let me give you an example of a patient.

Below is an example of a single patient undergoing surgery at time zero followed by chemotherapy.

The patient has since been in remission.

He is being monitored using clinical tests and imaging methods.

Around day 450, the cancer unfortunately recurred.

The question is, can we figure this out sooner?

All this time we have been continuously drawing blood to be able to measure the amount of ctDNA in the blood.

Therefore, at the initial time point, as expected, there is a high level of cancer DNA in the blood.

However, this goes to zero at later times and remains negligible at later times.

However, there is an increase in cancer DNA in the blood around day 340 and finally further increases at days 400 and 450.

Here are the key points in case you missed it: At 340 days, there is an increase in cancer DNA in the blood.

This means we can detect this cancer more than 100 days earlier than traditional methods.

This means that treatment can be administered 100 days earlier, surgical intervention can be performed 100 days earlier, cancer can grow 100 days earlier, and resistance can develop 100 days earlier.

For some patients, those 100 days are a matter of life and death.

We are really excited about this information.

Because of this mandate, we are now doing additional research on other cancers, including breast, lung and ovarian cancer, and can't wait to see how quickly we can find these cancers.

After all, I have a dream with two vials of blood, and a dream that in the future, two vials of blood will be drawn as part of every standard medical check-up.

And from those two vials of blood, we'll be able to compare the DNA of all known cancer signs, hopefully detecting cancer as early as months or years.

Even with our current treatments, this means millions of lives could be saved.

Add to that recent advances in immunotherapy and targeted therapies, and the end of cancer is in sight.

I hope that the next time you hear the word “cancer,” you will feel even more hopeful.

hold up.

Cancer researchers around the world are working hard to beat this disease, and impressive progress is being made.

This is the beginning of the end.

We win the battle against cancer.

And for me this is amazing news.

thank you.

(applause)

I have a question for you here. How many scents do you think you can smell and possibly identify accurately?

100?

300?

1,000?

One study estimates that humans can detect up to 1 trillion different odors.

1 trillion.

It's hard to imagine, but your nose has the molecular machinery that makes it happen.

Olfactory receptors (tiny odor detectors) are packed into your nose, each patiently waiting to be activated by the odor, or ligand, it's assigned to detect.

It turns out that humans, like all vertebrates, have many olfactory receptors.

In fact, more of our DNA is devoted to genes for different olfactory receptors than to other types of proteins.

why is that?

Do olfactory receptors do anything else besides helping us smell?

In 1991, Linda Buck and Richard Axel revealed the molecular identity of olfactory receptors. This research eventually led to a Nobel Prize.

At the time, we all thought these receptors were only in the nose.

However, about a year later, it was reported that olfactory receptors were expressed in tissues other than the nose.

And then another such report came out, and then another report came out.

We now know that these receptors are present throughout the body, including in rather unexpected locations such as muscles, kidneys, lungs and blood vessels.

But what are they doing there?

Well, we know that olfactory receptors act as sensitive chemical sensors in the nose. That's how olfactory receptors mediate our sense of smell.

It turns out that they also function as sensitive chemical sensors in many other parts of the body as well.

Now, I'm not saying your liver can sense the aroma of your morning coffee when you walk into the kitchen.

Rather, the liver may be using olfactory receptors to chemically detect changes in the concentration of chemicals wafting through the bloodstream after you've had your morning coffee.

Many cell types and tissues in the body use chemosensors or chemosensors to track concentrations of hormones, metabolites, and other molecules, and some of these chemosensors are olfactory receptors.

If you need a specialized chemical sensor that can track specific molecules in your pancreas or kidney, why reinvent the wheel?

One of the first examples of olfactory receptors found outside the nose showed that human sperm express olfactory receptors and that sperm with these receptors look for chemicals that the receptor reacts to, the receptor's ligands.

That is, the sperm swims towards the ligand.

This has interesting implications.

Could the sperm help locate the egg by sniffing out the areas with the highest ligand concentrations?

I like this example because it clearly shows that the primary role of olfactory receptors is as a chemosensor. However, circumstances can affect how we perceive odors, which direction sperm swim in, and, as it turns out, a huge variety of other processes.

Olfactory receptors are thought to be involved in muscle cell migration, helping the lungs sense and respond to inhaled chemicals, and wound healing.

Similarly, taste receptors were once thought to exist only in the tongue, but are now known to be expressed in cells and tissues throughout the body.

Even more surprising, recent studies have found that photoreceptors in our eyes also play a role in blood vessels.

My lab is working to understand the role of olfactory and gustatory receptors in the kidney.

The kidney is the central control center of homeostasis.

And for us, it makes sense that homeostasis control centers would be a logical place to use chemical sensors.

We have identified a large number of different olfactory and gustatory receptors in the kidney, one of which, olfactory receptor 78, is known to be expressed in cells and tissues important for blood pressure regulation.

Deletion of this receptor in mice reduces blood pressure.

Surprisingly, it turned out that this receptor responds to chemicals called short-chain fatty acids, which are produced by the bacteria present in the gut, the intestinal flora.

After being produced by the intestinal flora, these chemicals are absorbed into the bloodstream where they can interact with receptors such as the olfactory receptor 78 . This means that alterations in gut microbiota metabolism can affect blood pressure.

We have identified a large number of different olfactory and gustatory receptors in the kidney and are just beginning to characterize their different functions and to understand which chemicals each responds to.

Similar studies are underway in many other organs and tissues, but only a small number of receptors have been studied so far.

This is exciting.

It fundamentally changes our understanding of the extent to which one of our five senses affects us.

And it has the potential to change our understanding of some aspects of human physiology.

It's still early, but I think I can smell what we're chasing.

(laughs) Thank you.

(applause)

The first time I cried underwater was in 2008 on Curacao, in the far south of the Caribbean.

It's beautiful there.

I was studying these corals for my PhD, and after many days of diving on the same reef, I got to know them personally.

I made friends with a coral colony and it was totally normal.

Hurricane Omar then shattered them, tearing away their skin, leaving behind fragments of scarred tissue that were difficult to heal and large pieces of algae-covered carcasses.

The first time I saw this damage all the way to the reef, I cried as I sank into the sand with my scuba gear on.

If corals can die so quickly, how can coral reefs survive?

And why did I make it my job to try to fight for them?

I had never heard of such a story by any other scientist until last year.

A Guam scientist wrote that he "cried in his mask" after seeing the damage to the reef.

Afterwards, the Australian scientist wrote, "We cried when we showed our students the results of our coral survey."

It's a good time to cry over corals.

(Laughter) That's because the Pacific reefs are losing coral at a rate never seen before.

Due to climate change, the water becomes so hot during the summer that these animals cannot function normally.

They vomit colored algae that live on their skin, and the clear, bleached tissue left behind usually starves and rots.

The skeleton is then covered with algae.

This is happening on an incredible scale.

The northern Great Barrier Reef lost two-thirds of its coral over hundreds of miles last year, and has since been bleaching again this year, with bleaching spreading further south.

Pacific reefs are plummeting right now, and no one knows how bad it will get.

The Caribbean, where I work, has already experienced a plunge.

The coral reefs there have been severely abused by humans for centuries.

We already know how the story will go.

And we may be able to predict what will happen next.

Let's look at the graph.

Since the invention of scuba, scientists have measured the amount of coral on the ocean floor and how it has changed over time.

And after centuries of continued human pressure, Caribbean coral reefs have met one of three fates.

Some reefs have rapidly lost coral.

Some reefs lost coral more slowly, but eventually stayed the same.

OK, so far it's not going very well.

However, on some reefs in the Caribbean, the best protected reefs and reefs some distance away from humans, they managed to keep the corals protected.

Why don't you try it?

And I've seen very few reefs reach zero.

The second time I cried underwater was on the north coast of Curacao in 2011.

It was the calmest day of the year, but diving there is always pretty sketchy.

My boyfriend and I swam against the waves.

I stared at the compass to find my way home and he was looking for sharks. After 20 minutes of swimming that felt like an hour, we finally landed on the reef. I was so shocked and overjoyed that my eyes filled with tears.

1000-year-old corals were lined up one after another.

They have survived the entire history of European colonialism in the Caribbean, and centuries before.

I had no idea what coral could do when given the opportunity to grow.

The truth is that even as we lose so much coral and go through this massive coral extinction, some reefs will survive.

Some have ragged edges, some are beautiful.

And protecting our coastlines, feeding us and supporting tourism will remain worth billions of dollars a year.

The best time to protect coral reefs was 50 years ago, the next best time is now.

Even with more frequent and widespread bleaching events, some corals could recover.

In 2010, a bleaching event occurred in the Caribbean Sea, stripping large sections of the skin from these boulder corals.

This coral has lost half of its skin.

But looking at the sides of this coral after a few years, this coral is actually healthy again.

They are doing the same thing as healthy corals.

They make copies of polyps, fight off algae, and reclaim their territory.

If a few polyps survive, the coral can regenerate. All you need is time, protection and the right temperature.

Some corals can regenerate in 10 years, while others take longer.

But the more stresses such as overfishing, sewage pollution, manure pollution, dredging and coastal construction are removed locally, the better they can withstand and the faster they can regrow when the climate stabilizes.

And even as we go through the long, grueling and necessary process of stabilizing the Earth's climate, some new corals still spawn.

This is what I study in my research.

We seek to understand how corals make babies and how they find their way to reefs, and invent new ways for corals to survive their early and vulnerable life stages.

One of my favorite baby corals appeared shortly after Hurricane Omar.

This is the same species I was studying before the storm, but it is really rare to see babies of this species very rarely.

This is actually an endangered species.

In this photo, this little baby coral, this little polyp ring, is a few years old.

It repels algae just like its bleaching mate.

And like their North Shore cousins, they aim to live to 1,000 years.

What is happening in the world and oceans has changed our timeline.

We can become incredibly pessimistic in the short term, lamenting what we have lost or taken for granted.

But we can still be optimistic in the long run and ambitious about what we fight for and what we expect from governments and the planet.

Corals have lived on Earth for hundreds of millions of years.

They survived the extinction of dinosaurs.

they are bad guys

(Laughter) Individual corals can experience great trauma and fully recover if given a chance and protected.

Corals have always played the long game, and now so do we.

Thank you very much.

(applause)

Today we will talk about technology and society.

The Department of Transportation estimates that 35,000 people died in traffic accidents in the United States alone last year.

Worldwide, 1.2 million people die each year in road accidents.

If there was a way to eliminate 90 percent of those accidents, would you support it?

Of course it is.

This is what self-driving car technology promises to achieve by eliminating human error, a leading cause of accidents.

Imagine yourself sitting in a self-driving car in 2030 and watching this vintage TEDxCambridge video.

(Laughter) Suddenly the car has a mechanical failure and can't stop.

If the car continues on its way, it will hit a large number of pedestrians crossing the road, but the car may swerve to save the pedestrian and hit a bystander, possibly killing him.

What should the car do, and who decides?

What if the car doesn't do that to save the pedestrian, and the car crashes into a wall, possibly killing you, the passenger?

This scenario is inspired by the trolley problem, invented by philosophers decades ago to think about ethics.

Now, how we think about this issue matters.

For example, we may not think about it at all.

You could say that this scenario is unrealistic, incredibly unlikely, or just plain stupid.

But I think this criticism misses the point. Because you're taking the scenario too literally.

Of course, such accidents do not happen. In any accident there are two or three options: everyone dies in some way.

Instead, the car calculates something like the probability of hitting a particular group of people. Deviating from one direction to another may slightly increase the risk to passengers or other drivers and pedestrians.

It's a more complex calculation, but it still involves trade-offs, and trade-offs often require ethics.

Then we might say, "Well, let's not worry about this.

Wait until the technology is fully ready and 100% secure. ”

Suppose we can actually eliminate 90 or 99 percent of these accidents in the next 10 years.

What if it took another 50 years of research to eliminate the last 1% of accidents?

Shouldn't we adopt that technology?

At current rates, 60 million people will die in car crashes.

So the point is that waiting until it's completely safe is also an option, and it comes with trade-offs.

People online on social media are coming up with all sorts of ways to stop thinking about this issue.

One person suggested that the car should somehow change course between passengers (laughs) and bystanders.

Of course, if that's what a car can do, it's what a car should do.

We are interested in scenarios where this is not possible.

And my personal favorite is a blogger's suggestion to put an eject button on the car and press it just before the car self-destructs (laughs).

(Laughter) So, if we allow the car to make trade-offs on the road, how do we think about those trade-offs and how do we make decisions?

Well, maybe we should do some research to find out what society wants. Because, after all, regulations and laws reflect society's values.

Here's what we did.

Together with my collaborators Jean-François Bonnefon and Azim Sharif, we conducted a study to present people with these types of scenarios.

We gave them two choices inspired by two philosophers, Jeremy Bentham and Immanuel Kant.

Bentham argues that cars should follow a utilitarian ethic. Even if the act kills a bystander and the act kills a passenger, actions should be taken to minimize overall harm.

Immanuel Kant said that automobiles should follow obligatory principles such as "thou shalt not kill".

So obviously you shouldn't do anything that harms humans, and you should let the car run its course, even if it might harm more people.

What do you think?

Bentham or Kant?

Here's what we found.

Most people sided with Bentham.

So people seem to want cars to be practical and to minimize harm overall, and that's what we all should do.

Problem solved.

However, there is a small pitfall.

When I asked people if they would buy such a car, they said, "Never."

(Laughter) They want to buy a car that protects them at all costs, but they want other people to buy cars that do the least damage.

(Laughter) I've seen this problem before.

It's called a social dilemma.

And to understand the social dilemma, we need to go back in history a bit.

In the 1800s, British economist William Forster Lloyd published a pamphlet describing the following scenario.

You have a group of farmers, namely English farmers, who share a common land to graze their sheep.

Now, if each farmer brings in a certain number of sheep, let's say 3 sheep, the land will rejuvenate, the farmers will be happy, the sheep will be happy, and all will be well.

Now, if one farmer brings in an extra sheep, he'll do a little better, and he won't hurt anyone else.

But if every peasant made a rational decision individually, the land would be devastated, to the detriment of all peasants and, of course, to the sheep.

This problem can be seen in many places, such as the difficulty of managing overfishing or reducing carbon emissions to mitigate climate change.

When it comes to regulation of driverless cars, current communal lands are basically public safety, which is in the public interest, and farmers are the passengers or vehicle owners who choose to ride in those vehicles.

And making the personally rational choice to prioritize one's own safety may reduce the common good as a whole and minimize overall harm.

This is traditionally called the "tragedy of the commons," but I think the problem could be a little more insidious in the case of self-driving cars, as individual humans aren't necessarily making such decisions.

Thus, automakers may only need to program their cars to maximize safety for their customers, and the cars may automatically learn that doing so requires slightly increased risk to pedestrians.

In the sheep analogy, we are like having an electric sheep with a mind of its own.

(Laughter.) And even if the farmers don't know it, they may go to graze.

So this is a tragedy of the Algorithm Commons, and it may introduce new types of challenges.

Traditionally, social dilemmas of this kind have traditionally been resolved using regulation, so governments or communities come together to collectively decide what outcomes they want and what constraints need to be placed on individual behavior.

And surveillance and enforcement can be used to ensure that the public interest is upheld.

So why don't we, as regulators, require all vehicles to minimize harm?

After all, this is what people say they want.

And more importantly, as an individual, if I buy a car that could cost me in the very rare case, while everyone else enjoys unconditional protection, I can be sure I'm not the only one doing it.

Our survey asked people whether they supported regulation. And here are the results we found:

First of all, people said no to regulation. And secondly, they said, "If you regulate the car and minimize the overall damage, I wouldn't buy the car."

So, ironically, regulating cars to minimize harm may actually cause more harm because people may not choose safer technology, even though they are much safer than human drivers.

I don't have the final answer to this mystery, but as a starting point, I think society should come together to determine trade-offs we are comfortable with, and come up with ways we can enforce those trade-offs.

As a starting point, my brilliant students Edmund Awad and Sohan D'Souza built a moral machine website that generates random scenarios. It's basically a bunch of random dilemmas where you have to choose what your car should do in a given scenario.

And even the age and race of the victims are changing.

To date, we have collected over 5 million decisions from over 1 million people worldwide from our website.

And this helps us understand early on what trade-offs people are comfortable with and what is important to them across cultures.

But more importantly, doing this exercise will help people realize how hard it is to make those choices and that regulators are being forced to make impossible choices.

And perhaps this will help us as a society understand what trade-offs will ultimately be made in regulation.

And indeed, I was delighted to hear that the first regulation from the Department of Transportation announced last week included a 15-item checklist to be provided by all automakers, with number 14 being ethical considerations. How are you going to deal with this?

It also encourages them to reflect on their decisions by outlining their choices.

Here's one example. Be warned that this is not your typical example, i.e. a typical user.

He is the most sacrificed and most saved person for this person.

(Laughter) Some of you may agree with him or her, but we don't know.

However, this person seems to favor passengers slightly over pedestrians in their choices, and happily punishes footbridges.

(Laughter) Let's finish.

We'll call it the ethical dilemma of what the car should do in certain scenarios: deviate from it or stay. I started with the question.

But then I realized the problem was something else.

It was a question of how to get society to agree and force trade-offs that they were comfortable with.

It's a social dilemma.

In the 1940s, Isaac Asimov wrote the famous Laws of Robotics, the Three Laws of Robotics.

Robots must not harm humans, robots must not disobey humans, and robots must not allow themselves to harm humans.

But after nearly four decades and many stories pushing these laws to their limits, Asimov introduced Law 0 above all else. That is, robots must not harm humanity as a whole.

I don't know what this means for self-driving cars and your specific situation, and I don't know how it might be enforced, but I hope that by recognizing that regulation of self-driving cars is not only a technical issue, but also a social cooperation issue, we can at least start asking the right questions.

thank you.

(applause)

(laughs) (laughs) That's SpotMini.

He'll be back in a little while.

Me -- (Applause) I love building robots.

And my long-term goal is to build robots that can do the same things humans and animals do.

And there are three things that we are particularly interested in.

The first is balance and dynamic mobility, the second is mobile manipulation, and the third is mobile perception.

Demonstrate dynamic mobility and balance.

I'm standing here balancing.

I know you are not very impressed. Well, how are you now?

(laughs) How are you now?

(Applause.) These simple features mean people can move almost anywhere on the planet, over any terrain.

We would like to capture it with robots as well.

What about operations?

I have this clicker in my hand. I don't see it, and I can operate it without problems.

But more importantly, you can move your body while holding the manipulators and clickers, stabilize and coordinate your body, and even walk.

This means I can move around the world, extend my arms and hands, and be able to handle almost anything.

So it's a mobile operation.

And you can do this too.

The third is recognition.

I'm looking at a room with over 1,000 people. My amazing vision system sees you all. You are stable in space as I move my head and move around.

This kind of locomotion awareness is very important for robots that move and behave in the world.

I would like to give a brief status report on how we are proceeding with robot development for these purposes.

The first three robots are all dynamically stabilized robots.

This goes back a little over ten years. It's "Big Dog".

It has a gyroscope to keep it stable.

It has sensors and a control computer.

This is a cheetah robot running with a sprinting gait. It's constantly doing the math to recycle energy, bounce off the ground, and maintain steady propulsion.

And this is a larger robot that can navigate deep snow with very good leg locomotion.

The depth is about 10 cm, but there is no particular problem.

This is Spot, a new generation of robots. It's a little older than the robots that appeared on stage.

And we've all heard of drone delivery. Can I use a drone to deliver packages to my house?

So what about old-fashioned legged robot deliveries?

(Laughter) So we've been taking robots to employees' homes and (Laughter) to see if we can break into different access methods.

Believe me, the Boston area has all sorts of winding staircases.

So it's really a challenge.

But we're doing very well, about 70% of the way there.

And this is a move operation. Attach the arm to the robot and proceed through the door.

Now, one of the key things about building an autonomous robot is not having it do exactly what you say, but also dealing with the uncertainty of what happens in the real world.

So Steve, one of the engineers, is there, giving the robot a hard time.

(Laughter) And the fact that programming still tolerates all that interference is that it does exactly what it's supposed to do.

Here's another example, where Eric is pulling the robot as he climbs the stairs.

Believe me, getting a robot to behave the way it should in such situations is very difficult, but the result is a robot that generalizes and becomes much more autonomous than it otherwise would have been.

This is the humanoid robot Atlas.

This is the 3rd generation humanoid that we are building.

We'll talk a little bit about the hardware design later.

And we kept saying: How close to human-level performance and speed can you get in a normal task like moving boxes on a conveyor?

It reaches about two-thirds the average human speed.

And since this robot is ambidextrous, bodily and treaded, it is truly an example of dynamic stability, mobile manipulation and mobile perception.

Now -- (Laughter) We actually have two Atlases.

(Laughter) Well, not everything goes as planned.

(Laughter) (Laughter) (Laughter) And this is the newest robot called "Handle".

The steering wheel is interesting, half like an animal, half like a leg or something else with wheels.

It's a funny way to put your arm on, but it actually does some amazing things.

It can carry 100 lbs.

We'll probably do more than that, but so far we've hit 100.

Despite having wheels, it has pretty good rough terrain capability.

And handles love to put on a show.

(Laughter) (Applause) I want to talk a little bit about robot religion.

Many people think of a robot as a machine with a computer that tells it what to do, and that the computer listens for information through sensors.

But that's really only half the story.

The real story is that the computer makes suggestions to the robot on one side and the physics of the world at work on the other.

And that physics includes gravity, friction, and bouncing off objects.

It is my belief that successful robots must be designed in software, hardware, and behavior all at once, with a holistic design in which all these parts really intertwine and work together.

And when perfect design is achieved, true harmony is achieved between all interacting parts.

So half software, half hardware, and behavior.

We recently did some work on the hardware. The photo on the left is a conventional design, with conductors, tubes, connectors, and other parts all bolted together.

And the right side is more integrated. It should look like an anatomy diagram.

Using the miracle of 3D printing, we are starting to build robot parts that closely resemble animal anatomy.

This is the upper part of the leg with the hydraulic pathways such as actuators, filters, etc., all embedded and all printed as one part, the whole structure being developed with knowledge of what the loads and movements will be from data recorded from robots, simulations etc.

In other words, it is a data-driven hardware design.

Using such a process, not just the upper leg, but everything else, our robot went from being a big, huge, bulky, slow and bad robot, one that weighed about 400 pounds on the right side, to one that weighed about 190 pounds in the middle just in the video, just a little bit heavier than me. And we have a new robot. This works, and I'm not going to show you yet, but the left side weighs only 200 pounds. At 165 lbs, strength and capacity are all the same.

So these things are improving really fast.

So it's time for Spot to come back. We demonstrate a little mobility, dexterity, and perceptiveness.

This is Seth Davis, my robot Wrangler for today. He steers Spot to give it a rough direction, but all the coordination of the legs and sensors is done by the robot's onboard computer.

Robots can walk in different gaits. It has a gyro, or solid-state gyro, and an IMU.

Of course, batteries are also installed.

One of the great things about legged robots is that they are omnidirectional.

In addition to moving forward, you can also move sideways and turn on the spot.

And this robot is a bit of an attention grabber.

I love doing dynamic walks like running -- (Laughter) And there's one more thing.

(Laughter) If this was really a show off, I'd be jumping on one leg, but hey.

Well, Spot has a series of cameras (stereo cameras) here, with a feed up in the middle.

It's a little dark inside the audience, but I plan to use the camera to observe the terrain in front of me while overcoming obstacles.

In this demo, seth pilots, but the robots all do their own terrain planning.

This is a topographic map, where the data from the camera is unfolding in real time, showing red spots as places you don't want to step on and green spots as good places.

And here we treat them like stepping stones.

So try to stay on the block and adjust your stride. Such maneuvers require a great deal of planning, all of which is done in real time, adjusting the stride a little longer or a little shorter.

Then change this to another mode. In this mode, blocks are treated like terrain, deciding whether to step up or step down as you progress.

So this is using dynamic balance and mobile perception. Because you have to adjust what you see along with how it works.

Another feature of the Spot is a robotic arm.

Some might think this is the head and neck, but believe me, it's the arms.

Seth is driving it.

He's actually moving his hands and his body is following.

So the two are aligned in the way I talked about earlier, the way people can do it.

In fact, one of Spot's coolest features is called "chicken head mode," where you keep your head fixed in one place in space and move your body around.

There's a variation of this called "twerking" -- (Laughter), but we're not going to use that today.

(Laughter) So, Spot: I'm kind of thirsty. Can I have a soda, please?

In this demo, Seth does not drive.

The robot has a LIDAR on its back and uses props placed on the stage to locate itself.

I have been to that place.

Now he uses a handheld camera to find and pick up the cup, but again Seth is not driving.

We plotted a path for it to go -- it seemed to go off course -- and now Seth is to take over control again. Because I'm a little reluctant to let Seth run by itself.

Thank you Spot.

(Applause.) So Spot: You just finished your TED performance, what do you think?

(laughs) Me too!

(laughter) Thanks to everyone and the team at Boston Dynamics for all the hard work behind the scenes.

(Applause) Helen Walters: Mark, come back in the middle.

Come over here, I have a question.

UPS and package delivery were mentioned.

What other applications do you see for your robot?

Mark Leibert: You know, I think robots with the capabilities I've been talking about are going to be very useful.

About a year ago I went to Fukushima to see the situation there. There is a great need for a machine that can go to a dirty place and help repair it.

I don't think it will be long before such robots are introduced into the home. One of the great needs is to care for the elderly and disabled.

I don't think it's long before we use robots to take care of our parents, or perhaps even have our children help us take care of them.

There are many others.

I think there is a limit.

Many of the ideas we haven't come up with yet help people like you to come up with new applications.

HW: So what about the dark side?

What about the military?

are they interested?

MR: Yes, the military has funded robotics a lot.

I don't consider the military to be the dark side, but I do believe that, like all high tech, it can be used for anything.

HW: Great. Thank you very much.

MR: Okay, you're welcome.

thank you.

(applause)

I love museums.

Have you ever been to a natural history museum?

in New York City?

(Applause.) So one of the things I do is take my kids to museums.

Recently I took them to the Natural History Museum.

I had two sons, Sabian and Davis.

And when you enter the main entrance of the museum, there is a wonderful sculpture of Teddy Roosevelt.

You guys know which one I'm talking about.

Teddy Roosevelt sits there with one hand on his horse, bold and strong, with his sleeves rolled up.

I don't know if it's shirtless, but it's like that.

(Laughter.) And to his left is a Native American walking.

And to his right is an African American walking.

And as we climbed the stairs and approached the sculpture, my eldest son, nine years old, said. "Dad, why do they have to walk when he can get in the car?"

It stopped me.

It stopped me.

It takes a lot of history to explain it, but I'm going to do it to them anyway.

That's a question I probably never asked.

But basically what he meant was, "That looks unfair.

Dad, that's unfair.

And why such unfair things are put outside such a nice establishment. ”

His question made me wonder. Is there a way we can fix public sculptures and national monuments?

I can't turn it off, is there a way to fix it?

Now, I didn't grow up going to museums.

It's not my history.

My mother was 15 when I was born.

she is wonderful

My father struggled with himself for most of my life.

If you really want to know the truth, the only reason I got into art is because of women.

There was an amazing, wonderful, wonderful, beautiful and smart woman who was 4 years older than me and I wanted to date her.

But she said, "You are too young and don't think about your future."

So I kept running to junior college, enrolled in some classes, ran again, and was basically like, "Now I'm thinking about my future."

(laughs) "Can I go out?"

For the record, she's even more amazing.

i married her

(Applause.) So when I randomly ran into a junior college and signed up for classes, I wasn't really paying attention to what I was signing up for.

(Laughter) So I ended up taking an art history class, but I didn't know anything about art history.

But when I entered that class, something amazing happened.

For the first time in my college career, visual intelligence was called for.

It is the first time.

The professor showed an image of bold strokes of blue and yellow and said, "Who is that?"

And I said, "That's Van Gogh. Clearly that's Van Gogh.

i got this "

(laughs) I got a B in that class.

For me it was amazing.

Let's just say I wasn't a good student in high school. OK?

My GPA in high school was .65.

(laughs) First decimal point, 6 5.

So it was very, very, really big that I got a B.

And this became my strategy, a tactic for understanding everything else, thanks to the fact that I realized that I could learn visually things that I could not learn otherwise.

I wanted to continue this relationship. Things were going well.

I decided to continue with my art history class.

One of my last art history classes, I will never, never forget.

It was one of my art history research classes.

Has anyone ever taken an investigative art history class that tried to teach the whole art history in one semester?

All I'm talking about is cave paintings and Jackson Pollock meshing in the same way. It doesn't really work, but they try anyway.

Now, when I looked at the book at the beginning of the semester, in this 400-page book, there was a 14-page section on black people in painting.

Well, this was jam-packed with sections about black people drawing and black people drawing.

It wasn't very picky, let's just say so.

(Laughter) Nonetheless, I was really excited about that, because in other classes I've taken, we haven't even had that kind of conversation.

We didn't talk about it at all.

So imagine my surprise when I went to class and on the day I was supposed to study that particular chapter, my professor told me, "I don't have time to read this chapter today, so I'm skipping it."

"Oh, I'm sorry, please wait a minute, Sensei, Sensei.

sorry. This is a really important chapter for me.

Will you consider it someday? ”

"Titus, I don't have time for that."

"I'm sorry, I'm sorry, I'm sorry, I really want you to understand.

Clearly the author thinks this is important.

why skip this? ”

"Titus, I don't have time for that."

"OK, last question, I'm really sorry.

I need to talk, so when can I talk? ”

(Laughter) I went to her office hours.

I ended up being kicked out of her office.

I went to the dean.

The dean eventually said, "You can't force her to teach you anything."

And in that moment I knew that if I wanted to understand this history, if I wanted to understand the role of those who had to walk, perhaps I would have to figure it out for myself.

So...

Above you on this slide is a painting by Frans Hals.

This is one of the kinds of images that were in that chapter.

I taught myself how to draw by going to museums and looking at images like this.

I have something to show you.

I made this.

I -- (applause) made some changes.

You can see the slight difference in the paint.

All the art history I have absorbed has helped me understand that painting is a language.

There's a reason he's the tallest in this composition.

There is a reason the painter is showing this gold necklace here.

In these paintings he is trying to tell us something about the economic status of these people.

Painting is a visual language and everything in the painting has meaning and is important.

coded.

However, in some cases, the configuration structure and configuration hierarchy can obscure other things.

This silk should also tell you that they have a lot of money.

In art history, more has been written about dogs than about this other character.

Historically speaking, a study of this kind of painting tells us more about the lace that the woman wears in this painting, the maker of the lace, than about this person, about his dreams and hopes, what he wanted out of life.

I have something to show you.

Do not think that this is about eradication.

it's not.

The oil I put in this paint is linseed oil.

Eventually these faces will emerge bit by bit as they become transparent over time.

What I'm trying to do, what I'm trying to show you, is a way to shift your gaze just a little, just a moment, just a moment, and ask yourself: Why do some people have to walk?

What is the impact of this kind of sculpture in museums?

What effect does this kind of painting have on the most vulnerable people in society, who constantly see this kind of depiction of themselves?

I'm not saying turn it off.

This history cannot be erased.

It's real. we have to know that.

We think of it the way we think of it. Let's go back for a moment.

You remember those old cameras that actually needed to be in focus when taking a picture. right?

If you put the camera up and I want to focus on you, move the lens slightly to the left and you come forward.

If you move the lens slightly to the right, the people in the background will come out when you move it back.

I'm just trying to do it here.

I'm about to give you that chance.

I am trying to answer that question my son had.

I want to create paintings and sculptures that are honest and that speak to the diversity and progress of the present while also fighting the conflicts of the past.

And you can't do that by using an eraser to remove things.

It doesn't work.

I think it should be the same as the US Constitution.

When the situation arises where we want to change a law of the American Constitution, we will not remove any other law.

Plus the "this is where we were, but this is where we are now" fix.

If we can do that, I think it helps us understand a little bit where we're going.

thank you.

(applause)

Lonely.

All of us in this room will experience loneliness at some point in our lives.

Loneliness is not a function of being alone, but rather of how socially connected you are with the people around you.

In this room right now, there may be someone surrounded by a thousand people who feels lonely.

And while loneliness can have many different causes, as an architect I'm going to tell you today that loneliness can be a result of our built environment, the very home we choose to live in.

Let's take a look at this house.

It's a lovely house.

There is a large yard, picket fence and parking for 2 cars.

And the house may be in a neighborhood like this.

And for many people around the world, this home, this neighborhood, it's a dream.

But the danger in achieving this dream is a false sense of connection and increased social isolation.

I know, now I can hear someone in the room yelling at me in my head, "That's my house, that's my neighborhood, I know everyone on my block!"

To which I answer, "Great!"

And I wish there were more people like you. Because I think there are more people in this room who live in similar situations and don't know their neighbors.

They may notice and greet them, but hold their breath and ask their spouse, "What's your name again?"

You can ask questions by name to show that you know who you are.

Social media also contributes to this false sense of connection.

This image is probably all too familiar.

Standing in an elevator, sitting in a cafe and looking around, everyone is using their mobile phones.

You're not texting or checking Facebook, but everyone else is, and you've probably been in a situation like me where you make eye contact, smile and say hello, and the person pulls out their earbuds and says, "Sorry, what did you say?"

I find this incredibly isolating.

The concept I want to share with you today is the antidote to isolation.

It's not a new concept.

In fact, this is an ancient way of life that still exists in many cultures around the world outside of Europe.

And about 50 years ago the Danes decided to make a new name, and since then tens of thousands of Danes have been living in this connection.

And it's being pursued more extensively around the world as people seek community.

This concept is cohousing.

Cohousing is a purposeful neighborhood where people get to know each other and care about each other.

With cohousing, you have your own home, but you also share significant spaces, both indoors and outdoors.

Before I show you some cohousing pictures, I'd like to introduce my friends Sheila and Spencer first.

When I first met Sheila and Spencer, they had just entered their sixties and Spencer was looking to the end of his long career in primary education.

And I really hated the idea that I might not have kids when I retired.

They are my neighbors now.

We live in a co-housing community that I have not only designed but developed and practiced building.

This community is very intentional about our social interactions.

Then let me guide you on the tour.

From the outside, ours looks like any other small apartment.

In fact, we look the same as our neighbors, except we are bright yellow.

Inside the house is quite traditional.

We all have living rooms, kitchens, bedrooms and bathrooms, and we have nine of these houses around a central courtyard.

This is mine, this is Spencer and Sheila's.

It's not the house that makes this building unique as a cohousing, but rather what's happening here: the central courtyard and the social interactions that take place around it.

Looking out over the courtyard, I look forward to meeting Spencer and Sheila.

In fact, every morning I see Spencer waving wildly at me as I make breakfast.

Overlooking the courtyard from the house, you can see children and adults playing in different combinations and playing together, depending on the season.

Lots of laughter and chatter.

There are many hula hoops.

And sometimes, "Hey, stop hitting me!"

Or the cries of children.

These are the sounds of our daily life, the sounds of social connection.

At the bottom of the courtyard is a double door that leads to the apartment complex.

I consider Common House to be the secret sauce of cohousing.

It's the secret sauce because it's where social interaction and community life begins and radiates from there to the rest of the community.

We have a large dining room in our flat that seats all 28 of us and our guests, and we eat together three times a week.

To support their meals, they have a large kitchen, where three people can take turns cooking.

That means, with 17 adults, I will lead the cooking once every six weeks.

On two other occasions, I help the team prepare and clean up.

And every other night I just show up.

I have dinner, talk to my neighbors, get a good meal from someone who cares about my vegetarian preferences, and then go home.

Our nine families are deliberately choosing a different lifestyle.

Instead of pursuing the American dream that might be isolated in a single-family home, we chose co-housing to increase our social connections.

This is how communal living begins. There is a common intention to live cooperatively.

And intent is the single most important feature that distinguishes cohousing from other housing models.

It's hard to see the intentions, even to show them, but I'm an architect, so I can't help but show more pictures.

So here are some examples to illustrate how intent is expressed in some of the communities I have visited.

We carefully select furniture, lighting, and sound materials to support eating together. Discreet visual positioning and visual access to children's play areas around and inside the apartment complex. Given the size and distribution of social nodes that gather in and around communities to support our daily lives, all of these spaces help contribute to and enhance each community's sense of community.

what was that word? "Communitas".

Communitas is a fancy term in social science that means "the spirit of community."

And in visiting over 80 different communities, my community metrics were: "How often did the residents eat together?"

How often they eat common meals is entirely up to each group, but some groups I know have been eating together every night for the last 40 years.

I know someone who has a potluck party once or twice a month.

My observation is that people who eat together more often indicate a higher level of communion.

I've found that when we eat together, we start planning more activities together.

Eating together allows us to share more.

Start observing each other's children.

We will lend you a power tool. We borrow each other's cars.

Despite all this, as my daughter often says, it's not all rainbows and unicorns in the flats, and I'm not best friends with everyone in the community.

We have differences and even conflicts.

However, those of us who live in communal housing are consciously thinking about human relationships.

We are motivated to resolve our differences.

We will follow up, confirm, speak our personal truths and apologize when necessary.

Skeptics would say that cohousing is only interesting or attractive to a small percentage of people.

And I agree with that too.

If you look at Western cultures around the world, only a small percentage of people live in cohousing.

But it needs to change because our very lives depend on it.

In 2015, Brigham Young University completed a study showing that people living in quarantine have a significantly increased risk of early death.

The US Surgeon General has declared quarantine a public health epidemic.

And this fad isn't just limited to the United States.

So when I said earlier that cohousing is the antidote to isolation, I should have said cohousing can save your life.

If I were a doctor, I would say take two aspirin and call me in the morning.

But as an architect, I would suggest you take a walk with your neighbors, eat together, and call me in 20 years.

thank you.

(applause)

So, 24 years ago, I was invited to serve as art editor at The New Yorker magazine, and I worked to rejuvenate the somewhat solidified magazine, welcome new artists, and pull the magazine out of its ivory tower and into the times.

And it was just right for me. Because I've always been fascinated by how simple drawings can cut through the torrent of images we see every day.

How can you capture a moment, embody social trends and complex events in a way that many words cannot describe, and how can you reduce it to its essence and turn it into a cartoon?

So I went to the library and saw the first cover drawn by Rhea Ervin in 1925. A dandy staring at a butterfly through a monocle, we call it Eustace Tilly.

And as the magazine became known for its in-depth research and lengthy reports, I realized that some of the humor got lost along the way. Eustace Tilly is now often seen as an arrogant dandy, but in fact, when Leah Irvine first painted this image in 1925, he painted it as part of a humor magazine to entertain the youth of the time, the flappers of the tumultuous '20s.

And in the library I found an image that really captured the Depression zeitgeist.

And it showed us not just how people dressed and what their cars were like, but what made them laugh and what their prejudices were.

And I really got a sense of what it feels like to be living in the 30's.

So I called on contemporary artists like Adrian Tomine here.

I often call on narrative artists, such as cartoonists or children's book writers, and give them a theme, like what it's like to ride the subway, or Valentine's Day, and they send me a sketch.

And when the sketch is approved by editor David Remnick, it's done.

And I love that those images don't really tell you what to think.

But they make you think, because the artist really is -- it's almost a puzzle. The artist draws a dot and you, the reader, have to complete the picture.

So to get this left image by Anita Kunz, or the right image by Tomer Hanuka, you need to find the difference.

and it is...

It's really exciting to see how you engage with your readers...

Test your stereotypes on what these images really look like.

But once you understand it, the stereotypes in your head will be sorted out.

But images need not just show people, sometimes they show emotions.

In the immediate aftermath of September 11th, I, like everyone else, was completely unsure of how to deal with what we were going through. And I felt that no image could capture this moment, so I wanted to capture only the black cover, like no cover.

So I spoke with my husband, the cartoonist Art Spiegelman, and I said I was going to suggest it, and he said, "Oh, if you're going to do a black cover, why not draw the silhouettes of the Twin Towers in black on black?"

And I sat down to paint this, and the moment I saw it sent a shiver down my spine, and I realized that in refusing to create an image, we had found a way to capture loss and grief and absence.

And what I've learned along the way is that some images say the most important things, and sometimes they do it the most affordably.

A simple image can say a lot.

Here is an image released by Bob Stark shortly after Barack Obama's election that captures the historic moment.

But you can't really plan for this. Because to do this, we need the artist to experience the emotions we all feel in that moment.

Back in November 2016, during last year's election, the only image we could share was this one on the stand the week everyone voted.

(Laughter) Because I knew someone would feel that way when the election results came out -- (Laughter).

We were really stumped when we found out the results. And here's another image sent by Bob Stark that really struck a chord with me.

Again, I have no idea what's going to happen next, but I felt like I didn't know how to move forward here, but I did. Here's the image we released when the Women's Marches were held across the United States after Donald Trump's election.

Over the last 24 years, I have seen over 1,000 images produced each week. People often ask me which one is my favorite, but I can't pick one. Because what I am most proud of is how different each image is.

It is due to the talent and diversity of all the contributing artists.

And now, well, now we're Russian property, so -- (laughter) In this rendering here by Barry Britt, Eustace is Eustace Vladimirovich Tilly.

And that butterfly is none other than Donald Trump, who flapped his wings in amazement trying to figure out how to control the butterfly effect, and the famous logo painted by Ray Irvin in 1925 is now in Cyrillic.

So what I'm really excited about at this moment is how...

As you know, press freedom is essential to our democracy.

And from the sublime to the absurd, using only ink and watercolor, we see how artists can capture what's going on and participate in a cultural dialogue.

It's what puts those artists at the center of that culture, and I think that's exactly where they should be.

Because what we need now is a good comic.

thank you.

(applause)

A decade ago, computer vision researchers thought it would be nearly impossible for a computer to tell the difference between a cat and a dog, even if the state of artificial intelligence had advanced significantly.

Now we can do it with over 99% accuracy.

This is called image classification. Given an image, label that image. Computers recognize thousands of other categories as well.

I'm a graduate student at the University of Washington working on a project called Darknet, a neural network framework for training and testing computer vision models.

So let's see what the darknet thinks of this image we have.

If you run the classifier on this image, you'll find that not only do you get dog or cat predictions, you actually get predictions for a specific breed.

That's the level of granularity we have now.

And that's right.

My dog ​​is actually a malamute.

We've made amazing progress in image classification, but what happens when you run a classifier on an image like this?

good ...

We can see that the classifiers return almost similar predictions.

That's right. There's a malamute in the image, but given this label it doesn't really tell us much about what's going on in the image.

I need something more powerful.

I'm working on a problem called object detection. Look at the image to find all the objects, put a bounding box around them and determine what those objects are.

Here's what happens when I run the detector on this image:

With these results, we can do even more with computer vision algorithms.

You can see that it recognizes that there is a cat and a dog.

It knows their relative positions and sizes.

You may also know additional information.

There is a book inside.

If you want to build a computer vision-based system, such as a self-driving car or a robotic system, this is the information you need.

We need something to allow us to interact with the physical world.

Well, when I started working on object detection, it took 20 seconds to process one image.

To understand why speed is so important in this field, here's an example of an object detector that takes 2 seconds to process an image.

So this is 10x faster than a detector with 20 seconds per image, and we know the state of the whole world has changed by the time we make a prediction. This is not very useful for applications.

Speeding this up another 10x means that the detector is running at 5 frames per second.

It's much better, but you don't want such a system driving your car if there's critical movement, for example.

This is a detection system running in real time on my laptop.

So it tracks me smoothly as I move through the frame and is robust to different changes in size, pose, forwards and backwards.

This is fantastic.

This is really what you need when building systems on top of computer vision.

(Applause.) In just a few years, we went from 20 seconds per image to 20 milliseconds per image, a thousand times faster.

How did you get there?

Previously, an object detection system would take such an image, divide it into a number of regions, run a classifier on each of these regions, and the high score of that classifier would be considered a detection in the image.

However, this required thousands of runs of the classifier on the images and thousands of neural network evaluations to generate the detections.

Instead, we trained a single network to do all detections.

Generate all bounding boxes and class probabilities simultaneously.

Our system only needs to look at the image once instead of thousands of times to make a detection. That's why we call it the YOLO method of object detection.

With this speed, you are no longer limited to just images. Video can be processed in real time.

And now we don't just see that cat and dog, we get to see them move around and interact with each other.

This is a detector trained on 80 different classes in Microsoft's COCO dataset.

There are all kinds of things like spoons and forks, bowls and common objects like that.

Animals, cars, zebras, giraffes and many more exotic ones.

And now it's time to do something fun.

We're going to go out to an audience and see what we can detect.

Anyone want a stuffed animal?

There are some teddy bears there.

And we can lower the threshold of detection a bit, so we can find more of you in the audience.

Let's see if we can get those stop signs.

I found some backpacks.

Let's zoom in a little.

And this is great.

And all the processing happens in real time on your laptop.

And it's important to remember that this is a general-purpose object detection system, so it can be trained for any image region.

The same code you use to find stop signs, pedestrians, and self-driving bikes can be used to find cancer cells in tissue biopsies.

And there are already researchers around the world using this technology for advances in medicine, robotics, and more.

This morning I read in the newspaper that they are conducting animal census in Nairobi National Park using YOLO as part of this detection system.

That's because Darknet is open source, public domain, and free for anyone to use.

(Applause.) But we wanted to make detection more accessible and easy to use, so we combined model optimization, network binarization, and approximation to make it possible to actually run object detection on a mobile phone.

(Applause.) And I'm really excited. Because there is a very powerful solution to this low-level computer vision problem that anyone can build something with.

The rest is up to you and the people around the world who have access to this software. I can't wait to see what people build with this technology.

thank you.

(applause)

The first time I felt fear was when I was 41 years old.

People always called me brave.

As a child, he climbed the tallest trees and approached any animal without fear.

I liked challenges.

My father used to say, "Good steel can withstand any temperature."

And when I got involved in Colombian politics, I assumed I could withstand any temperature.

I wanted to end corruption. I wanted to cut ties with politicians and drug traffickers.

The first time I was elected, it was because I singled out corrupt and untouchable politicians.

I also accused the president of his association with the cartels.

That's when the threats started.

One morning I had to send my young children out of the country in secret to the airport in the French ambassador's armored car.

A few days later, I was attacked but survived.

The following year, the Colombian people elected me with the most votes.

I thought people were applauding me because I was brave.

I thought I was brave too.

But I wasn't.

I had never experienced true fear before.

The situation changed on February 23, 2002.

At the time, I was campaigning as a presidential candidate in Colombia and was detained by an armed group.

They were dressed in military uniforms.

I saw their boots. They were rubber.

And I knew that the Colombian army wore leather shoes.

I knew they were FARC guerrillas.

From that point on everything happened very quickly.

The special forces leader ordered us to stop the vehicle.

Meanwhile, one of his subordinates stepped on an anti-personnel landmine and flew through the air.

He landed sitting upright in front of me.

We made eye contact, and then the young man realized that the rubber boots with their feet in had landed far away.

(sigh) He started screaming like crazy.

And to tell the truth, as I am reliving these emotions, as I am feeling now, at that moment I felt something inside me break and become infected with his fear.

My mind went blank and I couldn't think of anything. It was paralyzing.

When I finally responded, I said: "They're going to kill me, and I didn't say goodbye to my children."

When they took me to the deepest part of the jungle, the FARC soldiers declared that they would kill me if the government did not negotiate.

And I knew the government wouldn't negotiate.

Since then, I have fallen asleep in horror every night - cold sweats, shivering, stomachaches, insomnia.

But worse than that, what was happening in my mind was that my memory had been erased of all phone numbers, addresses, names of loved ones, and even important events in my life.

So I started doubting myself and my mental health.

And with doubt came despair, and with despair came melancholy.

I was plagued with infamous behavioral changes, but it wasn't just paranoia in moments of panic.

It was mistrust, hatred, and the urge to kill.

I realized this when they chained my neck to a tree.

It was raining tropically that day, so they let me outside.

I remember suddenly wanting to go to the bathroom.

"Whatever you have to do, do it in front of me, girl," the guard shouted at me.

And I decided at that moment to kill him.

And for days, filled with hatred and fear, I made plans, tried to find the right time, the right way.

Then suddenly I got up and got out of the situation and thought, 'I'm not going to be one of them.

I'm not going to be an assassin.

I still have plenty of freedom to decide what I want to be. ”

It was then that I learned that fear confronts itself.

It forced me to align my energies and align my meridians.

I have learned that facing fear is the path to growth.

Talking about all of this raises a lot of emotions, but in retrospect I can identify the steps I took to do it.

I would like to share three of them with you.

The first was to follow the principles.

I was in the midst of panic and mental block, and I realized that if I followed my principles, I would do the right thing.

I remember my first night in a concentration camp that the guerrillas had built in the middle of the jungle. We had 12 foot high bars, barbed wire, guards on all four corners and armed men pointing their guns at us 24 hours a day.

That morning, the first morning, some men arrived and shouted, "Count off! Count off!"

Fellow hostages awoke, startled, and began to identify themselves in numerical order.

But when it was my turn, I said, "Ingrid Betancourt.

Call my name if you want to know if I'm here. ”

The rage of the guards was nothing compared to the anger of the other hostages. Because obviously they were scared – we were all scared – and they were afraid that they would be punished because of me.

But for me, beyond fear, was the need to protect my identity, to prevent them from turning me into objects and numbers.

That was one of the principles. It is to protect what I consider to be human dignity.

But don't get me wrong. Guerrilla had analyzed everything very well. They've been kidnapping for years, developing techniques to crush us, defeat us, and divide us.

And the second step was learning how to build supportive trust, how to come together.

The jungle is like another planet.

It's a world of shadows and rain, filled with the hum of millions of insects, including Magina ants and bullet ants.

I didn't stop scratching for a single day while in the jungle.

And of course there were tarantulas, scorpions and anacondas...

I once encountered a 24-foot-long anaconda that seemed to swallow me in one bite.

Jaguars...

But what I want to say is that none of these animals has done more harm to us than humans.

The guerrillas terrorized us.

They spread rumors.

Among the hostages they caused betrayal, envy, resentment and mistrust.

It was with Lucho that I ran away after a long time.

Lucho was a hostage two years longer than I was.

We decided to tie ourselves up with a rope to gain strength to submerge ourselves in dark water full of piranhas and crocodiles.

What we did was hide inside the mangroves during the day.

And at night we went out into the water and swam with the current.

It lasted for several days.

But Lucho fell ill.

He has diabetes and has fallen into a diabetic coma.

So the guerrillas captured us.

But after going through it with Lucho and facing our fears together, neither punishment, nor violence, but unity, can no longer divide us.

What is certain is that all guerrilla operations were so harmful to us that tensions still exist among some of the hostages of those days under the influence of the poison they produced.

The third step is very important to me and a gift I want to give you.

The third step is learning how to develop faith.

I would like to explain it as follows. John Frank Pinchao was a police officer who was a hostage for over eight years.

He was famous for being the scariest cat among us.

But Pincho -- I called him "Pincho" -- decided he wanted to run away.

And he asked me to help him.

At that point, I basically had a master's degree in escape attempts.

(laughs) So we started, but we were late because Pincho had to learn how to swim first.

And we had to carry out all these preparations in complete secrecy.

Anyway, when everything was finally ready, Pincho came up to me one afternoon and said, ``Ingrid, suppose I'm in the jungle.

what do i do? "

"Pincho, you pick up the phone and call the guy upstairs."

"Ingrid, you know I don't believe in God."

"God doesn't care. He will still help you."

(Applause.) It rained all night that night.

The next morning, the camp was awakened by a commotion as Pincho escaped.

They made us leave the camp and we started marching.

During the march, the guerrilla leaders announced that they had found Pincho dead and his body eaten by anacondas.

17 days have passed. Believe me, I've counted. Because it was torture for me.

However, on the 17th day, news jumped in from the radio. Pincho was released, apparently alive.

And these were the first words he said, "I know my fellow hostages are listening.

Ingrid, I did what you said.

I called a man upstairs and he sent a patrol to get me out of the jungle. ”

It was a special moment because...

Obviously fear is contagious.

But so is faith.

Faith is neither rational nor emotional.

Faith is an exercise of will.

It is a discipline of will.

It is everything that we are, that allows us to transform our weaknesses, weaknesses into strengths, powers.

It's a transformation.

It gives us the power to stand up in the face of fear, look beyond it, and see beyond it.

I hope you remember this. Because I know we all need to connect with that strength within us for when the storm is brewing around the ship.

It took years, years, years before I got home.

But when they took us handcuffed to the helicopter and finally out of the jungle, everything happened just as quickly as it did when they kidnapped me.

In an instant, I saw gagged guerilla commanders and rescue leaders screaming at my feet. "We are the Colombian army!"

you are free! "

The screams that came from all of us when we got our freedom back still vibrate inside me.

Now I know they can divide us all and manipulate us all with fear.

"No" vote in Colombia's peace referendum. Brexit; the idea of ​​building a wall between Mexico and the United States. Islamic terrorism—these are all examples of the political use of fear to divide and recruit us.

We are all terrified.

But we can all use the resources we have: principle, unity, and faith to avoid conscription.

Yes, fear is part of the human condition and necessary for survival.

But above all, it is a guide for each of us to build our own identity, our individuality.

Admittedly, the first time I was terrified was when I was 41, and it wasn't my decision to be terrified.

But what to do with that fear was my decision.

You can crawl through fear and survive.

But we can also get over our fears, stand up, spread our wings, fly high, high, high, high and reach the stars we all want to go to.

thank you.

(applause)

So imagine taking two kids in the backseat for a very long 19 hour drive to Disney World.

And 15 minutes into this 19-hour journey, the immutable laws of nature raise the question: "Are we there yet?"

(Laughter) I'll easily answer this question in the negative 100 more times, but I'll get there eventually.

What a wonderful, wonderful, wonderful trip.

You drive home for a long 19 hours.

And when you get there, the police will be waiting for you.

They are accusing you of committing a crime that occurred while you were in Florida.

You say to everyone who will listen, "I didn't do it!"

I couldn't do it!

I was playing with Mickey, Minnie and the kids! ”

But nobody believes you.

Eventually you will be arrested, tried, convicted, and sentenced.

And you will spend 25 years in prison until someone shows up and proves you were actually in Florida when this crime was committed.

So.

So I'm a law professor at Harvard who has spent the last few years working to win the release of wrongfully convicted and innocent people, like Jonathan Fleming, who spent 24 years and 8 months in prison for a murder that happened while he was at Disney World with his children in Brooklyn, New York.

How do we know this?

Because when he was arrested, in his back pocket was a time-stamped receipt showing he was at Disney World.

The receipt was kept in the police file, and a copy was kept in the prosecution's file, but they never gave it to the public defender.

In fact, no one even knew it was there.

It was left there for 20-odd years.

My team went through the files, found the files, did the rest of the investigation and figured out that someone else had committed the crime.

Mr. Fleming was at Disney World but is now released.

Let me give you some context.

So about three years ago, I got a call from the Brooklyn District Attorney.

He asked me if I would be interested in designing a program called the "Conviction Review Unit."

So I said yes.

A conviction review unit is essentially a unit within the public prosecutor's office where prosecutors look at past cases to determine whether mistakes have been made.

In the first year, we found about 13 wrongful convictions, including those who had been in prison for decades, and released them all.

It was the most in New York history.

The program is still ongoing and currently has 21 scheduled releases. Twenty-one of these have spent significant time in prison.

So let me tell you about a few other men and women I interacted with during the course of this program.

One name is Roger Logan.

Mr. Logan was in prison for 17 years and wrote to me.

It was a simple letter. It boils down to, "Professor Sullivan, I'm innocent. I've been framed.

can you see my case? ”

At first glance, the case appeared to be closed, but my research has shown that single-witness identification cases are prone to error.

That doesn't mean he was innocent, just that those cases need to be looked at a little more closely.

So we did.

And the facts were relatively simple.

Witnesses said they heard gunshots, ran to the next building and turned around to see Logan.

He was tried and convicted and spent 17 years in prison.

But it was a one-witness case, so we looked into it.

I sent some people to the scene, but there was a discrepancy.

Politely speaking, Usain Bolt could not have escaped from where he said he was to another.

right?

Then we found out it wasn't true.

So it didn't mean he didn't do it, but I knew there was something suspicious about this witness.

So when I checked the file, there was a number written on a piece of paper in the file.

The number indicated that this witness had a record.

We went back through 20 years of undigitized documentation to figure out what this record was about. And it turns out that the witness was in prison when he said he saw what he saw.

This man spent 17 years in prison.

The final case concerns two boys, Willie Stuckey and David McCallum.

They were arrested at age 15 and had their convictions overturned 29 years later.

Well, this was yet another incident. At first glance it appeared open and closed.

they confessed.

However, my research has shown that juvenile confessions without a parent present are error-prone.

DNA cases have proven this time and time again.

So, I did some more research.

We looked into the confession and found that there was something in it that the boys didn't know.

Only the police and prosecutors knew about it.

We knew what really happened. someone told them to say this.

We do not know exactly who or what person did it, but in any case we have determined that the confession was coerced.

Then we went back and did some forensics and did a thorough investigation and found that it wasn't these two boys who committed the crime, but two others who were much older, of different heights and haircuts.

That day, I went to court for a trial called the "Bacature Hearing," where the conviction was actually overturned.

I went to court. I wanted to see Mr. McCallum walk away from it.

So I went to court and said what judges always say, and it really meant something.

After the argument was over, he looked up and said, "Mr. McCallum," and said five beautiful words, "You are free to go."

Can you imagine?

Only about 30 years later, "You can go freely."

And he left the court.

Unfortunately, his co-defendant, Mr. Stuckey, did not get the benefit.

As you know, Mr. Stucky died in prison at the age of 34, with his mother sitting in the defense box.

I will never forget this.

She just swayed to the table and said, "I knew my kid wouldn't do this."

I knew my baby wouldn't do that. ”

And her baby didn't do that.

I did the other two as well.

If there's one thing we've learned from this sincere act of faith, it's that justice doesn't happen.

People do justice.

Justice is not something that comes down from above and makes everything right.

If so, Mr. Stuckey would not have died in prison.

Justice is achieved by people with good intentions.

Justice is a decision.

Justice is a decision.

we achieve justice.

The scary thing is that in each of the three cases I described, it took someone just a minute and a minute to go through the file and find this receipt.

Just one thing -- go through the files, find the receipt, and give it to the public defender.

It would have taken less than a minute for someone to watch a video confession and say, "It can't be that way."

wait a minute.

And perhaps Stuckey is still alive.

It reminds me of one of my favorite poems.

This is a poem that Benjamin Elijah Mays used to recite, and he called it "God's Minutes."

And it goes something like this: "I was given only one minute, only 60 seconds, it was forced, I could not refuse, I neither asked for it nor chose it.

But it's up to me to use it or not.

If you lose it, you have to suffer, and if you abuse it, you have to take responsibility.

It's just a moment, but it contains eternity. ”

If I were to charge each of us, I would say something like this: "Every day, every day, take one extra minute and do justice.

You don't have to. So some people, like public defenders, spend their careers and lives doing justice every day.

But in your professional life, whatever you do, take time to do justice.

Make your coworkers feel better.

If you hear something sexist, don't laugh and speak up.

If someone is feeling down, take an extra minute every day to lift them up and it will be a great, great place.

I have something to show you.

Well, above me is a picture of David McCallum.

Today is the day he was released from prison.

Thirty years later, he was able to hug his previously untouchable niece.

So I asked him, "What do you want to do first?"

And he said, "I just want to walk down the sidewalk without anyone telling me where to go."

It wasn't painful, I just wanted to walk on the sidewalk.

I spoke with Mr. McCallum about two weeks ago.

I have been to New York.

It was the two-year anniversary of his release.

And we talked, laughed, hugged and cried.

And he's doing very well.

And one of the things he said when we met him is that he now dedicates his life and career to making sure no one gets unjustly locked up.

Ladies and gentlemen, justice is a decision.

thank you very much.

(applause)

I want you to touch your face

continue.

what do you feel

soft? squeeze?

It's you, right? do you feel

Well, that's not entirely true.

We actually feel the thousands of microscopic creatures that live on our faces and fingers.

Today you are feeling some of the germs wafting through the air ducts.

They trigger our allergies and cause a musty smell.

We feel some of the 100 billion bacterial cells that live on our skin.

They're munching on your sebum and duplicating it, creating the smell of body odor.

You may also be exposed to faecal bacteria that were sprayed the last time you flushed the toilet, or bacteria that live in water pipes and were sprayed in the last shower.

sorry.

(Laughter) You're probably even giving microscopic high fives to the two types of mites that live on our faces, all faces.

They spent the night writhing on your face and fucking you on the bridge of your nose.

(Laughter) Many of them are now leaking their gut contents into their pores.

(Laughter) Now look at your fingers.

how do you feel? gross?

Do you really need soap or bleach?

It feels that way now, but it won't feel that way in the future.

For the past 100 years, we have been at odds with the microscopic life forms around us.

If you said you had bugs in your home or germs in your sink, there was a man-made solution to it, a product to eradicate, exterminate and disinfect.

We are currently working to rid the world of most of the microbes.

But in doing so, we are ignoring the best source of new technology on the planet.

The last 100 years have featured human solutions to microbial problems, and the next 100 will feature microbial solutions to human problems.

I'm a scientist working with researchers at North Carolina State University and the University of Colorado to understand our most familiar microbes. It's often found in our most intimate and boring environments: under the couch, in the backyard, at the navel.

I do this work because it turns out that we know very little about the microscopic life around us.

A few years ago, no scientist could tell you what bugs and microbes live in your home, a place you know better than anywhere else.

So my team and I are armed with swabs, tweezers, and advanced DNA technology to uncover the subtlest life closest to us.

In doing so, they discovered more than 600 species of insects that live in U.S. homes, from spiders and cockroaches to tiny feather-hugging mites.

And we found over 100,000 species of bacteria and fungi living in our dust bunnies, and thousands more in our clothes and showers.

We went further and looked at the microbes that live inside each insect in our home.

Inside each insect, for example the wasp, we see a microscopic jungle in a petri dish, a world of hundreds of vibrant species.

Behold the bio-universe!

Many of the species you see now don't have names yet.

Most of the life around us remains unknown.

I remember the first time I discovered a new species and gave it a name.

It was a fungus that lives in a paper wasp's nest.

Because it is white and fluffy, I named it "mucor nidicola", which means "living in someone else's nest" in Latin.

Everyone thinks dinosaurs are cool, so this is a photo growing on a dinosaur.

I was a graduate student at the time and was very excited to discover this new life form.

I called my father and said, "Dad! I just discovered a new microbial species."

Then he laughed and said, "That's great. I hope you find a cure for it too."

(laughs) "Heal me."

Now that my dad is my number one fan, I realize that I actually let him down, both as a daughter and as a scientist, in that desperate moment when he tried to kill my new little life form.

In all the years spent working in laboratories and in people's backyards, investigating and cataloging the subtle life around us, I had never made my true mission clear to him.

My goal is not to find new microscopic life-killing technologies around us.

My goal is to find new technologies out of the world that can help save us.

The biodiversity that lives in our homes exceeds the list of 100,000 new species.

It's 100,000 new sources of solutions to humanity's problems.

It's hard to believe that something this small, or that has only one cell, can do anything powerful, but it can.

These creatures are microscopic alchemists, with the ability to alter their environment with an arsenal of chemical tools.

This means they can live anywhere on Earth and eat whatever food is around them.

This means it can eat everything from toxic waste to plastic, and produce waste products like petroleum, battery power, and even nuggets of real gold.

They can transform inedibles into nutritious ones.

They can turn sugar into alcohol.

They give chocolate its flavor and give the soil strength to grow.

I'm here to say that in the next 100 years these tiny creatures will solve even more of our problems.

And there are many issues to choose from.

There are mundane things like foul-smelling clothes and bland food.

And then there are the monumental problems of disease, pollution and war.

And this is my mission. It's about not just cataloging the subtle life around us, but finding what it's particularly good at helping us with.

Here is an example.

We started with wasps, a pest that lives in many homes.

From inside the wasp, we extracted a little-known microbial species that has the unique ability to make beer.

This is a characteristic that only a few species on earth possess.

In fact, every commercially produced beer you've ever had may have been made from one of just three microbes.

But our seed can make beer that tastes like honey, and it can also make beer with a pleasantly sour taste.

In fact, this microbial species that lives in the belly of a wasp may be able to produce a valuable sour beer that outperforms other species on the planet.

There are currently four species producing commercial beer.

Now think about tasting your future favorite beer where you used to watch pests.

As a second example, I worked with researchers to dig up people's backyard soil.

So we discovered a microbe that could make a new antibiotic — an antibiotic that could kill the world's worst superbugs.

This was a great find, but here's the secret. During the last 60 years, most of the antibiotics on the market were derived from similar soil bacteria.

Every day, you and I, and everyone in this room and on the planet, are saved by the same soil bacteria that produce most antibiotics.

Where we used to look at dirt, now think about drugs.

Perhaps my favorite example comes from a colleague who studies pond scum microbes. This microbe is tragically named after the cow dung in which it was first discovered.

It's completely unremarkable and not worth arguing about, but researchers found that it could be given to mice to vaccinate against PTSD.

It vaccinates against fear.

Where there was once pond dregs, now consider hope.

There are many other examples of microbes, but I don't have time to talk about them today.

I've given you an example of a solution you can get from just 3 seeds, but imagine what the other 100,000 seeds in your dust bunny can do.

It may make you sexier, smarter, or live longer in the future.

I want you to look at your fingers again.

Think about all the unknown microbes.

Think about what they could do, what they could build, whose life they could save in the future.

How are your fingers doing now?

A little powerful

Because it feels like the future.

thank you.

(applause)

My son and iPhone were born three weeks apart in June 2007.

So while early adopters lined up outside to get their hands on this amazing new gadget, I had my hands full at home, constantly filled with something else to send notifications. (Laughter) The miserable, colic baby only slept in a stroller that moved in complete silence.

I was literally walking 10-15 miles a day and lost baby weight.

The portion was great.

But hey, I was bored.

Before I became a mother, I was a journalist who rushed off when the Concorde crashed.

I was one of the first to come to Belgrade when the revolution broke out in Serbia.

Well, I'm exhausted.

This walk lasted for weeks.

But it was only three months later that something changed.

As I tapped on the pavement, my mind also began to wander.

I began to imagine what I would do when I could finally sleep again.

So the colic subsided, I finally got an iPhone and was able to practice the hours of wandering.

I created my dream job of hosting a public radio show.

So I no longer needed to rush to the battlefield, but my new smartphone allowed me to become a mother and a journalist.

You might be on Twitter at the same time you're on the playground.

Well, when technology came in and took over, I hit a wall when I thought so.

So I want you to imagine this: You are hosting a podcast and you have to prove that it is worth investing precious public radio funds.

My goal was to increase viewership tenfold.

So one day, like you, I sat down and brainstormed, and the results were fruitless.

Isn't this different from writer's block?

Nothing was there waiting to be unearthed.

There was nothing.

So I started thinking. When was the last time you had a good idea?

Yes, when I was pushing the stroller.

Now all the gaps in my day are filled with phone hours.

While waiting for my latte, I checked the headlines.

I updated my calendar while sitting on the couch.

Texting has turned every spare moment into an opportunity to show my colleagues and my loving husband just how sensitive a person I am. At least it gave me the chance to find another sofa that would be perfect for my page on Pinterest.

I realized that I was never bored.

Isn't it only boring people get bored anyway?

But then I started wondering. What really happens when we get bored?

Or, more importantly, what would happen to us if we were never bored?

And what would happen if we completely removed this human emotion?

I started talking to neuroscientists and cognitive psychologists and what they told me was interesting.

It turns out that boredom activates a network in your brain called "default mode."

So when we're folding laundry or walking to work, our bodies are on autopilot, and that's when our brains are really busy.

I'm Dr. Sandy Mann, a boredom researcher.

(Audio) Dr. Sandy Mann: When you start daydreaming and letting your mind really wander, you start thinking a little bit beyond your conscious mind, a little bit more subconsciously, which makes connections.

Actually, it's really amazing.

Manoush Zomorodi: Isn't it just wonderful?

This is my brain taken with fMRI. In default mode, I found myself connecting disparate ideas, solving some of the most vexing problems, and doing something called "autobiographical planning."

This is when we reflect on our lives, focus on key moments, create personal stories, then set goals and figure out what steps we need to take to reach them.

But now, I can sit back and relax on the couch while updating a Google Doc or replying to an email.

We call it "ending shit," but neuroscientist Daniel Levitin, PhD, says what we're really doing is:

(Audio) Dr. Daniel Levitin: Every time you shift your attention from one thing to another, your brain must activate a neurochemical switch and deplete the nutrients in your brain to accomplish that.

So if you're trying to multitask 4 or 5 things at once, you're not actually doing 4 or 5 things at the same time because your brain doesn't work that way.

Instead, we move rapidly from one thing to the next, depleting our neural resources as we go.

(Audio) MZ: So you're using switch, switch, switch, glucose, glucose, glucose.

(Audio) DL: Exactly, supplies of such things are limited.

MZ: Ten years ago, we were shifting our attention every three minutes while we were at work.

Now I do it every 45 seconds and I do it all day long.

The average person checks e-mail 74 times a day and switches tasks on the computer 566 times a day.

I learned all of this while talking to informatics professor Dr. Gloria Mark.

(Audio) Dr. Gloria Mark: So we've found that people tend to shift their attention more rapidly when they're stressed.

We also found, strangely, that people who slept less were more likely to check Facebook.

So we are stuck in this vicious cycle.

MZ: But can this cycle be broken?

What would happen if we broke this vicious circle?

Maybe my listeners can help me find out.

What if those cracks were brought back to the present day?

Could it help revitalize our creativity?

We named this project "Bored and Brilliant".

We expected hundreds of people to play with us, but thousands started signing up.

And they told me that the reason they were doing it was because they were worried that their relationship with their phone had become kind of... 'codependent'.

(Audio) Man: The relationship between a baby and a teddy bear, a baby and Binky, or a baby who wants his mother's cradle when he's done being held by a stranger. (Laughter) That's my relationship with my cell phone.

(Audio) Woman: I think of my phone like a power tool. Very useful, but dangerous if not handled properly.

(Audio) Woman 2: If you're not paying close attention, you suddenly find yourself wasting an hour doing something without even thinking about it.

MZ: Okay. But you needed data to actually measure the improvement.

Because that's what we do these days.

So we partnered with several apps that measure how much time you spend on your smartphone each day.

If you think it's ironic that I asked people to download another app to spend less time on their phones, yes, but you have to meet people where they are.

(Laughter) So, before Challenge Week, we were averaging two hours a day on the phone and doing 60 pickups. Just a quick check, did you get a new email?

Here's what Tina, a student at Bard College, discovered about herself.

(Audio) Tina: So far, I'm on my phone for 150-200 minutes a day and pick it up 70-100 times a day.

And that's really alarming. Because that time could have been spent doing something more productive, more creative, more self-directed. Because when you're on your phone, you're not doing anything important.

MZ: Just like Tina, people were starting to observe their own behavior.

They were preparing for Challenge Week.

And that Monday they began waking up to instructions in their inboxes. This is a try.

Day 1: "Put it in your pocket."

Let go of that phone.

See if you can eliminate the reflex of checking all day, just one day.

If this sounds easy, it means you haven't tried it yet.

The listener is Amanda Itsuko.

(Audio) Amanda Itsuko: It's really itchy.

I feel a little crazy. Because I found myself picking up my phone while walking from one room to another, riding elevators, and even in cars, even though this is actually the really embarrassing part of saying it out loud.

MZ: Yes.

Well, but as Amanda has learned, this itch isn't really her fault.

This is exactly the behavior that technology was built to trigger.

(Laughter) I mean, right?

Former Google designer Tristan Harris.

(Audio) Tristan Harris: If I'm Facebook or Netflix or Snapchat, I literally have 1,000 engineers whose job is to get more attention from you.

I am good at this and I never want you to stop.

And as you know, the Netflix CEO recently said, "Our biggest competitors are Facebook, YouTube and sleep."

So there are countless places to focus your attention, but there are wars going on to get them.

MZ: I mean, I know how you feel. After a great episode of Transparent, when the next one starts playing, it's like, oh, okay, I'm going to get up and watch it.

Or add a little more personal information as the LinkedIn progress bar shows you're getting closer to the perfect profile.

A UX designer told me that only drug dealers and technologists refer to customers as "users."

(Laughter) (Applause) And as we know, users are worth a lot of money.

Former Facebook product manager and author, Antonio Garcia Martinez.

(Audio) Antonio García Martinez: The maxim is that if the product is free, you are the product. Your attention is the product.

But what is your attention worth?

That's why Facebook and other apps, literally every page load, instantly trigger billions of auctions a day competing for the cost of a single ad impression.

MZ: By the way, the average person spends two years of their life on Facebook.

Well, back to Challenge Week.

I soon found myself getting creative.

This is New Yorker Lisa Alpert.

(Audio) Lisa Alpert: I think it was boring.

Then, I suddenly saw the stairs going up to the top of the station, and thought that I could go up and down again and do a little cardio, even though I had just come down those stairs.

So I did, and when I had some more time, I did it again and did it again 10 times.

And I did full cardio.

I got on the R train feeling kind of tired, but wow, I didn't even think about that.

Is there such a thing?

(laughter) MZ: So I learned that creativity means different things to different people.

(Laughter) But everyone felt that the third day's challenge was the hardest.

It said "delete the app".

Let's take a look at that app. you know that Something that will always fascinate you and keep you hooked. Take it off your phone, even if it's just for the day.

I almost cried when I deleted the game Two Dots.

(laughter) Yes, Two Dots players know what I'm talking about.

But there was a good company in my dire situation.

(Audio) Man 2: This is Liam from Los Angeles. I deleted Twitter, Facebook, Instagram, Tumblr, Snapchat and Vine from my phone all at once.

And it was an embarrassingly emotional experience at first.

Seeing the lock screen with no new notifications made me feel strangely lonely.

But I love to decide when I think about and visit my social networks, and not let my phone decide that.

thank you.

(Audio) Woman 3: I was so sad to delete the Twitter app. Perhaps after using Twitter for the past year, I feel that I have developed a Twitter addiction. This "boredom and glitz" challenge really made me realize that.

After a short period of really bad withdrawal symptoms, like headaches from lack of caffeine, I feel great now.

Had a lovely dinner with my family. We hope to continue using these powerful tools systematically in the future.

(Audio) Woman 4: I don't have the guilt I feel when I know I'm wasting my time on my phone.

Perhaps I should start giving myself challenges and memories like this every morning.

MZ: So yes, this was progress.

I can't wait to see what the numbers show at the end of the week.

But when the data came in, we found that we were able to cut our phone usage from 120 minutes to 114 minutes per day, an average of just 6 minutes.

yes. husband.

So I went back to the scientists in a bit of a depressed mood and they just laughed and said, see, changing people's behavior in such a short period of time is ridiculously ambitious, and what you've accomplished is far beyond what we thought possible.

Because people's stories mattered more than numbers.

They felt empowered.

Their phones went from Taskmaster back to Tools.

And in fact, I found the statements of the young people the most interesting.

Some of them told me they were unaware of some of the emotions they felt during Challenge Week. Come to think of it, if I hadn't known life without connections, I might never have experienced boredom.

And there can be consequences.

USC researchers studying teenagers who used social media while talking to friends or doing homework found that, two years later, they were less creative and imaginative about their own personal futures and solving social problems such as neighborhood violence.

And we really need to enable this next generation to focus on big issues like climate change, economic inequality, and big cultural differences.

No wonder CEOs in an IBM survey named creativity as their greatest leadership ability.

OK, but here's the good news. Ultimately, 20,000 people listened to "Bored and Brilliant" that week.

90% saved time.

70% have more time to think.

People told me they were sleeping better.

they felt happy.

My favorite note is from a man who said he felt like he was waking up from a mental hibernation.

Thanks to some personal data and some neuroscience, we were allowed to be offline a little longer, and a little boredom gave us clarity and helped us set some goals.

That said, always-on connectivity may not be fun in a few years.

But on the other hand, teaching people, especially children, how to use technology to improve their lives and self-regulate should be part of digital literacy.

So the next time you check out your phone, remember that if you don't decide how you're going to use the technology, the platform will decide.

And ask yourself: What am I really looking for?

Because if it's just to check your e-mail, that's fine. Run it and you're done.

But if you want to distract yourself from the hard work that involves deeper thinking, take a break, stare out the window, and know that doing nothing can actually help you become your most productive and creative self.

It may feel weird and uncomfortable at first, but boredom can really lead to brilliance.

thank you.

(applause)

How many companies did you work with today?

I woke up, showered, washed my hair, used the hair dryer, ate breakfast, ate cereal, fruit, yogurt, whatever, drank coffee, drank tea.

You may have taken public transport to get here, or you may have used your own car.

You interacted with the company you work for or own.

You interacted with clients, customers, and so on.

I believe there are at least seven companies you interacted with today.

Let me tell you some amazing stats.

One in seven large public companies commits fraud every year.

This is a US academic study looking at US companies. There is no reason to believe that things are different in Europe.

This is a study that investigated both detected and undetected fraud using statistical methods.

This is not a petty scam.

These frauds cost the shareholders of these companies, and society at large, $380 billion annually.

Can anyone come up with some examples?

Auto industry secrets aren't so secret anymore.

Fraud has become a feature, not a bug, of the financial services industry.

That's not me, it's the president of the American Financial Association who said so in his presidential address.

This is a big problem, especially given an economy like Switzerland that relies so heavily on trust in the financial industry.

On the other hand, 6 out of 7 companies actually remain honest despite all the temptations to start fraudulent activities.

There are also whistleblowers like Michael Woodford who whistleblowered to Olympus.

These whistleblowers risk their careers and friendships to reveal the truth about their companies.

Some journalists, like Anna Politkovskaya, risk their lives to report on human rights violations.

she was killed About 100 journalists are killed each year for their belief in revealing the truth.

So in today's talk, I would like to share with you some insights that I have gained and learned over the last ten years of my research in this area.

I am a researcher, a scientist working with economists, financial economists, ethicists, neuroscientists, lawyers, and others to understand what makes us human and how we can address this problem of corporate fraud and, in turn, help improve the world.

First, I want to share with you two very different visions of how people behave.

First, I would like to introduce Adam Smith, the founder of modern economics.

His basic idea was that if everyone acted in their own interest, it would ultimately be good for everyone.

Self-interest is not a narrowly defined concept that aims only at short-term gain.

It has long term implications.

Think about it.

Now think about this dog.

maybe that's us.

There is a temptation -- sorry vegetarians -- (lol) dogs love bratwurst.

(Laughter) Now, the straight and selfish act here is to go for it.

So my friend Adam here might jump up and pick up a sausage and thereby ruin all this beautiful tableware.

But that's not what Adam Smith meant.

He didn't mean to ignore all consequences. Rather the opposite.

He would have thought that there might be negative consequences, for example, the owner might be angry with the dog, and the dog might anticipate it and not behave in this way.

It may be us weighing the benefits and costs of our actions.

What will it be?

Now, I'm sure many of you, especially if you're a large company, have an internal code of conduct.

And if you act according to that code of conduct, you are more likely to receive bonuses.

Conversely, ignoring this increases the chances that you will not get the bonus or it will be reduced.

In other words, this is a very economic incentive to make people more honest or more in line with corporate principles.

Similarly, reputation is a very powerful economic force.

We strive to build a reputation for being honest, perhaps. Because then people will trust us more in the future.

right?

Adam Smith spoke of a baker making good bread not out of charity for those who consume it, but because they want to sell more bread in the future.

In my research, for example at the University of Zurich, I found terrible media coverage of Swiss banks that get caught up in the media in the context of tax evasion and tax evasion.

Profits decrease because they lose new net money in the future.

It's a very powerful reputation force.

benefits and costs.

Here is another perspective of the world.

Meet the 18th-century German philosopher superstar Immanuel Kant.

He developed the concept that some actions are right and some are wrong, regardless of the consequences.

For example, it is wrong to lie.

So meet my friend Immanuel here.

He knows sausage is very tasty, but he's a good dog so he's about to turn away.

He knows it's wrong to jump up and risk ruining all this beautiful tableware.

Everything about incentives, codes of conduct, bonus schemes, etc., is utterly irrelevant if you believe that people are so motivated.

Perhaps people are motivated by different values.

So what are people actually motivated by?

The two gentlemen here have perfect hairdos, but they give us a completely different worldview.

what to do with this?

I'm an economist and I do what I call an experiment to address this problem.

We remove the facts that confuse reality.

Reality is so rich, with so much going on, it's almost impossible to know what really drives people's behavior.

Let's do a little experiment together.

Imagine the following situation.

You are alone in your room, it's not here.

There is now before you a five-franc coin like the one I hold.

Here are the steps: Toss a coin four times and enter the number of tails on the computer terminal in front of you.

Here is the situation.

Here is the problem.

5 francs are paid each time a tail is announced.

So if I say I've thrown two bottoms, I get paid 10 francs.

If you say zero, you will be paid zero francs.

If you say "I cast four tails", you will be paid 20 francs.

It is anonymous, no one is watching your actions, and you receive that money anonymously.

There are two questions.

(Laughter.) You know what's going to happen, right?

First, what would you do in that situation?

Second, look left, look right -- (Laughter) and think about how the person sitting next to you would act in that situation.

We did this experiment.

We did it recently at the Manifesta art exhibition here in Zurich, not with students in university labs, but with real people like you.

First, a quick reminder about statistics.

If you toss a coin four times and it turns out to be a fair coin, the probability of getting four tails is 6.25%.

And, intuitively, the odds of getting all four tails are much lower than two tails.

Here are the specific numbers:

I will explain what happened.

People have actually done this experiment.

About 30 to 35 percent said, "Well, I did a four-tail toss."

It's highly unlikely.

(Laughter) But what's really surprising here, perhaps for economists, is that about 65 percent of people didn't say I threw the bottom of the fourth inning. No one is looking at you in that situation, but the only consequence is that you will get more money if you answer 4 times than if you answer less.

Announcing zero leaves 20 francs on the table.

I don't know if the others were all honest or because they were anonymous they said something a little higher or lower than what they were doing.

I just observed the distribution.

But all I can say is it's another coin flip here.

Yes, it's the tail.

(Laughter) Don't check, okay?

(Laughter) All I can say is that not everyone behaved the way Adam Smith predicted.

So what does that leave us with?

Well, people seem to be motivated by certain intrinsic values, and our research looks at this.

We turn to the idea that people have so-called protected values.

A protected value is more than just a value.

A protected value is one that you are willing to pay a price to maintain.

They are willing to pay a price to resist the temptation to give in.

As a result, you feel better when you make money in a way that is consistent with your values.

Let me show you this again with our pet dog metaphor here.

Sausages taste better if we can get them without going against our values.

That's what our research shows.

On the other hand, if we do, that is, if we get the sausage and in doing so actually violate our values, we devalue the sausage.

Quantitatively quite strong.

These protected values ​​can be measured, for example, by survey means.

These experiments are highly predictive, simple nine-item surveys.

If you think about the population mean, there is a distribution around it. Each person is different and so are we.

People with a protected set of values ​​one standard deviation above the average discount about 25 percent of the money they receive from lying.

In other words, every dollar you get for lying is worth just 75 cents to them, unless you put some incentive in place to act honestly.

That is their intrinsic motivation.

By the way, I am not a moral authority.

I'm not saying I have all these beautiful values, right?

But I'm interested in how people behave and how that richness of humanity can actually be harnessed to improve how organizations work.

So there are two very different visions here.

On the other hand, you can appeal the benefits and costs and try to get people to act on them.

On the other hand, you can also select people with values ​​and desirable traits—competence that fits your organization.

I still don't know where these protected values ​​actually came from.

Is it nurtured or is it natural?

What I can say is that the distribution is fairly similar for men and women.

For someone who studied economics or who studied psychology, it's pretty similar.

It's pretty similar even for different age groups of adults.

But how this will develop over a lifetime remains to be seen.

That will be a topic for future research.

The thought I'd like to leave you guys with is that it's okay to resort to incentives.

i am an economist. I certainly believe in the fact that incentives work.

But instead of securing talent and then introducing incentives, think about selecting the right talent.

Selecting the right people with the right values ​​can go a long way in saving a lot of trouble and a lot of money within an organization.

In other words, putting people first pays off.

thank you.

(applause)

It's 1878.

Sir Francis Galton gives a wonderful lecture.

He has lectured at Anthropological Institutes in England and Ireland.

Known for his pioneering work on human intelligence, Galton is a great polymath.

He is an explorer, anthropologist, sociologist, psychologist and statistician.

He is also a eugenicist.

This talk presents a new technique that allows you to combine photos to create composite portraits.

This technique can be used to characterize different types of people.

Galton believes that by combining photographs of violent criminals, we can discover the true face of the crime.

But to my surprise, the composite portrait he created was beautiful.

Galton's astonishing discovery raises a deep question: "What is beauty?"

Why do certain compositions of lines, colors and shapes excite us so much?

For most of human history, these questions have been approached using logic and speculation.

But in recent decades, scientists have used ideas from evolutionary psychology and tools from neuroscience to tackle beauty problems.

We are beginning to glimpse the why and how of beauty, at least in terms of what beauty means to the human face and shape.

And along the way, we come across some amazing things.

This decision is certainly subjective to the individual when considering one another's beauty, but is shaped by the factors that contribute to the survival of the group.

Numerous experiments have shown that several basic parameters contribute to the attractiveness of a face.

These include averaging, symmetry, and hormonal influences.

Let's look at each in turn.

Galton's finding that composite or average faces are generally more attractive than individual faces contributing to the average has been replicated many times.

The results of this experiment match the intuition of many people.

Average faces represent the central tendencies of the group.

People with mixed traits represent different populations and probably have greater genetic diversity and adaptability to the environment.

Many people find mixed-race individuals attractive, but inbred families are less attractive.

The second element that contributes to beauty is symmetry.

People generally find symmetrical faces more attractive than asymmetrical ones.

Developmental abnormalities are often accompanied by asymmetry.

And in plants, animals and humans, parasitic infections often create asymmetries.

It turns out that symmetry is also an indicator of health.

In the 1930s, a man named Maximilian Factorovich realized the importance of symmetry to beauty when he designed a beauty micrometer.

With this device, he was able to measure small asymmetrical imperfections, which he then compensated for with a product sold by his company, Max Factor. Max Factor, as you know, is one of the most famous brands in the world for 'makeup'.

A third factor that contributes to facial attractiveness is hormonal influence.

And here I must apologize for restricting my comment to heteronormative norms.

However, estrogen and testosterone play an important role in shaping the characteristics we find attractive.

Estrogen produces traits that indicate fertility.

Men are generally attracted to women who are both young and mature.

A too babyish face can mean that the girl is not yet fertile, so men find women attractive with big eyes, full lips and narrow chins as indicators of youth, and high cheekbones as an indicator of maturity.

Testosterone produces traits that we typically think of as masculine.

These include thick eyebrows, thin cheeks, and a large, square chin.

But there is an interesting irony here.

If anything, testosterone suppresses the immune system in many species.

So the idea that testosterone-infused function is a fitness metric doesn't really make much sense.

Here the logic flips.

Scientists use the handicap principle instead of the fitness index.

The most common example of a handicap is the peacock's tail.

This beautiful but unwieldy tail doesn't exactly help peacocks avoid predators or get close to them.

Why should such an extravagant appendage evolve?

Even Charles Darwin wrote in a letter to Asa Gray in 1860 that the sight of a peacock's tail made him sick.

He developed the theory of sexual selection out of frustration that the theory of natural selection could not explain it.

For this reason, the presentation of a peacock's tail signifies sexual attraction, which means that the peacocks are more likely to mate and produce offspring.

Now, a modern twist on this display argument is that peacocks advertise their health to peacocks.

Only particularly fit organisms can devote resources to the maintenance of such luxurious appendages.

Only particularly healthy men can pay the price that testosterone imposes on the immune system.

And, by analogy, consider the fact that only the very rich can afford to pay $10,000 or more for a watch as a show of economic might.

Now, many people hear evolutionary claims like this and think they mean that we are somehow unconsciously seeking a healthy mate.

And I think this idea is probably not correct.

Teenagers and young adults are less known to make decisions based on health concerns.

But it doesn't have to be. Let me explain why.

Imagine a group of people with three different tastes: green, orange, and red.

From their point of view, these preferences have nothing to do with health. they just like what they like.

However, if these preferences are related to differences in offspring chances, for example in a 3:2:1 ratio, 3 greens to 2 oranges to 1 red in the first generation, and with each subsequent generation the proportion of green increases, so that after 10 generations 98 percent of this population prefers green.

Now, one scientist visited this population, took samples, and found that the preference for green was universal.

So the point in this slightly abstract example is that while preferences for certain physical traits can be arbitrary for an individual, over time they become universal for a population if those traits are genetic and associated with reproductive dominance.

So what happens in your brain when you see a beautiful person?

Attractive faces are tuned to a part of the visual cortex at the back of the brain, an area called the fusiform gyrus, specifically for face processing, and an adjacent area called the lateral occipital complex, specifically for object processing.

In addition, an attractive face activates parts of the reward and pleasure centers located in the front and deep parts of the brain. These include regions with complex names such as the ventral striatum, orbitofrontal cortex, and ventromedial prefrontal cortex.

Our visual brain, tuned to process faces, interacts with pleasure centers to underpin our experience of beauty.

Surprisingly, we are all interested in beauty, but unknowingly, beauty also fascinates us.

Our brain responds to attractive faces even when we are not thinking about beauty.

We conducted an experiment in which people were asked to look at a series of faces and, under certain conditions, decide whether the two faces were the same person or different.

Even in this condition, an attractive face strongly drove neural activity in the visual cortex, even though people were thinking about the person's identity rather than beauty.

Another group similarly found an automatic response to beauty in our pleasure centers.

Taken together, these studies suggest that our brains automatically respond to beauty by linking sight with pleasure.

These beauty detectors seem to send out a signal every time we see beauty, regardless of what else we think.

Also, our brains are embedded with the stereotype that "beautiful is good".

Within the orbitofrontal cortex, neural activity responding to beauty and goodness overlaps, and this occurs even when people do not think clearly about beauty and goodness.

Our brains seem to reflexively associate beauty with goodness.

And this reflexive association can be the biological trigger for various social effects of beauty.

Attractive people receive all sorts of advantages in life.

They are considered more intelligent and trustworthy, and are given higher rewards and lesser punishments, even if such judgments are not justified.

Observations like this reveal the ugly side of beauty.

In my lab, I recently discovered that people with minor facial abnormalities or disfigurements are viewed as less kind, kind, intelligent, capable, and diligent.

Unfortunately, we also have the stereotype that being disfigured is bad.

This stereotype is probably exploited and magnified by popular media images. There, facial ugliness is often used as an abbreviation to describe a villainous figure.

We need to understand this kind of implicit bias if we are to overcome it and move toward a society that treats people fairly based on their actions rather than their appearance.

Let me think about one last thing.

Beauty is a work in progress.

The so-called universal beauty attributes were chosen during the Pleistocene epoch for about 2 million years.

Life was cruel, barbaric, and long ago.

Selection criteria for reproductive success at the time are less relevant today.

For example, death from parasites is not among the top causes of death in humans, at least in the technologically advanced world.

From antibiotics to surgery, contraception to IVF, the filters for reproductive success are being relaxed.

And under such moderated conditions, the combination of preferences and traits is free to fluctuate and become more diverse.

While we have had a huge impact on the environment, modern medicine and technological innovation have had a huge impact on what it means to look beautiful.

Even though we are changing the universe, the universal nature of beauty is also changing.

thank you.

(applause)

So sorry.

Now at this stage I am terrified.

I have not met many people in my life who readily admit when they are afraid.

I think it's because deep down they know how easily it spreads.

You know, fear is like a disease.

When it moves, it moves like wildfire.

But what if you did what you had to do in the face of that fear?

That's called courage.

And like fear, courage is contagious.

I'm from East St. Louis, Illinois.

It's a small city just across the Mississippi River from St. Louis, Missouri.

I have lived in and around St. Louis all my life.

In 2014, in Ferguson, Missouri (another suburb north of St. Louis), when Michael Brown Jr., an ordinary teenage boy, was shot dead by police, I remember thinking he wouldn't be the first, nor the last, to be killed by law enforcement.

But his death was different.

When Mike was killed, I was reminded of those in power who tried to use fear as a weapon.

The police response to mourning communities has been to use force to enforce threats such as militarized police, imprisonment, and fines.

The media even tried to scare us into each other by the way the story was told.

And all this has worked in the past.

But, as I said earlier, this time it's different.

The death of Michael Brown and subsequent treatment of the community sparked a series of protests in and around Ferguson and St. Louis.

When I joined the protest on the fourth or fifth day or so, it wasn't out of courage. It was out of guilt.

See, I'm black.

I don't know if you have noticed that.

(Laughter.) But I couldn't help but sit in St. Louis, a few minutes from Ferguson, and go see it.

So I sat down to check it out.

When I went outside, I discovered something amazing.

I felt angry. There was a lot of it.

But what I found more than that was love.

Someone who has love for themselves.

love for their community.

And it was beautiful—until the police came.

A new emotion was inserted into the conversation: fear.

Well, I'm not going to lie. When I saw those armored vehicles, all the equipment, all the guns, all the police, I was personally horrified.

And when I looked around the crowd, there were many people doing the same thing.

But I also saw people who had something else in their hearts.

It was courage.

Look, those guys were yelling and refusing to walk away from the police.

They were past that point.

Then I felt something change inside of me, so I screamed and realized that the people around me were doing the same.

And there were no such feelings.

So I wanted to do something more.

I went home and thought, I'm an artist. I make shit

So I set out to create something dedicated to the protest movement, a weapon of spiritual warfare, something to give people a voice, something to empower them to move forward.

I did a project where I took pictures of protesters' hands and stuck them on and under boarded up buildings and community shops.

My goal was to raise awareness and boost morale.

And I think I did just that, at least for a moment.

So I wanted to spice up the stories that the people I was watching had courage in the present moment.

And me and my friend, filmmaker and partner Sabaa Folayan, did just that with the documentary Whose Streets?

I feel like I have become a conduit for all this courage that has been given to me.

And I think that's part of our job as artists.

I think we should be the ones who convey courage through our work.

And we, especially in times like these, are the walls between ordinary people and those who use their power to spread fear and hatred.

I will ask you there.

Those who move, those who shake, thought leaders, what are you going to do with the gift that has been given to free you from the fear that binds us every day?

'Cause you know, I'm scared every day

I can't remember a time when it wasn't.

But when I understood that fear was not in me to cripple me, but to protect me, when I understood how to harness that fear, I discovered my power.

thank you.

(applause)

Hey, guys.

Now let's go back to 2007.

I put my heart and soul into the album, which took about six months to make, and was playing about three times a day on Myspace at the time, but when I started noticing that other people were playing guitar and singing and posting videos on this new site called YouTube, which had 300,000 views, I was getting more and more depressed.

So I decided to start making some Youtube videos.

Then one day, a video of my band appeared on the homepage. This was amazing. I got a lot of new fans.

There were probably a lot of people who didn't really like the music or anything -- (laughter) okay, because people started coming to our shows, we started touring, we put out records.

And when I checked my bank account balance after my first monthly iTunes payment, it was $22,000. At the time, I was living in my father's house and trying to make a living as a musician by uploading videos to the Internet, so this was amazing. In 2009 there was literally zero respect even for people uploading videos to the internet.

Over the next four years, I uploaded more and more videos to the Internet. And the videos just got better and better, and I made enough money to buy a house through brand deals, commercials, and iTunes sales.

And built a recording studio.

But there was one big problem. I mean, making money as a creative person in 2013 was pretty weird.

First of all, business models were constantly changing.

That meant $58,000 in iTunes download revenue per year would be replaced with about $6,000 in streaming revenue.

Steam paid less than downloads.

And as more and more creators began to appear online, the competition for those five-figure brand deals that had kept the band alive for so long only increased.

For that matter, our videos themselves, the creative things we were loved and appreciated by our fans, were actually adding value to the world, and those videos were bringing us near-zero dollars in revenue.

Here's a real-life snapshot of your YouTube dashboard over a 28-day period showing 1 million views and $166 in ad revenue for those views.

In 2013, the whole machine that brings art online and makes money just didn't work.

It doesn't matter if you are a newspaper publisher, an organization or an independent creator.

A webtoon with 20,000 monthly readers gets paid hundreds of dollars in advertising revenue.

This is 20,000 people.

In what world is this not enough?

can not understand.

If this is not enough for people to make a living, what kind of system have we built?

Actually, I have a hypothesis about this.

I think it was a strange 100 years.

(Laughter) (Applause) About 100 years ago, humans discovered a way to record sounds in wax cylinders.

That was the beginning of the gramophone.

Around the same time, we discovered how to record light on celluloid photographic paper. This was the beginning of film and television.

For the first time, you can save art on top of objects. This was amazing.

Art used to be entirely temporary. So if I missed the symphony, I couldn't hear the orchestra playing.

But for the first time, it was amazing to be able to save an orchestral performance to a physical object and listen to it later.

In fact, this is so amazing that over the next 100 years, from 1900 to 2000, humanity built just a few billion dollars of infrastructure to practically help artists do two things.

First, to put our art on objects, and second, to get them to people who want them all over the world.

Therefore, many industries are focusing on these two issues.

Surprisingly, there are trucking companies, brick-and-mortar stores and marketing companies, and manufacturers of CD jewel cases that are tackling these two problems.

And we all know what happened.

Ten years ago, the internet matured, we had Spotify, Facebook, YouTube, iTunes and Google Search, and in 10 years the infrastructure, supply chains, distribution systems and monetization schemes that had been built for 100 years were completely bypassed.

After 100 years of designing these things, it's no wonder it's now completely broken for creative people.

Given this new situation, it's no wonder the monetization part of the chain doesn't work.

But what makes me so excited to be a creator now, to be alive today, to be a creative person right now, is the realization that it only takes 10 years to understand the development of this new machine, the next 100 years of infrastructure for creators.

And it turns out that it's only been 10 years.

There's been a lot of trial and error, some really good ideas, and a lot of experimentation.

Like Twitch streamers. Has anyone heard of Twitch?

Twitch streamers earn between $3 and $5,000 a month streaming gaming content.

Big companies make more than $100,000 a year.

There is a site called YouNow, which is an app.

It allows musicians and vloggers to be rewarded with digital goods from their fans.

So, I'm working on that issue too.

Four years ago, a friend and I founded a company called Patreon.

We currently have 80 people working on this issue.

It's basically a membership platform that makes it super easy for creators to earn monthly rewards from their fans for a living.

For creators, it's like being paid for being creative.

And this is one of our creators.

They are called "Kinda Funny".

YouTube has about 220,000 subscribers.

And when I upload a video, I get around 15,000 to 100,000 views.

Check yourself now.

I think when you hear a number like that, "15,000 views," and you see content like this, you're quick to classify it as not as legitimate as the morning shows you hear on the radio or the talk shows you see on NBC or whatever. But once "Kinda Funny" launched on Patreon, within weeks, they were making $31,000 a month from the show.

It took off so quickly that they decided to expand the show and add new shows, and now have a second Patreon page, earning an additional $21,000 a month.

And they're raising the overall funding through memberships to expand what's essentially becoming a media company.

OK, let's look at another example.

Derek Bodner is a sports journalist who wrote for Philadelphia magazine until it cut all sports coverage a few months ago.

Currently, he writes articles and publishes them on his website. He still covers sports, but for himself.

And he earns $4,800 a month from 1,700 regular customers, funded by membership.

This is Crash Course -- free educational content for the world.

The show actually airs on the PBS Digital Network for $29,000 per month.

The duo have sailed all over the world and are paid monthly for their journey records by 1,400 regular customers.

This is producing the podcast "Chapo Trap House". In fact, they've made another $2,000 a month since I screenshotted this. So now I'm making $56,000 a month from podcasts.

And Patreon isn't the only one grappling with this issue.

Google is starting to work on this too.

A few years ago they launched a fan funding. More recently, Super Chat launched as a way for creators to monetize their live streams.

Newspaper companies are experimenting with memberships.

The New York Times has a membership program. The Guardian's membership program has over 200,000 paying subscribers.

Ideas, experiments, and advancements are springing up right now, and it's heading towards rewarding creators.

and it's working.

It's not perfect yet, but it really works.

So, Patreon has over 50,000 creators getting paid on the platform, who get paid every month for putting their art online and being creative.

The next 100 years of infrastructure are underway, but this time it will be different. Because there is a direct connection between the people who make things and the people who love them.

I went to a cocktail party about seven or eight years ago.

This was when the band hit our first machine, so things were really booming.

I just made about $400,000 in one year through iTunes sales, deals with brands, and more.

Then the man came up to me and said, "Hey, Jack, what are you doing?"

I said, "I am a musician."

Then he quickly sobered up, stuck out his hand, put it on my shoulder and said in a really serious and very nice voice: "I hope I will succeed someday."

(laughs) And...

I remember many such moments.

I just cringe when I think about it.

It's very embarrassing to feel underappreciated as a creative person.

But as a species, we're leaving that cocktail party behind.

We leave that culture and move out of it.

We will get better at paying creators. In 10 years, kids graduating from high school and college will think of becoming creators as just an option. I could be a doctor, I could be a lawyer, I could be a podcaster, I could have a webcomic.

It becomes the only thing you can do.

we understand that.

It will be a viable, sustainable and respected profession.

The creators will be coming out with amazing new machines on the other side of this weird 100, 100 year journey.

And they will be paid and evaluated.

thank you everyone.

(Applause) I think it went pretty well.

I hope the artists who see it don't give up and know that we're getting there.

It hasn't happened yet, but in a few years there will be many systems and tools for making a living online. Podcasts are starting to take off, and even if they're not making money from them yet, they're going to happen and get paid.

It's happening.

So let me explain further the complexity of our situation.

We will solve climate change and build cities for 3 billion people at the same time.

It's a doubling of the urban environment.

If we don't get it right, we don't know if all the climate change measures in the world will save humanity. Because a lot depends on how we shape our cities, not just their environmental impact, but also our social well-being, our economic vitality, our sense of community and connection.

Fundamentally, the way we shape our cities is a manifestation of the humanity we bring to life.

So I think it's our turn today to get it right.

And it seems that it is our actions that are ultimately causing the problem, so doing things right will help solve climate change to some extent.

The problem isn't floating around, and it's not just ExxonMobil or the oil companies.

It's us; how we live.

how we live

There are villains in this story.

It's called sprawl, and I'll be frank about it.

But it's not just sprawl like low-density development on the fringes of metropolitan areas that you think, or many of you think.

In fact, I think sprawl can happen anywhere and at any density.

An important property is that it isolates people.

It segregates people into economic enclaves and land-use enclaves.

It cuts them off from nature.

It allows the interactions and interactions that make cities great places and societies thrive.

So the antidote to sprawl really needs to be considered by all of us, especially when working on a construction project of this magnitude.

Now let's take a look at one exercise.

We developed a model for California so that the state can work to reduce its carbon footprint.

We created a series of scenarios for how nations would grow, but this is just one of the oversimplified scenarios.

We mixed the various development prototypes and said they would bring 10 million new crew members to California by 2050.

And one was sprawl.

Shopping malls, subdivisions, office parks, etc. are pretty much the same.

The other was that not everyone migrated to cities, dominated only by compact developments that we thought of as tram suburbs, walkable neighborhoods, low-rise but integrated mixed-use environments.

And the results are astonishing.

They are astonishing not only in the scale of the difference in this one change in our urban-building habits, but also in that each represents a special interest group, one that once championed one concern at a time.

They didn't understand what I call the 'common interest' of urban forms that allow union with other people.

As for land consumption, environmentalists are very concerned about it, and so are farmers. There is a wide variety of people and of course neighborhood groups who want open space nearby.

California's sprawled version nearly doubles the physical footprint of the city.

Greenhouse gases: significant savings. In California, cars are the most carbon-intensive, and cities that rely less on cars obviously generate significant savings.

Vehicle mileage: That's what I just talked about.

Reducing the average number of miles driven per household by just 10,000 to the mid-26,000 miles per year has a huge impact on air quality and carbon emissions, as well as on household budgets.

As we have seen, the middle class struggles to maintain.

Healthcare: We were talking about how to fix things when they break. to clean the air.

Why not stop polluting?

Why not use your legs and bike more?

And it depends on the kind of city we shape.

Household Costs: 2008 was not only a financial industry runaway, it was also a sign of the times.

It was that we were trying to sell too many of the wrong kind of homes. Large lots, single family homes, far away, too expensive for the average middle class family to afford, and frankly no longer fit their lifestyle.

However, in order to move inventory, you can have it sold at a discount on the loan amount.

I think that was a lot of what happened.

Saving $10,000 in costs -- remember the median is $50,000 in California -- that's a big factor.

It's just a car and utility bills.

So, apart from the environmentalists and politicians, everyone is fighting everyone, the often siloed affordable housing advocates are now beginning to understand the common cause, and I think that common cause is what really makes a difference.

As a result of these efforts, Los Angeles has now decided to transform into a more transportation-centric environment.

In fact, since 2008 they have issued $400 billion in bonds for transportation and voted $0 for new highways.

What a change! LA will be a city of pedestrians and transportation, not a city of cars.

(Applause.) How is that possible?

Take the least desirable land—the strip—and add to it where space and transportation are, then embed mixed-use developments to meet new housing demand and make the existing neighborhoods around them more complex, more interesting, and more walkable.

This is another kind of sprawl. China, dense sprawl, what seems to be a contradiction, has the same problem, all segregated in superblocks, and of course this amazing smog just talked about.

China currently spends 12% of its GDP on health impacts.

Of course, the history of Chinese cities is solid.

Same as anywhere else.

Community was all about small local shops, local services, and walking and socializing with neighbors.

It may sound utopian, but it's not.

That's actually what people really want.

The new superblock is a block containing 5,000 units and is similarly gated. Because no one else knows.

And, of course, there are no sidewalks, no shops on the first floor, and a very sterile environment.

In one of the superblocks here, I found an incident where people were illegally setting up shop inside their garages to support the local service economy.

There is a desire of people to "want to be right".

We just need to get planners and politicians on board.

have understood. Concerning technical planning.

Chongqing is a city of 30 million people.

It's about the same size as California.

This is a small growing area.

They wanted to test alternatives to sprawl in several cities across China.

That's 4.5 million people.

What you can see from this image is that these circles are all within walking distance around the transit station. A huge investment in metro and BRT and a distribution that allows everyone to work within walking distance.

The red part, this is the explosion.

Suddenly our principles demanded green spaces that preserve important ecological features.

And other streets there are car-free roads.

So instead of bulldozing the site and building buildings right up to the river, this green edge was something that wasn't really normative in China until a series of practices were experimentally launched in China.

Urban structure, small blocks, perhaps 500 households per block.

they know each other

There are shops around the street and local destinations.

And since the number of roads increases, the roads themselves become smaller.

A very simple and straight urban design.

Now here's something I love dearly.

Consider the logic.

Only one-third of the population owns a car, so why should the roads be 100 percent ceded to cars?

What if 70 percent of the roads were car-free and others could navigate transit, walk or bike?

Why don't we have geographic equity in our distribution system? (Applause)

And frankly, cities would work better.

No matter what you do, no matter how many ring roads you build in Beijing, you can't overcome complete traffic jams.

So this is a car-free road with mixed use along the edges.

Transportation runs through the middle.

We're excited to bring self-driving vehicles to public transport, but we may have a chance to talk about that later.

Currently, there are seven principles adopted by the highest levels of the Chinese government, and we are moving towards their implementation.

And I think they are simple, universally universal principles.

One is to preserve the natural environment, history and important agriculture.

The second is the mix.

Mixed use is popular, but when we say mixed we mean mixed income, mixed age groups and mixed land use.

walk.

There is no great city that isn't fun to walk around.

you don't go there

The place to go on a trip is a place where you can walk.

Why not make it anywhere?

Bicycles are the most efficient means of transportation we know.

China is currently adopting a policy of six-meter bike lanes on all roads.

They are serious about reclaiming bicycle history.

(Applause.) Complicated planners, here we are: connect.

This is a road network that allows many routes instead of a single route and provides different types of roads instead of just one.

get on.

We need to invest more in transportation.

There is no silver bullet.

Self-driving cars will not solve this problem.

In fact, they end up generating more traffic and more VMTs than the alternatives.

and concentrate.

We have a hierarchy of cities based on transportation rather than the old structure of highways.

It's a big paradigm shift, but we need to reconnect these two elements in a way that really shapes the fabric of the city.

So I have high hopes.

In California, the United States, and China, these changes are widely accepted.

I'm hopeful for two reasons.

One is that most people understand it.

They have an innate understanding of what a great city can and should be.

Second, the kind of analysis we can now do has allowed people to connect the dots and form political coalitions that didn't exist in the past.

It allows us to have the kind of community that we all need.

thank you.

(Applause) Chris Anderson: Yes, self-driving, self-driving cars.

A lot of people here are very excited about them.

What are their concerns or problems?

Peter Calthorpe: Well, I think there's too much hype here.

First, everyone says they get rid of a lot of cars.

What they don't say is that the vehicle's mileage will increase significantly.

There will be more cars on the road.

More congestion is expected.

CA: Because it's so attractive that you can read a book or sleep while driving.

PC: Well, there are several reasons.

One is that private ownership encourages people to travel longer distances.

It will be a new expanse of life.

If you can work while commuting, you can live in a more remote area.

It would activate sprawl in a way that I was very frightened of.

Taxis: About 50 percent of the surveys said people do not carpool.

Not sharing them could increase the vehicle's mileage by 90%.

Sharing them still increases the VMT by about 30%.

CA: By sharing, do you mean multiple people riding at the same time in some kind of intelligent ridesharing?

PC: Well, an Uber share without a handle.

In reality, vehicle efficiency can be achieved with or without a steering wheel.

They claim that only they can achieve efficient electricity, which is not true.

But the real bottom line is that walking, biking, and transportation are how cities and communities thrive.

And it's the wrong direction to confine people to private spaces, whether they have a handle or not.

And frankly, the image of an AV on its way to McDonald's to pick up a pack without an owner being sent back with this kind of haphazard errand is really terrifying to me.

CA: Well, thank you. And I have to say that the miscellaneous street image you showed me was really moving and really beautiful.

PC: Thank you. CA: Thank you for your hard work.

(applause)

So if you see someone standing on the street corner with a sign like this in your city, raise your hand.

I think we all do.

To be honest, have you ever wondered if they were serious at least once?

If we offer them a job, will they really take it?

And what does that job mean for their lives?

This is the story of what happened in my city when we decided to investigate, to change the way we think about begging and to empower people through the dignity of work.

We call it "There's a better way."

We call this "there's a better way" because we believe there are better ways to get the money you need than begging on the street corner.

I believe there are better ways to help a brother or sister in need than to pass a few bucks out the car window.

We know that work has dignity.

We also know that people are much more likely to invest in themselves if they believe their community will invest in them first.

And since we're all designed to be kind and compassionate, it always feels good to give a few bucks to someone in need.

But if you talk to beggars, many of them will tell you that your few bucks aren't necessarily used to feed the body, but to feed an addiction.

There's a better way.

My name is Richard Berry and I have one of the best jobs in the world.

I am going to be the mayor of Albuquerque, New Mexico, a great city in America.

On July 17, 2015, I had lunch in the great American city and on my way back to City Hall saw this gentleman standing on the street corner.

As you can see, he has a sign that says he wants a job.

However, if you look closely at the photo, you can see that he is standing under a blue sign. The sign says if you need help, need food or shelter, or want to donate, call 311, the community service number.

So why is this guy standing with his sign under mine?

So I wondered if anyone would call that 311 sign, but I did 11,000.

Installed at about 30 intersections.

And we connected them with food, housing and services.

Yet he still stands under my billboard with a sign that says he wants a job.

It's easy. he wants a job.

So I decided to do something unusual in government.

I decided to make the solution simpler rather than complicated.

I went back to my office and gathered the staff and said, 'We will take this man at his word, and we will accept others like him.

The man says he wants a job, so we're going to give him a job and make our city a better place by then. ”

As you know, Albuquerque is a beautiful place.

It is one mile high, bordered by the Sandia Mountains to the east, and the Rio Grande River flowing through the center of the city. We are home to the Albuquerque International Balloon Fiesta.

On days like today, you can literally ski in the morning and play golf in the afternoon.

But there is always work to be done. Weeds always need to be pulled out and litter must be picked up.

There are two questions you need to ask yourself if you want to do something like this in your city.

The first is, "Is there anything more to do in your city?"

If the answer is no, can you give me the mayor's phone number so I can give him some advice?

(Laughter) But the second question you have to ask is this. Is your solution to panhandling working?

If you're like Albuquerque and you're taking the punitive approach you used to, handing out tickets to beggars and money givers, I'd suggest your solution isn't working. And I also know you haven't gotten to the root of your city's problems.

So if you have something to do and you need people who need it, there's a better way.

Luckily, it's not that complicated.

This is a 2006 Dodge van.

It was in the motor pool with nothing to do.

I put on new tires and wrapped the logo.

This van is now going out to the street corner where the beggars are. we go to them

We stop the van, get out, and ask if we want to work for the day instead of begging for the day.

And if you're wondering if they really think so, it takes about an hour to load this van in the morning as most of the people we ask have a job for the day.

But you need more than just a van.

It takes a super nice human being to drive that van.

And my super awesome human being, his name is Will.

This is him in a yellow vest.

Will works for a local non-profit partner.

He works for homeless people every day.

The beggars trust him, he believes them, and he is fully committed.

I like to say, "Where there's a will, there's a way."

So if you want a Better Way campaign in your city, you'll need to find the will yourself. Because he's one of the keys to the success of this campaign in Albuquerque.

We also need good nonprofit partners.

Our facility is St Martin's Hospitality Center.

They have been part of our community for over 30 years.

They provide counseling, food, housing, and if they don't, I know someone in our city who can.

But they go above and beyond for me as mayor.

Provides agility.

It can take two weeks, or even two months, to bring employees to work in Albuquerque.

Imagine - my old Dodge van, my super awesome human being, Will, a great partner at a local nonprofit - they drive up to the street corner and there's a beggar and they say, 'Would you like to work for a day?

When the beggar said yes, Will said, "Great! I'll be back in six weeks."

(Laughter) It doesn't work.

Having that agility in our program is very important.

And they take care of all the paperwork, insurance, and other things that I can't do right away.

We pay the beggars $9 an hour.

Feed once on site.

At the end of the day, our old Dodge van takes them back to St. Martin's Hospital and connects them to counseling services.

So far, we've cleaned up 400 city blocks in the city of Albuquerque using a pilot program, a few days a week, awesome humans and Dodge vans.

We picked up over 117,000 pounds of trash, weeds and trash.

I don't know if you've ever weighed tumbleweed, but tumbleweed doesn't weigh much, so you can imagine the amount of material we picked up.

My city has 6,000 employees and no department is better than the solid waste department.

At the end of the day we send the truck out and help the beggars load the truck with the materials they picked up during the day and we take it to the landfill.

I am lucky and hope that the city officials will work with the beggars.

They improve our city as they improve their lives.

And like anything else, listen, it takes resources.

But the good news is, it doesn't take long.

We started with an old van, super awesome people, a great local nonprofit, and $50,000.

But it also needed the trust of the community.

And luckily we were building it a few years before Better Way was born.

We have a program called Albuquerque Heading Home, a housing first model that houses chronically homeless people, and when I told the community that I wanted to do it differently, they said there was a smart way to do the right thing.

We currently house 650 chronically homeless and medically vulnerable people who, frankly, are the most likely to die on the streets in our city.

We commissioned a university and they did the research.

I would say we save taxpayers 31.6 percent over the cost of keeping someone struggling to survive on the streets.

We are now saving over $5 million while accommodating 650 people.

So we had the trust of the community, but we also needed to be a little more honest with the community. Because I had to convince people that by giving them that $5 over the counter, they might actually be minimizing their chances of helping someone in need. Here's why. That $5 could be used to buy fast food today. It is often used to purchase drugs and alcohol.

If you donate the same $5 to one of our shelters, you can feed seven people today.

If you donate to your local food bank or food pantry, your money can actually feed 20 people.

People ask: “Albuquerque has 600,000 people, Metro has 1 million people, and we can't do that in our city. We're too big, we're too small.”

I disagree; you can do this if you have one beggar per block.

If you live in a city of 8.5 million people, you can do this.

It doesn't matter what you do.

It's not the work you do that counts, it's the dignity of your work.

You can do anything.

So I think any city can do this.

And people say to me, 'Mayor, that's a little too simple.

That doesn't work. ”

But, friends, when you treat a beggar on a street corner with dignity and respect, perhaps for the first time in years, maybe for the first time in their life, and tell them that you believe in them, that this is your city as well as theirs, and that you really need their help to make our place better, and you understand that this is not the answer to all of their problems, but at least it is a start and something amazing happens.

When they get out there and start working together, you start to see amazing things happen.

They value teamwork. They understand the fact that they can make a difference.

And at the end of the day, when you return to St. Martins in your old Dodge van, you're much more likely to enroll in whatever services you need, like substance abuse and mental health counseling.

To date, pilot programs have provided approximately 1,700 daily shifts.

We connected 216 people to permanent employment opportunities.

In fact, 20 people have obtained the qualification of "Heading Home", which is the housing first model, and have already secured their housing.

And over 150 people have joined mental health substance abuse services through There's a Better Way.

This is me just two weeks ago at St. Martin's University doing a biennial point-in-time survey.

We are interviewing a homeless gentleman just like us, getting his information, thinking about where he came from, how he got there, and what we can do to help him.

Then I noticed he has the same sign he had in 2015. Same sign as I walked by here today.

So you have to ask yourself. Is it really making a difference?

Undoubtedly, it makes a difference.

Albuquerque is now one of the national leaders in combating some of the most stubborn and deep-seated social problems.

Combined with the Albuquerque Heading Home, Better Way program, the City of Albuquerque reduced the city's unsheltered homelessness by 80% last year.

Since I became mayor, we have reduced our city's chronically homeless population by 40 percent.

And by the HUD definition, we've reached feature zero. This literally meant that the city of Albuquerque was intentionally homeless for veterans.

(Applause.) So I'm happy to report that other cities have heard about this, and other mayors in Chicago, Seattle, Denver, Dallas, and others have called us and are now beginning to implement programs that bring equal dignity to work.

And I can't wait to learn from them.

I can't wait to see what their experiments are like and what their pilot projects are like. Then we will be able to initiate a collective approach across the country through the dignity of work.

And I want to commend them, mayors, communities and nonprofits for their efforts.

So who's next?

Are you and your city ready to step up?

Are you ready to think differently about these persistent social issues?

Are you ready to elevate people in your community through dignity at work and make your city better in many ways?

If so, my friend, I promise you there is a better way.

thank you.

(applause)

I am here to propose a new way of thinking about my field of expertise, artificial intelligence.

I think the purpose of AI is to give humans the intelligence of machines.

And as machines get smarter, so do we.

I call this "humanistic AI". This is artificial intelligence designed to meet human needs by working together and empowering people.

Well, I'm glad that the idea of ​​intelligent assistants is mainstream today.

This is a well-accepted metaphor for the interface between humans and AI.

The one I helped create is called Siri.