In fact, everyone can create their own masterpiece.

Would love to try it sometime.

It is very fun.

thank you.

(applause and cheers)

Hello. In fact, this is Bauer Bodoni's "Hello" to those print hysterics in us.

What has become clear in the last few days is the need to reconcile what the "big" wants—the "big" being the organization, the system, the country—with what the "small" want—the individual, the person.

And how do you combine these two?

I think Charlie Ledbetter spoke very clearly yesterday about the need to involve consumers, people in the process of making things.

That's what I want to talk about today.

So I think bringing the little things together to facilitate and create the big things is what we believe in and what we do with the ideo is to bring some kind of life to it.

I call this first chapter a "visibly obvious bloody glance" for the English here.

A lot of the time, good ideas are stared right in front of you, and you might miss them. And I think a lot of the time what we do is just hold the mirror up at the client and say, "Okay! Let's see what's going on."

Rather than explain it in theory, I would like to give an example.

We were asked by Minnesota's large health care system to describe the experiences of their patients.

And I think they were expecting -- they've worked with a lot of consultants before -- thousands of bubbles and systematic this and that and some kind of horrible org chart with all sorts of mappy stuff.

Worse, there are things like WowCharts and all sorts of—God only knows, all sorts of PowerPoint horrific deaths.

The first thing we actually shared with them was this.

Play this until your eyeballs are completely melted.

This is 59 seconds from the start of the movie.

This is 59 minutes.

3:19。

I think something will happen. I think we'll see a head soon.

5:10.

5:58.

6:20.

I was shown all the cuts, but I was completely like "What is this?".

The point is, just laying in a hospital bed all day looking at the roof, it's a really awful experience.

Think about it from the patient's point of view. Christian working with us at Ideo.

He just lay in his hospital bed and stared at the polystyrene ceiling tiles for a really long time.

Patients in hospitals are like that.

And they were, you know, dizzying, like glimpses of obvious bleeding.

fault. So it was a total revelation for them to observe the situation from the perspective of an outsider, as opposed to the organization's traditional position.

And it was a really catalytic event for them.

So they took action immediately.

They said, "Okay, it's not about systemic change."

It's not about pretentious and ridiculous things that we have to do.

It's a small thing, but it can make a big difference.

So we started by asking them to prototype really small things they could do to make a big impact.

The first thing we did was band-aid affix small bike mirrors to stretchers and hospital carts so that we could actually talk while being driven to nurses and doctors.

Seeing them in the rearview mirror created an interaction between the little humans.

A very small example of what they can do.

Interestingly, the nurses themselves kind of jumped into action and said, "Okay, we accept this." what can we do

The first thing they do is decorate the ceiling.

This really made me think -- I showed this to my mom recently.

I think my mother now sees me as something of an interior coordinator.

It's what I do for a living, kind of like Lawrence Llewellyn-Bowen.

It's not particularly the best design solution in the world for us as real, so to speak, hardcore designers, but it's still a great and empathetic solution for people.

What they started doing on their own, like changing the floor into the patient's room to say, "This is my room. This is my personal space," was a very interesting kind of design solution to this problem.

You moved from public space to private space.

Another idea, which also came from one of my nurses and I love it, was to take a traditional corporate whiteboard and put it on one wall in the patient's room and put this sticker on it.

What you can actually do is walk into a room and write a message to the sick person in that room. This is great.

So the very small, small, small solution had a big impact.

I thought it was a really great example.

So this is not a particularly new idea. It's like seeing opportunities in the things around you and turning them into solutions.

This is the history of invention based on this.

I read this because I want to get these names right.

Joan Ganz Cooney saw his daughter -- came down Saturday morning and saw her looking at a test card waiting for the show to start one morning, and from there Sesame Street began.

Malcolm McLean was traveling from one country to another and was wondering why it took them so long to get the boxes onto the ship.

And he invented the shipping container.

Georges de Mestral didn't have bugs all over his Birkenstocks, but while walking his dog in the fields, it became covered in tiny prickles called burrs, and Velcro was born from it.

And finally for the British, when Percy Shaw (which is a great British invention) was driving home one night, he found a cat's eye on the side of the road, and that's where cat's eye was born.

In other words, there is a sequence of using your eyes to see things for the first time, see things anew, and use them as opportunities to create new possibilities.

Second, it doesn't sound very Zen, but these are the words of the Buddha. “Finding yourself in the margins and looking at the edges of things is often a really interesting starting point.”

I think blinking vision tends to produce blinking solutions.

So using your peripheral vision to look wide is a very interesting place to look for opportunities.

Here is yet another medical example.

We were commissioned by device manufacturers to develop the Palm Pilot and Treo.

We have developed a lot of sexy technology at Ideo. They saw this and wanted sexy technology for medical diagnostics.

This was a device that nurses used when performing spinal surgery in hospitals.

Ask the nurse to enter the data.

And they had this vision of being interested in some kind of gadget, kind of like a nurse clicking on this aluminum device, all incredible.

When we actually went and saw this procedure in action, which I will get to in a moment, it became very clear that there is a human side to this that they really don't recognize.

With a 4-inch needle in the spine -- the device's data was for this procedure. It was for pain management. you are so scary you're crazy

So the first thing most nurses do is hold the patient's hand and comfort them. Human Gestures -- This made great two-handed data entry completely impossible.

So what we designed was something less sexy, but more human and practical.

So, while it's not a Palm Pilot by any stretch of the imagination, it does have a thumb scroll so you can do it all with one hand.

So, again, coming back to this, the idea that small human gestures dictated the design of this product.

And I think that's really, really important.

So I'll explain this workaround idea again.

We often use the phrase "workaround" as we look around. I was actually looking around at TED and just watching these sorts of things happen while I was here.

This idea of ​​how people frame solutions in our lives, and what we do in our environment with great potential, if somewhat unconscious, is something we often focus on.

We recently wrote a book called 'Thoughtless Acts? I hope you all got it too.

There was great intention and great opportunity for this kind of thoughtlessness that people did.

Why do we all follow street queues?

This is a photo of a Japanese subway.

I don't know why, but people consciously follow things.

Why do you put square milk cartons on a square fence?

Because we have to, we have to.

I don't know why, but it does.

Why wrap the tea bag string around the cup handle?

Again, we are kind of using the world around us to create our own design solutions.

And we always say to our clients: "Look at this.

This is really important. This is a really important one. ”

This is people designing their own experiences.

Now you can draw.

We park our shopping carts there, assuming that there are poles on the road so we can use them.

It's there for us to use, on some level.

So again, we make good use of the environment to do all these different things.

We incorporate other experiences. That is, take one item and move it to another item.

And this is my favourite. My mother used to say to me, "Just because your sister jumps into the lake doesn't mean you have to."

But of course we all do. We all follow each other every day.

In other words, they think that just because someone else has done something, it's okay for them to do the same thing.

And we always have this kind of semaphore around us.

In other words, a shopping bag equals "parking meter failure".

And we all know to some extent how to read these signals by now.

We all talk to each other in this very visual way without realizing what we are doing.

The third section is the idea of ​​not knowing, the idea of ​​consciously putting yourself backwards.

I always talk about unthinkable situations.

It's like having a beginner's mind, sharpening your mind, and seeing things anew.

A friend of mine is an IKEA designer and her boss asked me to help design a storage system for kids.

This is the Billy bookshelf. It's IKEA's best-selling product.

Hammer together. If it were me, I would hammer it with my shoes. Because it is impossible to assemble.

But a big selling bookshelf. How do we recreate this for our children?

When I actually look at children, the reality is that they don't think linearly about things like storage.

Children assume permission in an entirely different way.

Children live on food. They live under things.

Because their lives are centered around objects, their spatial perception relationships and storage concepts are completely different.

So the first thing I have to do is Graham, the designer. Think from their point of view. So here he is sitting under the table.

So what came out of this?

This is the storage system he designed.

So what is this? I hear your questions. no i don't.

(Laughter) I think this is a particularly great solution.

That is, we see the situation in a completely different way.

This is a perfectly sympathetic solution, aside from the fact that Teddy probably doesn't love it.

(Laughter) But it's such a great way of reframing the ordinary, and I think that's one thing.

And I think one of the themes I learned again at this conference is to put myself in the other person's shoes, how can I put myself in other people's shoes and really feel what they are feeling?

And will you use that information to drive solutions?

I think that's exactly what it is.

Last section: green armband. everyone has it

That's really it.

So the key is to pick a battle big enough but small enough to win.

Again, one of the themes that I think came across clearly at the conference was, "Where do I start?" How do I get started? What should I do first?

So again we were asked to design a water pump for a company called ApproTEC in Kenya.

It is now called "KickStart".

And again, as designers, we wanted this to be incredibly beautiful and spent a lot of time thinking about its shape.

And it was completely irrelevant.

Put yourself in these people's shoes, and the fact that you have to be able to fold it up and put it on your bike is far more important than the shape. Production methods must be made with indigenous manufacturing methods and indigenous materials.

So I had to look at it entirely from the user's perspective.

We had to completely transfer ourselves into their world.

So products that look very clunky are actually incredibly useful.

The power supply is similar to the Stairmaster, pumping up and down with a pump.

Even children can use it. Adults can also use it. Everyone uses it.

It's turning them into entrepreneurs - which is also one of the themes - it's turning them into entrepreneurs.

They use this very well.

And for us, it's great because it has won many design awards.

So we were able to really balance the needs of the design firm, the needs of the individuals within the company, the satisfaction of the product they were actually designing, and the needs of the individual designing it.

Pumping water from 30 feet.

So, as a final gesture, we gave all of you these bracelets this morning.

No kidding, I made a donation on behalf of everyone here to start the next project.

Because, again, I think it's like putting money in our mouths here.

We feel this is an important act.

So we gave out bracelets. The small one is the new big one.

Please try wearing it.

That's it. thank you.

(applause)

What I wanted to talk about today is the shift from one way of thinking about nature to another that is tracked by architecture.

What's interesting about architects is that we've always tried to justify beauty by looking to nature, and arguably beautiful architecture has always looked to nature's models.

So, for about 300 years, there has been a hot debate in the architectural world about whether the number 5 or the number is the better proportion to think of in architecture, because the nose is one-fifth of the head, or the head is one-seventh of the body.

And the reason it was a model of beauty and nature is because the decimal point had not yet been invented. Not in the 16th century. Since everyone had to determine the building dimensions in fractions, the room dimensions would be a quarter of the façade. Its structural pedestal is dimensioned as 10 units, with fractional subdivisions reaching down to smaller elements. Finer and finer.

The decimal point was invented in the 15th century. Architects stopped using fractions and created a new model of nature.

So what's happening today is that there are models of natural forms based on calculus and using digital tools that have a lot of influence on how we think about beauty and form, and how we think about nature.

The best example of this is probably the Gothic style. Although Gothic was invented after the invention of calculus, Gothic architects did not actually use calculus to define their forms.

Importantly, however, the Gothic moment in architecture was the first time that force and movement were considered in terms of form.

In examples like Christopher Wren's King's Cross, we see the structural forces of vaulting expressed as lines, and we are actually looking at the expression of structural forces and shapes.

Much later came Robert Mailert's bridge. This optimized the structural shape with an almost parabolic calculus curvature.

Hanging chain model of Catalan architect Antonio Gaudi.

The late 19th century and early 20th century and how the hanging chain model applies to archways and vaults.

In all these examples, therefore, structure is the decisive force.

Frei Otto began using the Bubble Bubble Diagram and the Bubble Bubble Model to generate the Mannheim Concert Hall.

Interestingly, in the last decade, Norman Foster, along with structural engineer Chris Williams, used a similar heat transfer model to generate the roof of the National Gallery.

All these examples have one ideal form because they are considered in terms of structure.

And as an architect, I'm not interested in ideal forms, I'm not interested in optimizing for the perfect moment, so I've always found this kind of system very restrictive.

So what I thought I would pick up is another factor that needs to be considered whenever we think about nature, and that is basically a common form of invention in genetic evolution.

My hero isn't actually Darwin. It was a man named William Bateson, the father of Greg Bateson, who had been here in Monterey for a long time.

And he was a so-called teratologist. Rather than examining norms, he examined every monster and mutation to find rules and laws.

So instead of trying to find an ideal type or an ideal average, he was always looking for exceptions. So in this example, an example of the so-called Bateson's Law, there are two types of mutations in the human thumb.

When I first saw this image 10 years ago, I found it really strange and beautiful at the same time.

It's beautiful because it's symmetrical.

So what he discovered is that in all cases of thumb mutation, instead of having no thumb, you either get an extra opposable thumb or you get four fingers.

That is, the mutation reverted to symmetry.

And Bateson invented the concept of symmetry breaking, where symmetry reverts wherever information is lost in a system.

So symmetry is not a sign of order or organization, as I have always understood as an architect, symmetry is a lack of information.

So every time we lose information, we move to symmetry. Adding information to the system breaks the symmetry.

So the whole way of thinking about natural shapes changed in that moment from looking for ideal shapes to looking for combinations of information and common shapes.

Literally after seeing that image and knowing what Bateson was working on, we started thinking about architectural forms, using these rules for symmetry breaking and bifurcation.

Let's talk a little bit about the digital mediums we use today and how they integrate calculus. The fact that the digital medium is based on calculus means that we don't have to think of dimensions in terms of ideal units or obscure elements.

In architecture, we deal with large-scale assemblies of components, so in this room you're sitting in right now, you might have, say, up to 50,000 pieces of material and all of them need to be organized.

Now, you would normally think they are all the same. For example, all the chairs you sit on are supposed to have the same dimensions.

You know, I haven't verified this, but it's the norm for all chairs to have slightly different dimensions. I want all the chairs to be spaced out for everyone's line of sight.

All the elements that make up the ceiling grid and lighting have lost their modular nature and are increasingly moving into these infinitesimal dimensions.

Because we all use calculus tools in manufacturing and design.

Calculus is also the mathematics of curves.

Therefore, a straight line defined in calculus is also a curve.

It's just a curve with no bends.

As such, a new vocabulary of forms is now permeating all design disciplines. Whether it's cars, architecture, or products, it's really affected by the digital medium of curvature.

That's where the complexity of the scale comes in -- you know, in the nose-to-face example, there's a partial idea of ​​the part to the whole.

In calculus, the whole concept of subdivision is more complicated, because the whole and the part are one continuous series.

It's too early in the morning for a calculus lecture, so I brought some images to illustrate how it works.

This is the Korean church we went to in Queens.

In this example, you can see that the components of this staircase are repetitive but not modular.

Each element in this structure has its own distance and dimensions, and every connection has its own angle.

Now, the only way it can be designed or built is with a calculus-based form definition.

It also incorporates the motion vector nature, so you'll find that it's very dynamic, opening and closing very dynamically when crossing the same form.

That is, the same space that looks like some sort of closed space, when viewed from the other side, has a sort of open view.

There is also a sense of visual movement within the space, as all the elements change in patterns that lead the eye to the altar.

I think this is one of the big changes in architecture. It means that we are actually starting to look for every characteristic of a church rather than an idealized form like the Latin cross of a church. That is, the light coming in from the back from an invisible source, the direction of concentrating towards the altar, and so on.

It turns out that it's not rocket science to design sacred space.

It just needs to incorporate a certain number of traits in some kind of genetic way.

These are different perspectives of the interior with a very complex set of directions within a simple form.

From a construction and manufacturing point of view, this is a kilometer-long apartment building built in Amsterdam in the 70s.

And here we divided the 500 apartments into smaller districts to distinguish between them.

I won't go into detail about these projects, but you can see that the escalators and elevators that circulate people along the building's surface are all supported by 122 structural trusses.

We use escalators to move people, so all these trusses are loaded diagonally.

Therefore, each shape is slightly different according to the length of the building.

So we worked with Bentley and MicroStation to create custom software to network all the components into these chunks of information. This way, if you change an element along the length of the building, not only will that change be distributed to each truss, but each truss will distribute that information across the building façade.

Therefore, one calculation is done for all the building components you add.

So just designing one connection between a structural billet and another structural billet requires tens of millions of calculations.

But what it gives us is the mutual, harmonious and holistic relationship of all these components.

This idea is what got me into product design. That's because design firms with ties to architects, such as furniture company Vitra and home goods company Alessi, work here.

They realized that this actually solves the problem: this ability to keep the composition separate while keeping the components separate.

Instead of blaming or praising BMW, let's take BMW as an example.

In 2005 they must have a distinct identity for all car models.

This means that the 300 Series, or even the latest in the upcoming 100 Series, should resemble the 700 Series at the other end of the line. Therefore, we need a clear and consistent identity that is BMW.

At the same time, there are people who will pay $30,000 for a 300-series car, and people who will pay $70,000 for a 700-series car. People who pay more than double that don't want their cars to look too much like the bottom end of the market.

Therefore, it is also necessary to distinguish between these products.

Therefore, this problem is exacerbated for wholes and parts as manufacturing begins to allow more design options.

Today, as an architect, I only think about the relationship between parts and wholes, but from a product design perspective, it's becoming more and more of an issue for companies.

So the first kind of test product we did was the Alessi coffee and tea set.

It's an incredibly expensive coffee and tea set. We knew that from the beginning. So I actually went to some people I know south of San Diego and used the explosive titanium molding method used in the aerospace industry.

Basically all we can do is cut a graphite mold, put it in an oven, heat it to 1,000 degrees, and slowly expand the soft titanium until it explodes at the last minute into this shape.

But the great thing about this is that the foam is only a few hundred dollars.

Titanium costs thousands of dollars, but the geometry is very cheap.

So here we designed a system of 8 interchangeable curves, much like the housing project I just showed you. By recombining them, you get an ergonomic shape that always has the same volume and can always be manufactured in the same way.

Then you can pay hundreds of dollars for each of these tools and get an incredible variety of components.

This is one example of that set.

So what was important to me was that this coffee set, which is just a coffee pot and a teapot, with a pot on a tray, had a consistency, a Greg Lynn Alessi coffee pot, and everyone who bought it got a one-of-a-kind piece that was unique in some way.

Coming back to architecture, what is organic about architecture as a discipline, unlike product design, is that the whole question of wholeness and monumentality is really our domain.

For example, it should be designed coherently as a single object, but it should also be divided into smaller rooms and have both large-scale and small-scale identities.

Architects tend to work with signatures. So an architect needs a signature, and that signature has to work across the scale from a house to a skyscraper. The signature issue is what we are good at maintaining and working on. And the complexity is, for example, the relationship between the shape of the building, its structure, its windows, its colors and its patterns. These are real architectural problems.

So my heroes in nature are tropical frogs.

I'm interested in them because they're the most extreme example of a surface where texture and -- let's call it decoration -- I know frogs don't think of it as decoration, but it's mechanics -- are all intricately tied together.

Therefore, a change in shape indicates a change in color pattern.

In other words, patterns and forms are not the same thing, but they actually work together and are somehow fused together.

So when building Costa Rica's National Park Center, I tried to take advantage of the idea of ​​gradient colors and texture changes as the structure moved across the surface of the building.

We also used the continuity of change from the main exhibition hall to the Natural History Museum. So everything is a continuum of aggregates, but within those aggregates there are very different kinds of spaces and forms.

In a residential project in Valencia, Spain, which we are working on, the various residential towers are fused together with shared curves, so that we get a single mass, a kind of monolith, but it breaks down into its individual elements.

And we find that the change in mass gives all 48 apartments their own shape and size, but always within a kind of controlled limit, change.

I work with a group of other architects.

There is a company called United Architects.

Our company was one of the finalists for the World Trade Center site design.

I think this shows how we were approaching an incredibly large-scale construction problem.

We wanted to create something like a Gothic cathedral around the ruins of the World Trade Center.

So I tried to connect 5 towers to one system.

And we found many examples of other architects trying to do the same since the 1950s.

We actually approached it at the building typology level. There you can build these five separate towers, but they will all join at 60 floors to form a sort of single mass.

We also worked with United Architects on a proposal for the European Central Bank Headquarters, which used the same system, but this time in a much more monolithic mass, like a sphere.

But again, we see multiple architectural elements sort of organically merging to create a whole, broken down into smaller pieces, in an incredibly organic way.

Finally, I would like to introduce some effects of digital fabrication.

About 6 years ago I bought one of these CNC mills to replace the young guys who always cut their fingers off when making models.

I also bought a laser cutter and started making things like large scale architectural elements and models in my own shop with direct access to the tools.

What I have discovered is that the tools actually create decorative effects when you intervene in the software.

So in interiors like this shop in Stockholm, Sweden, and this Dutch installation wall from the Dutch Institute of Architecture, I was able to use the textures left by the tools to create a lot of spatial effects, and I was able to integrate wall textures and wall shapes with materials.

So at the level of vacuum-formed plastics, fiberglass, and even structural steel, which is considered linear and modular.

The steel industry is much more advanced than the design industry, and with it you can think of putting all the beams and columns together into a single system that is not only very efficient, but also very beautiful and organic decorative and formal effects.

Thank you very much.

I was listed in my online bio as a design evangelist.

That's a little lofty. I'm more of a streetwalker type.

I spend a lot of time looking for designs in urban areas and studying design in the public sector.

I take about 5,000 photos per year. I thought I'd compile them and come up with images that are appropriate and interesting for you.

And I used 3 criteria. First, I wanted to talk about what you can find on the street, what's free, what's available to everyone, and possibly other important messages, rather than what's affordable and authentic, what's free, what's familiarly known to you by competitors and competitors.

Take these sidewalks in Rio as an example.

A very common public design done in the 50's.

The flowing organic forms are very beautiful and are very much in line with Brazilian culture. I believe that good design adds value to culture.

It's a complete contradiction to San Francisco and New York.

But I think these are my kind of information highways. I live in a more analog world, where pedestrian traffic, interactions and diversity interact, and where the simple things underfoot mean a lot to us.

What inspired me to start this business?

I was a ceramic designer for about 10 years and I loved the practical shapes, the simple things that I use every day, the colors on the shapes and the small structures on the surface.

This led me to start a company called Design Within Reach that works with simple forms, hires great designers, and sells their individuality and individuality, and it seems to have paid off.

In the years since I started the process, I spent a lot of time traveling around Europe looking for designs.

And in Amsterdam I felt a little wake-up call. I went to a design store there and was among a bunch of designers. And I've noticed that a lot of things look pretty much the same. And the effects of globalization are also affecting our communities.

We know a lot about what's going on in design around the world, but it's becoming increasingly difficult to find designs that reflect our unique culture.

Walking around the streets of Amsterdam, I realized that the big story of Amsterdam is not what is in the design stores, but what is on the streets, and perhaps self-evidently, it is a city that has not been taken over by modernism, where that kind of architecture and character has been preserved, where the bicycle plays an important role as a means of transportation for people, and where the rights of pedestrians are protected.

And I'm writing a weekly newsletter and I wrote an article about it. And because it got such a big response, I realized that design in the public space, that common design, is very meaningful to people and establishes a kind of foundation and dialogue.

Then I thought about other European cities where I spend a lot of time looking for designs, such as Basel, where Vitra is located, and northern Italy. These cities are bike-heavy and may have pedestrian areas. And we came to the conclusion that maybe these important design centers have something to do with bicycle and pedestrian traffic. A skeptic would undoubtedly say, "No, the correlation is that there are colleges and schools where people can't afford cars," but that didn't seem to be the case in many cities. Pedestrian traffic was protected in these areas.

Look at this, you wouldn't call this a designer bike. Designer bikes are made from titanium or molybdenum.

But I started looking at design in places like Amsterdam and realized that, as you know, design's first job is to serve a social purpose.

Therefore, I consider this bike a very good example of design rather than a designer bike.

And since that time in Amsterdam, I've spent more time in the city, observing designs looking for common evidence of designs that don't really bear as much of the designer's signature.

I recently went to Buenos Aires to see this bridge by Santiago Calatrava.

He is a Spanish architect and designer.

And a tourist brochure gave me the direction of this bridge - I love bridges figuratively, symbolically and structurally - but it was a little disappointing, because sludge from the river was sprinkled over the bridge. It wasn't really used.

And as I was getting ready to see the designs, I realized that they were often a little disappointing.

But there was a lot more going on in the area. It was kind of a construction zone. Many buildings were built.

And when you approach the building from a distance, you don't see much. If you look a little closer, you'll come to a nice little composition that reminds me of Mondrian, Diebenkorn, etc.

But for me it was an example of an industrial material with a bit of color and animation and a nice little still life, kind of an unintentional design.

And if you look a little closer, you'll see another perspective.

I think these little vignettes, these little chance designs are refreshing.

I don't know, but they give me a sense of the correctness of the world and the visual pleasure of knowing that the building probably wouldn't be as beautiful as this simple industrial scaffolding that exists to fill its role.

There was another building down the road and it was a nice visual structure. Horizontal and vertical elements, small decorative lines across, these magenta squiggles, workers reduced to decorative elements, it was a kind of nice deconstruction of an urban place.

And as you know, it doesn't exist anymore.

You caught it for a second, and finding this little still life is like listening to a little song or something. It gives me immense pleasure.

Antoine Predock designed an amazing ballpark called Petco Park in San Diego.

Local materials have been used brilliantly, but several interior configurations can be seen inside.

Some people go to baseball stadiums to watch games. I go to see design relations.

Just a wonderful architectural division and the way the trees form vertical elements.

Red is a landscape color often used for stop signs.

It steals your attention. It has so many emotions. It looks back at you like a shadow.

Part of a barrier tape constructed in Italy.

New York Construction Site: Red has almost as much emotional power as puppy cuteness.

Italian side street.

Red drew me into this little composition. Probably optimistic for me in the sense of public service mailboxes, door services, plumbing and so on.

It seems as if these various public services work together to create a nice little composition.

Almost everything looks better in Italy.

A simple menu laid out on a board to provide some kind of balance.

But I'm sure it's because it's what you see walking around the city.

Red can be a comical color. You can draw attention to the pathetic character of a small fire hydrant that suffers from bad urban planning in Havana.

You can animate simple blocks, simple materials with colors. If you are walking through New York, stop.

I don't always understand why I take pictures of things.

Great visual composition of symmetry.

It bends against sharp objects.

This is a comment on how New York City handles public seating.

I've found some just kind of interesting bollard relationships on the street with different interpretations, but these things amuse me.

Sometimes, a trash can—this one just on the streets of San Francisco—that has been sitting there for 18 months creates a nice 45-degree angle to these other relationships, turning a mundane parking lot into a nice little sculpture.

I mean, everywhere I go I see this kind of quiet design hand at work.

Havana is a wonderful region.

No commercial complications at all. It hides logos, brands and names so you can physically pay attention to things.

This is excellent protection for the pedestrian zone and repurposed colonial artillery for that purpose.

Cuba needs to be more resourceful with lockdowns and other effects, but it really is a great playground.

I have often wondered why Italy is truly the leader in modern design.

In our area, we are among the best in the field of furniture.

The Dutch are good, but so are the Italians.

And then I came across this little street in Venice. Communist headquarters shared a wall with this Catholic cathedral.

And I realized that Italy is a place where these different ideologies can be embraced, where diversity can be dealt with, where it can be left untroubled or ignored. But there are no conflicting factions in these, and perhaps tolerance for absurdity is what makes Italy so innovative and tolerant.

Italy also has a very good blend of the past and the present, and I think it is recognized in Italy and has an important influence on the culture. Because public spaces in Italy are protected, sidewalks are protected, and you can actually physically confront these things. And I think this helps people overcome their fear of modernism and such.

The typical San Francisco street corner may change.

And I use this This is what I consider to be a kind of urban spam.

I know this because I walk a lot, but private industry really disrupts the public sector here.

And looking at it, I would say that publications that report on urban issues also contribute to that. I want to say this to all of us, public policy is not going to change this at all. Private industry needs to take these things seriously.

Italy may be the extreme. Again, it is very apparent that there is some sort of control over what is going on in the environment, even in the way periodicals are sold and distributed.

I walk to work every day or ride my scooter and park it at this little spot.

Then one day I came down and all the bikes were red.

Now, I'm not trying to impress people who can use Photoshop or whatever, but this was the actual moment I got off my bike. I thought as I watched it. I thought it was as if all the biker brothers got together and conspired to make a small point.

And it reminded me of that -- to stay present, to pay attention to these kinds of things.

It gave me a strange possibility. Maybe if today were a yellow day in San Francisco, and we could all agree, we could create some installations.

But at the same time, it was a reminder of the power of patterns and repetition to influence our minds.

And I don't know if there's some sort of effect that's more powerful than a pattern, and a way that it kind of combines different elements.

I attended an art show in Miami in December and spent several hours looking at the art, and while I was surprised at the price and how high the art was, I had a great time looking at it.

And when I went outside, this car service guy had created a very nice little collage of these car keys. And the closest thing to me was the group of prayer tags I saw in Tokyo.

And I thought that if a pattern could tie these different elements together, it could do just about anything.

There aren't many shots of people, as they get in the way of studying the pure form.

I was having lunch at a small restaurant in Spain. It was such a wonderful day when I felt so lucky to have the place to myself, sip a glass of wine, soak up the local area, culture, food and tranquility. Then a bus of tourists arrived, filling the empty restaurant.

In a short period of time, the mood and personality changed with loud voices and big bodies, and we had to get up and leave. It was just uncomfortable.

At that moment, the sun rose and projected a pattern onto these bodies through a perforated screen, disappearing behind them. And we left the restaurant with an "okay" feeling. About things.

And I think patterns have the ability to eradicate some of society's most evil forces, such as bad manners in restaurants, but very seriously, this is to me, one of the things you're doing is that the aggressive nature of industry is what you've created within the monoculture, and I think it's important to us that you maintain cultural diversity within the monoculture.

The last shot I'm dealing with -- returning to this subject of sidewalks -- I wanted to say something here -- I'm kind of optimistic.

After World War II, the effects of automobiles became truly devastating in many cities.

Much of the urban area has been converted to parking lots with a kind of indiscriminate use.

Many of the planning departments became subordinate to the transportation department. Much like Walmart, it's easy to wreck your car. I won't do that.

But they are examples of urbanization and the changes that have taken place in recent years, and the growing sensitivity to the importance of the urban environment as a cultural hub.

I believe that the statements I make in this public sector are our contribution to the greater whole.

Cities are where we are most likely to encounter diversity and mingle with other people.

We go there for art and all other stimuli.

But I think people recognize the sanctity of our urban areas.

Places like Chicago have really reached a sort of international status.

In fact, the United States is becoming something of a leader in enlightened urban planning and renewal, and I would like to point to places like Chicago. There, we see someone like Mayor Daly as a bit of a design hero who can get past the political process and whatever it takes to improve the neighborhood.

In a city like this, you might expect to see upgraded flower boxes on Michigan Avenue where the wealthy shop, but actually walk along the streets and you'll find that each street has a different flower box. There is real diversity in plants.

And the idea that city groups can maintain different types of foliage is actually quite exceptional.

It has common elements found throughout Chicago, plus Big D's design statement, the Pritzker Pavilion by Frank Gehry.

My measure of this being an important part of the design is not the looks, but the fact that it serves a very important social function.

For example, the area hosts many free concerts. It has an amazing sound system.

However, the work the city has done with its public areas is significant and almost a model internationally.

I work for the San Francisco Council of Mayors and the International Conference of Mayors, and Chicago is considered the pinnacle of that, and I want to give Mayor Daly and the locals my heartfelt tribute.

I thought I should include at least one shot of technology for you guys.

It's also in Chicago's Millennium Park, where Spanish artist and designer Plensa has created a kind of digital readout in the park that reflects the personalities and personalities of the people of the area.

And I think it's a welcoming field that embraces and reflects diversity. I think the United States excels in merging both technology and the arts in the public sector.

You can really take on a leadership role, and Chicago is an example of that.

thank you very much.

"The Road Not Chosen" by Robert Frost Two roads diverged in the yellow woods And unfortunately I could not travel both And being a lone traveler For a long time I stood and looked down one as far as I could, down to the bend in the undergrowth. Then the other one was just as fair and probably had a better case, because it was grassy and wanted to wear out. For that matter, the person who passed there really wore them as much, and that morning they were both lying in the foliage as well, but the treads of their feet were pitch black.

Oh, I saved the first one for another day! But knowing that roads lead to roads, I wondered if I should come back.

I would say this with a sigh, long ago, somewhere in the woods, two paths diverged, and I chose the less-traversed one, and that made all the difference.

Do you think that what we are building today will be considered a wonder in the future?

Think Stonehenge, Pyramids, Machu Picchu, Easter Island.

Well, they are all quite different from what we do today, with huge stones assembled in a complex but seemingly illogical way, all traces of their construction erased and shrouded in mystery.

It seems to me that humans could not have made these things. Because it wasn't made by humans.

They were carefully crafted by a primitive race of giants known as Cyclops.

(Laughter) And I've been working with these monsters to learn the secrets of moving those giant stones.

And after all, Cyclops is not so strong.

They are really smart about getting useful material for them.

Well, the video of the big stone-like wobbly creature behind me is the result of this collaboration.

Well, cyclops may be mythical creatures, but their wonders are still real.

It was made by humans.

But they also created a myth surrounding them. And when it comes to wonder, there is a thick connective tissue between myth and reality.

Consider Easter Island, for example.

When Dutch explorers first encountered the island, they asked the Rapa Nui people how their ancestors moved these giant statues.

And the Rapa Nui said, "Our ancestors didn't move the statue because the statue walked by itself."

Over the centuries this has been ignored, but in fact it is true.

These statues, known as moai, were carried while standing and rotating from side to side.

OK？

The moai are spectacular to visitors today, but one must imagine what they would have looked like back then, with giant moai marching around the island.

The real monument was not the object itself, but the cultural ritual that brought the stone to life.

As an architect, I've been chasing that dream.

How can we change the way we think about construction to accommodate its mythological aspects?

So what I do is challenge myself to perform a series of ancient but very simple tasks, simply moving and standing large, heavy objects, such as this 16-foot-tall megalith designed to stand vertically across land. Or this 4,000-pound behemoth that breathes life into itself to dance on stage.

And what I've discovered is that by thinking of architecture not as a final product, but as a performance from conception to completion, you're rediscovering a very clever way to build things today.

As you know, much of the discussion around our future focuses on technology, efficiency and speed.

But if I've learned anything from Cyclops, it's that wonder can be clever, spectacular, and sustainable thanks to its mass and mystery.

And while people still want to know how the ancient wonders were constructed, I've been asking Cyclops how to create a mystery that leaves people asking that very question.

Because in an era where buildings are designed to last 30, or even 60 years, I want to learn how to create something that can be enjoyed forever.

thank you.

(applause)

Okay, let's get started.

(music) (singing) You can be gay.

We are different in many ways.

It doesn't matter if you are a boy, a girl or somewhere in between. We are all part of one big family.

Gay means "happy".

Queer Kid Stuff.

You are enough in Queer Kid Stuff.

(Applause) Starting a performance with lyrics like, "You can be gay," is something else for a roomful of adults, but not for a roomful of kindergarteners.

You just heard the theme song for my web series "Queer Kid Stuff." The series makes LGBTQ+ and social justice videos for all ages.

And when I say all ages, I mean literally babies to great grandmothers.

Now I know what you're thinking: "Hey, they talk about kids and gay stuff."

But talking to kids about being gay is actually very important.

The American Academy of Pediatrics has found that children have a firm understanding of their gender identity by the age of four.

This is the time when children develop their self-awareness.

They observe the world around them and absorb and internalize that information.

Most parents today want their children to grow up to be kind, empathetic, and confident adults, and exposure to diversity is an important part of their social and emotional development.

And gender nonconforming children, trans children, and children with trans, nonbinary, and queer parents are everywhere.

In this series, the teddy bear co-host and I discuss the LGBT community, activism, gender and pronouns, consent and body positivity.

We approach these topics using simple definitions and metaphors similar to those we just heard.

We approach these ideas. In the words of my old professor, "under the doorknob." Descend to the height of a toddler, look up at the big world through those tiny little eyes, and take these seemingly complex ideas and simplify them. Focus on the core concepts instead of making fun of them.

Gender is how we feel and how we express ourselves.

Sexuality is about love, gender and family, not about sex.

These are all ideas that children can understand.

In one of my early episodes on gender, I used the idea of ​​pronouns to emphasize definition and introduced gender-neutral pronouns like "they" and "they."

I encourage my children to think about their own pronouns and ask others for pronouns.

Later episodes build on this foundation and introduce fancy terms like "non-binary" and "transgender."

I get emails from viewers in their 20s who use my videos to explain non-binary gender to their grandparents.

But over and over again, I've gotten the "Kids stay kids" comment.

Well, that's a very good opinion, but only if it actually includes all children.

Just weeks ago, a 15-year-old boy in Huntsville, Alabama, died by suicide after being bullied for being gay.

In 2018, he was a 7-year-old boy living in Denver, Colorado.

There have been and will be many more.

Lesbian, gay, and bisexual teens are more than three times more likely to attempt suicide than heterosexual teens, and transgender teens are almost six times more likely.

One study found that about a third of homeless youth identified as lesbian, gay, bisexual, or questionable, and about 4 percent of homeless youth identified as transgender, compared to 1 percent of the general youth population surveyed.

According to the Human Rights Campaign, 128 transgender people have been murdered in 87 cities in 32 states since 2013.

And these are the only ones reported.

And 80 percent of those killings were of trans women of color.

This bizarre situation is bleak, to say the least.

YouTube comments on my video are not so good.

I am used to harassment.

I get messages every day that I am a pedophile and that I should kill myself in a more creative way.

I once had to put the word "truck" on my block list because I wanted someone to run me over a truck.

"Shower" and "Oven" are also in there, less creative and with more disturbing references to the Holocaust.

When the neo-Nazis marched in Charlottesville, I wasn't surprised to learn that the person who created the violent meme on Reddit about my episode was among the tiki torch crowd.

This barrage of negativity is exactly what we are facing. Overwhelming statistics, violence, mental health risks, the well-meaning but flawed response my parents gave me when I came out: they didn't want me to have a tougher life.

That's what we're up against.

But in the face of all that, I choose joy.

Choose rainbows, unicorns, glitter, and sing along with your childhood teddy bear that it's okay to be gay.

I make queer media for kids because I wish I had this when I was their age.

I don't want others to have to suffer for what I did by not understanding my identity because they had no idea who I was.

I teach and spread this message through joy and positivity, rather than framing it around the hardships of queer life.

I want my children to grow up proud of who they are and who they can be, no matter who they love, what they wear, or what pronouns they use.

And I want them to learn to love others because of their differences, not in spite of them.

By cultivating this pride and empathy, I believe the world will be a kinder, more equal place and help combat the prejudice and hatred that pervades our world.

So discuss gender with your child.

Talk to your child about sexuality.

Tell me about your consent.

Tell them it's okay for boys to wear dresses and it's okay for girls to speak up.

Spread extreme queer joy.

thank you.

(applause)

Deep beneath the geysers and hot springs of the Yellowstone caldera are magma chambers generated by hot spots in the Earth's mantle.

As magma moves toward the surface, it crystallizes to form young, hot igneous rock.

Heat from these rocks causes groundwater to move toward the surface.

As the water cools, ions such as quartz crystals from silicon and oxygen, feldspar from potassium, aluminum, silicon and oxygen, and galena from lead and sulfur precipitate as mineral crystals.

Many of these crystals have characteristic shapes. For example, this spiky quartz cascade, or a pile of galena cubes.

But why does it grow into such a shape over and over again?

Part of the answer lies in that atom.

The atoms of all crystals are arranged in highly organized and repeating patterns.

This pattern is characteristic of crystals and is not limited to minerals. Sand, ice, sugar, chocolate, ceramics, metals, DNA and even some liquids have crystalline structures.

The atomic arrangement of each crystalline material falls into one of six different families: cubic, tetragonal, orthorhombic, monoclinic, triclinic, and hexagonal.

Given the right conditions, crystals grow into geometric shapes that reflect the arrangement of atoms.

Take for example galena, which has a cubic structure composed of lead and sulfur atoms.

The larger lead atoms are arranged in a three-dimensional lattice at 90 degrees to each other, and the smaller sulfur atoms fit neatly between them.

As the crystal grows, sulfur atoms are attracted to such sites and lead tends to bind to these sites.

The end result is a grid of bonded atoms.

This means that the 90-degree lattice pattern of galena's crystal structure is reflected in the visible shape of the crystal.

Quartz, on the other hand, has a hexagonal crystal structure.

This means that the atoms are arranged in hexagons on a plane.

In three dimensions, these hexagons consist of many intertwined pyramids made up of one silicon atom and four oxygen atoms.

Therefore, the characteristic shape of quartz is a hexahedral column with a pointed tip.

Depending on environmental conditions, most crystals can form multiple geometric shapes.

For example, diamonds that form deep in the Earth's mantle have a cubic crystal structure and can grow into cubes or octahedra.

The shape a particular diamond grows depends on growth conditions such as pressure, temperature and chemical environment.

Although growth conditions within the mantle cannot be directly observed, laboratory experiments have provided some evidence that diamonds tend to grow cubic at low temperatures and octahedral at high temperatures.

Trace amounts of water, silicon, germanium, and magnesium can also affect diamond shape.

And diamonds don't naturally grow into the shapes found in jewelry. These diamonds are cut to accentuate their brilliance and clarity.

Environmental conditions can also affect whether crystals form.

Glass is made of molten silica sand, but it is not crystal.

This is because the glass cools relatively quickly and the atoms do not have time to align themselves into the ordered structure of the quartz crystal.

Instead, the random arrangement of atoms in molten glass becomes fixed upon cooling.

Many crystals grow so close to each other that they do not form geometric shapes.

Rocks like granite have many crystals but no recognizable shape.

As the magma cools and solidifies, many of the minerals within it crystallize at the same time, quickly running out of space.

Also, certain crystals, such as turquoise, do not grow into recognizable geometric shapes under most environmental conditions, even with enough space.

Every crystal's atomic structure has unique properties, and while these properties may have nothing to do with human emotional needs, they have powerful applications in materials science and medicine.

Today I want to talk about how reading can change our lives and the limits of that change.

I want to talk about how reading can bring us a sharable world of powerful relationships.

But also about that connection is always partial.

Reading is, after all, a lonely and idiosyncratic occupation.

The writer who changed my life was the great African-American novelist, James Baldwin.

When I was growing up in West Michigan in the 1980s, very few Asian-American writers were interested in social change.

So I think I turned to James Baldwin as a way to fill this void, a way to be race conscious.

But perhaps because I knew I wasn't African American myself, I also felt challenged and condemned by his words.

In particular the words: "There are liberals who have all the right attitudes but no real convictions.

When you're short on chips and somehow expect them to be served, they somehow aren't there. ”

They are not there for some reason.

I took those words literally.

where should i put myself?

I went to the Mississippi Delta, one of the poorest areas in America.

This is a place shaped by a strong history.

In the 1960s, African Americans fought with their lives for education and the right to vote.

I wanted to be a part of that change and help young teens graduate and go to college.

When I arrived in the Mississippi Delta, it was still poor, still isolated, still in need of dramatic change.

The school I went to didn't have a library or career guidance counselor, but it did have police officers.

Half of the teachers were alternates, and when students got into fights, the school sent them to the local county jail.

This is the school where I met Patrick.

He put up twice when he was 15, he was in the 8th grade.

He was quiet and introspective and always seemed to be deep in thought.

And I hated watching other people fight.

I once saw him jump between two girls and get slammed to the ground during a fight.

Patrick had only one problem.

He didn't want to come to school.

He said it can be very depressing at times because there are constant fights at school and teachers are leaving.

Besides, his mother had two jobs and was too tired to let him come.

So it became my job to get him to school.

And since I was crazy, 22, and fervently optimistic, my strategy was to just show up at his house and say, "Hey, why don't you come to school?"

And this strategy actually worked, and he started coming to school every day.

And he started doing well in my class.

He wrote poetry and read books.

He came to school every day.

I entered Harvard Law School around the same time I found a way to connect with Patrick.

I was once again faced with the question of where to put myself and where to put my body.

And I thought the Mississippi Delta was the place where the people with the money, the people with the opportunities, all those things were leaving.

And those who remain are those who have no chance of leaving.

I didn't want to be the one to leave.

I wanted to be the one who remained.

On the other hand, I was lonely and tired.

So I convinced myself that if I had a prestigious law degree, I could make even bigger changes.

So I left.

Three years later, when I was about to graduate from law school, a friend called me to tell me that Patrick had gotten into a fight and killed someone.

I was devastated.

Part of me didn't believe it, but part of me also knew it was true.

I flew down to meet Patrick.

I visited him in prison.

And he told me it was true.

that he killed someone.

And he wouldn't say more about it.

When I asked what happened to school, he said he dropped out the year after I quit.

And he wanted to tell me something else.

He looked down and said he had a newborn daughter.

And he felt like he had let her down.

That was it, our conversation was hurried and awkward.

When I got out of prison, the voice inside me said, "Come back."

If you don't go back now, you'll never come back. ”

So I graduated from law school and came back.

I went back to see Patrick to see if I could help him with his legal case.

And this time, when I saw him for the second time, I thought I had a great idea and said, "Hey Patrick, why don't you write a letter to your daughter so that she can be remembered?"

And I gave him pen and paper and he started writing.

But when I saw the paper he gave me back, I was shocked.

I couldn't recognize his handwriting, he was making a simple spelling mistake.

And as a teacher, I knew that my students could improve dramatically in a short period of time, but I had no idea that they could fall back dramatically.

Even more heartbreaking was seeing the letter he had written to his daughter.

He wrote, "Sorry for my mistake, sorry I couldn't be there for you."

And this was all he felt he had to say to her.

And I asked myself, how can I convince him of the part of me that he has more to say and doesn't need to apologize for?

I wanted him to feel that he had something worth sharing with his daughter.

For the next seven months, I visited him every day and took the book with me.

My tote bag has become a small library.

We brought in James Baldwin, Walt Whitman, and C.S. Lewis.

I brought guidebooks on trees and birds, and a dictionary, which later became his favorite book.

On some days, we would sit in silence for hours reading together.

On other days, we read books together and read poetry together.

We started by reading haiku, hundreds of haiku, and seemingly simple masterpieces.

And I asked him, "Tell me your favorite haiku."

And some of them are very funny.

Here are some words from Issa: "Don't worry, spiders, I'm casually guarding the house."

And this is, "Nobody punished me for half a day's nap!"

And this gorgeous piece depicts the first day of snow: "Deer licking each other's first frost on each other's fur."

There is something mysterious and gorgeous about the appearance of poetry.

Empty spaces are as important as the words themselves.

We read this poem by W.S. Merwin wrote it after seeing his wife working in the garden and realizing that they would spend the rest of their lives together.

"Let me imagine we'll come again when we want, and spring will come. We'll be less old than we've ever been. Worn sorrows will soften like the early morning clouds that slowly come." When I asked Patrick what his favorite line was, he said.

He said it just reminds him of where time stopped, where time no longer matters.

And I asked him if there is such a place where time lasts forever.

And he said, "My mother."

Reading a poem with someone changes the meaning of the poem.

Because it becomes personal to him and it becomes personal to you.

Then we read, we read so many books, we taught ourselves to read and write, we read the memoirs of Frederick Douglass, an American slave who escaped freedom because of his literacy.

I grew up thinking of Frederick Douglass as a hero, and I saw this story as a story of upliftment and hope.

But reading this book sent Patrick into a kind of panic.

He stuck to Douglas' story of giving gin to his slaves as a way of proving that masters could not have their freedom at Christmas.

Because the slave stumbles in the field.

Patrick said it has something to do with this.

He said there are people in prison, like slaves, who don't want to think about their condition because it's too painful.

It hurts too much to think about the past, it hurts too much to think about how far we have to go.

His favorite line was: "I will do anything to let go of my thoughts!

What tormented me was thinking about my condition forever. ”

Patrick said Douglas had the courage to write to keep thinking.

But Patrick never realized how much he resembled Douglas to me.

I wonder how he kept reading even though he was in a panic.

He finished the book before me and read it on the concrete stairs with no light.

Then we read one of my favorite books, Marilyn Robinson's Gilead. This is a letter from a father to his son.

He loved this sentence: "I'm also writing this to let you know if you ever wonder what you've been doing in your life...

You were a godsend to me, a miracle, more than a miracle. ”

Something about this language, that love, that longing, that voice, rekindled Patrick's desire to write.

And he piled notebook on notebook and wrote a letter to his daughter.

In these beautifully intricate letters, he imagined himself and his daughter canoeing down the Mississippi River.

He would imagine they found a mountain stream with perfectly clear water.

As I watched Patrick write the letter, I thought: And I ask all of you. How many of you have ever written a letter to someone you feel has let you down?

It's much easier to get those people out of your head.

But Patrick faced his daughter every day and felt a sense of responsibility to her with a strong focus on every word.

In my life, I wanted to risk myself like that.

Because the risk is the strength of the heart.

Let me step back and ask the uncomfortable question.

Who am I to tell this story like this Patrick's story?

Patrick has lived with this pain and I have never been hungry for a single day in my life.

I've thought about this question a lot, but what I'm trying to say is that this story isn't just about Patrick.

It's about us, it's about the inequality between us.

A rich world where Patrick and his parents and grandparents have been shut out.

In this story, I represent that rich world.

And in telling this story, I didn't want to hide myself.

Hide the power I have

In telling this story, I wanted to reveal that power and ask how we can bring us closer together.

Reading is one way to close that distance.

It gives us a quiet universe that we can share together, share equally.

You're probably wondering what happened to Patrick now.

Did reading save his life?

I could and I couldn't.

When Patrick got out of prison, his journey was excruciating.

Employers rejected him because of his background, and his best friend, his mother, died of heart disease and diabetes at the age of 43.

He was homeless and hungry.

So people say a lot of things about reading that feel exaggerated to me.

Even if they could read and write, they were not discriminated against.

However, her mother's death did not stop there.

So what can reading do?

I would like to finish today with a few answers.

Reading gave him mystery, imagination and beauty inside.

Reading gave him images that brought him joy: mountains, seas, deer, frost.

Words to enjoy the free and natural world.

Reading gave him words for what he had lost.

How precious are these lines from poet Derek Walcott?

Patrick memorized this poem.

“The days I held, the days I lost, the days I overgrown, like my daughter, like my arms.”

Reading taught him his own courage.

Remember he kept reading Frederick Douglass, even if it was painful.

He remained conscious, even though it hurt to be conscious.

Reading is a form of thinking, and reading is difficult because you have to think.

And Patrick chose to think rather than not think.

And finally, reading gave him the language to speak to his daughter.

Reading inspired him to want to write.

There is a very strong connection between reading and writing.

When you start reading, you start finding words.

And I found the words to imagine the two of them together.

He found the words to say how much he loved her.

Reading has changed our relationship as well.

It brought us closer and gave us the opportunity to see beyond our own perspective.

And reading has embraced unequal relationships and brought us temporary equality.

When you meet someone as a reader, you meet them for the first time, new and fresh.

There's no way of knowing what his favorite line will be.

What memories and personal grief he has.

And you face the ultimate privacy of his inner life.

And you start to wonder, "Well, what is my inner life made of?"

What do I have that is worth sharing with others?"

I would like to end with some of my favorite passages from Patrick's letter to his daughter.

"The river is shaded here and there, but the light shines through the trees...

Many mulberries hang from some branches.

Extend your arm straight out to grab something. ”

And in this lovely letter he wrote, "Close your eyes and listen to the sound of the words.

I have this poem by heart and I want you to know it too. ”

Thank you very much to all of you.

(applause)

This is wheat bread, whole grain bread, made with new techniques that I have been experimenting with, developing and writing about. For lack of a better name, we call it the epoxy method.

I call this the epoxy method because it doesn't look very appetizing. I get that, but when you think about epoxies, what are epoxies?

These are two resins, they can't make glue by themselves, but when you combine the two something happens. Bonding occurs, resulting in a very strong and strong adhesive.

What I've tried to do with this technology is take all the knowledge that the baking world, the baker community, has been trying to accumulate over the past 20 years or so since we started working on the bread renaissance in America, and put it together to come up with a way to help you consume whole grain bread.

And let's be honest, everyone is trying to transition to whole grains.

After 40 years of knowing that whole grains are the healthier option, we're finally getting to the point where we're really flipping out and actually trying to eat whole grains.

(Laughter.) But the challenge for whole grain bakers is how to make it taste good.

Since it is whole wheat, you can easily make delicious bread using white flour. White flour is sweet.

It's mainly starch, and when you break it down, it's starch -- what is starch? It's -- thank you -- sugar, yes.

So bakers, and good bakers, know how to bring out the inherent sugars trapped in starch.

Whole grain bread presents another obstacle.

The bran is probably the healthiest part of the bread for us, and the bran is fiber for us because it is rich in fiber.

I have germs. It's good, but it's not the most delicious part of wheat.

That is, whole grain bread historically has a kind of mandate of being a health food bread, and people don't like eating or citing health food. They like to eat healthy and wholesome, but when we think of something as healthy food, we think of it as something we eat out of obligation, not out of passion or love of taste.

And ultimately, the challenge of any baker, every culinary student, every chef is to deliver flavor.

Taste is king. taste rules.

I call it the Flavor Rule. taste rules.

And you can get someone to eat something good for you once, but if you don't like it, you'll never eat it again, right?

So, this time I will try this bread.

I'm going to try this at lunch, and I'll go into a little more detail about it, but it's not just made with two fabrics. This attempt to bring out the flavors is also by making the dough unleavened the day before.

Only the fabric is wet.

This is a moist dough we call a "soaker" that helps kick off the enzyme activity.

And enzymes are like the secret ingredient that brings out the flavor of the dough.

The sugars trapped in starch begin to be released.

Enzymes do that.

So if we can release some of them, they become accessible within our taste buds.

They become available as food to yeast.

You can now put it in the oven for caramelization, and you will get a beautiful dough.

Another dough we make is fermented, or pre-fermented.

And it is made. It's a sourdough starter, or what we call a 'viga', or some other kind of pre-leavened dough with a small amount of yeast that also starts to develop flavors.

And on the second day, we combined these two parts. That's epoxy.

And we're hoping that the enzymatic dough pieces will become fuel packs for the leavened dough pieces that, when combined with the final ingredient, can create a bread that unlocks the full flavor potential of the grains.

That's the challenge. Now, let's go back and look at these 12 steps in our wheat journey.

I'll explain briefly and then look at it again.

Well, let's start with the first stage.

And this is what every student should start with first.

Anyone who works in the culinary world knows that the first stage of cooking is "Mr. Ann Place." It simply means "to put things in order" in French.

Everything is in place. first stage.

Therefore, in baking, weighing ingredients is called scale.

The second stage is mixing. Take out the ingredients and mix.

We have to develop gluten.

Flour does not contain gluten. Gluten is the only possibility.

Here, glutenin and gliadin are present, but neither are strong enough to make good bread, so we pre-set another kind of epoxy.

But when they hydrate and bind to each other, they create a stronger molecule, a stronger protein called gluten.

Therefore, the mixing process must generate gluten, activate the leaven and yeast, and basically evenly distribute all the ingredients.

Then comes fermentation, the third stage where the flavor is actually formed.

Yeast comes to life and eats sugar to produce carbon dioxide and alcohol. That is, belching and sweating. This is bread.

It's yeast belching and sweat.

And somehow this changes - yeast belches and sweat change later - and this gets to the heart of what makes bread so special, that it's a food that changes. We'll look into that soon.

But then it quickly goes through the next few stages.

We divide it into smaller units after it has fermented and its flavor and character begin to emerge.

Then take those units out and shape them. Pre-shape it a bit, usually a circle, or sometimes a small torpedo shape.

This is called "rounding".

And there is a short rest period. It can be several seconds.

It doesn't matter if it's 20 minutes or 30 minutes. Call it a rest or bench.

Then comes the final shaping, "panning". This means placing the molded bread in a frying pan.

It takes a little time, but it is a characteristic stage.

You can also put it in the basket. You can use a bread mold, but bake it in a pan.

And then stage 9.

Fermentation, which began in the third stage, continues through all other stages. Again, develop further flavors.

Final fermentation takes place in the 9th stage.

We call it "calibration".

Proofing means proving that the fabric is alive.

Then, in stage 9, the dough is shaped into its final shape and placed in the oven (stage 10).

Three changes take place inside the oven.

The sugar contained in the dough will caramelize in the dough.

They give us beautiful brown skin.

Only dough can be caramelized. Only there it gets hot enough.

Inside, the protein, or gluten, coagulates.

At about 160 degrees, the proteins all align and form a structure, the gluten structure, or ultimately what is called a bread crumb.

And the starch will gelatinize when it reaches about 180 degrees.

And gelatinization is another variation of the oven.

Coagulating, caramelizing, gelatinizing, the starch thickens, and when it absorbs all the moisture around it, it swells and then bursts.

And they burst and pour out their entrails into the bread.

So basically right now we're eating yeast sweat—sweat, belching, and starchy gut.

What goes into the oven as dough comes out as bread in stage 11, so it is transformed again in stage 10 of the oven.

And Stage 11 calls this "cooling down". Because we don't eat bread right away.

There is a little carryover baking.

The protein must be established, fortified and tightly packed.

Next is stage 12. Textbooks call it “wrapping,” but students call it “eating.”

So, we begin our journey from wheat to eating today. I'll try this in a few minutes and see if I managed to accomplish this bakery's mission to bring out the flavor.

But I want to go back now and revisit these steps and talk about it from a transformative perspective. Because I truly believe that everything is understandable. And this is not my own idea. This goes back to scholasticism and the ancients, where everything can literally be understood on four levels: metaphorical or poetic, political or ethical.

And finally, what is called the mystical or sometimes "anagodical" level.

These levels are hard to reach unless you literally go through them.

In fact, we're literally talking about bread because Dante says you can't understand the three deeper levels unless you understand the literal level first.

But let's look at these stages again, perhaps in terms of connection to a deeper level. All in my quest to answer the question, "What's so special about bread?"

And it fulfills this mission of maximizing flavor potential.

Because bread begins as wheat and other grains.

But what is wheat? Wheat is a grass that grows in fields.

And just like any other grass, at some point it will put out seeds.

And we harvest that seed, that's the wheat grain.

Well, to harvest it, that is, what is harvesting?

It's just a euphemism for murder, right?

So that's the harvest -- we say we harvest the pigs, right?

Yes we butcher. Yes, that is life.

We harvest wheat, but we kill it as we harvest it.

Well, wheat is alive and it seeds when we harvest it.

Well, at least if we have seeds, we have the potential for future life.

You can plant them in the ground.

And we preserve some of them for future generations.

But most of those seeds are crushed into flour.

And at that point, wheat suffered the ultimate humiliation.

Not only were they killed, they were also denied the possibility of producing future life.

So we turn it into flour.

As I said earlier, I think bread is a revolutionary food.

The first transformation, by the way, the definition of transformation for me is a radical change from one thing to another.

OK. ? Not subtle, but radical.

Instead of hot water becoming cold or cold water becoming hot, water boils into steam.

It's a change, two different things.

Well, in this case the first transformation is from life to death.

It's called a radical.

That's how this flour was made.

And what should we do? Add water.

The first stage is weighing.

In the second stage, water and salt are added to it and mixed to create what is called "clay".

It's like clay.

Then, an ingredient called "leaven" is injected into the clay.

In this case it is yeast, but yeast is fermented. What does leaven mean?

Leaven comes from an etymology meaning to enliven, enliven, bring to life.

By the way, what is the Hebrew word for clay? Adam.

You know, bakers are kind of dough gods at this moment. And his dough, well, not intelligent life, is alive now.

And in the third stage you know it's alive because it grows. Growth is proof of life.

And while it's growing, all these literal transformations are happening.

Enzymes produce sugars.

Yeast eats sugar and makes carbon dioxide and alcohol.

There are bacteria there that eat the same sugars and turn them into acids.

In other words, under the watchful eye of the baker, this dough develops its individuality and individuality.

And the baker's choice along the way determines the outcome of the product.

Subtle changes in temperature, subtle changes in time, it all depends on balancing time, temperature and materials. That's the art of making bread.

So all this is decided by the baker, the bread goes through several stages and the character grows.

Then divide it, divide this one big piece of dough into smaller units and each of those units is given shape by the baker.

Then, as it takes shape, it is nurtured again, proves it is alive, and develops a personality.

And in stage 10 put it in the oven.

It's still fabric. No one eats bread dough. A few people eat it, but I don't think it's much.

I've met a few dough eaters, but that's not the cane of life, right? Bread is the stick of life.

But what we deal with is the dough, and we bring that dough into the oven and put it in the oven. As soon as the internal temperature of the fabric exceeds the threshold of 140 degrees, it passes through the so-called "heat dead point".

Students love that TDP. They think it's the name of a video game.

But it is thermal dead center and all life stops there.

The yeast, whose mission has been to nurture the dough, to bring it to life and to give it life, must give up its life to complete its mission of turning this dough into bread.

So do you see the symbolism at work? It's starting to come out little by little.

I have come to understand it - what goes in is dough, what comes out is bread - or what comes in is alive and what comes out is dead.

Third transformation. The first transformation, from life to death.

The second transformation, the dead come back to life.

A third transformation, from the living to the dead -- but from dough to bread.

Or you can use the metaphor of a caterpillar becoming a butterfly.

And what comes out of the oven is what we call the wand of life.

It is a product that everyone in the world eats and cannot do without.

Bread is so deeply rooted in our psyche that it is used as a symbol of life.

It is used as a symbol of change.

And when we get to stage 12 and participate in that thing and complete the lifecycle again, you know, we essentially have the opportunity to ingest it and it nurtures us so that we continue and we have the opportunity to reflect on things like this.

Here's what I learned from bread.

This is what Pan taught me during my journey.

What we're going to do with this bread here, again, is to use this bread, which we call "spent grain bread," in addition to everything we've talked about so far. Because, as you know, making bread is very similar to making beer.

Beer is basically liquid bread, or bread is solid beer.

And -- (laughter) they -- were invented around the same time. I think the beer came first.

And the Egyptian who was guarding the beer fell asleep in the hot Egyptian sun, and the beer turned into bread.

But we got this bread, and what I did here is try again to evoke even more flavor from this grain if you add spent grain from beer making to it.

And when making this bread, you can use any kind of spent grain, from any kind of beer.

I like dark colored spent grain. Today we actually use a kind of lager, a light spent grain made from toasted wheat or barley, like a light lager or ale.

In other words, beer makers also know how to use sprouting, malting and roasting to extract flavor from grains.

Take some of it out and put it in the pan.

Therefore, not only high-fiber bread but also bread with fiber added on top of fiber has been completed.

So, again, we hope this is not just a healthy bread, but one you enjoy.

So if I break this bread, maybe I can share a little bit of this here.

Let's start a little story here. And here we will talk a little. I think it's better to taste it yourself before eating it for lunch.

I leave you with what I call a baker's blessing.

May your dough be crispy and your bread always rising.

thank you.

I have a friend named Kaveh Akbar who is a fellow poet.

Then Kave found an anatomical photo online of a blue whale's heart that a scientist had hung on a hook from the ceiling. This made it possible to observe that the blue whale's heart was large enough for a person to stand up completely within it.

And when Kave shared the photo online, he captioned it, "This is yet another reminder that the poem you intended to write has already been written by the universe."

And when I first saw it, I was terrified.

I was like, "Hey, I'm trying to invent a new metaphor!"

You are about to discover beauty that has not yet been discovered.

What do you mean the universe always gets there before me? ”

And I know this isn't just a poet's problem, but the days when the world feels especially big, especially impossible, especially full of grandeur, are the days when you feel, "What do I need to contribute to all this?"

A while ago I saw this video that you may have seen.

It circles the Internet every few months.

There are birds called starlings, and they fly in a so-called "rustle", which is generally just a big cloud of birds.

And someone just happened to film a quick mobile phone video of these starlings in flight.

And at first it was just an amorphous mass, but then there are moments when the birds move and form the shape of a starling in the sky.

(laughter) And the moment I saw it, I thought (gasp) “The universe has already written the poem you were going to write!”

(Laughter) But for the first time, it didn't fill me with despair.

Instead, I thought:

Perhaps instead it is my job to listen to what the universe is showing me and keep myself open to what the universe has to offer so that when my turn comes, just for a moment, I can hold something in the light for as long as I have.

The universe has already written the poem you were about to write.

And this is why in inherited choreography you can do nothing but point to a flock of starlings whose bodies rise and fall, the bodies of which huddle into the sky in a spreading curtain, and for a moment form the unmistakable shape of a giant bird flapping into the sky.

That's why the mouth is shaped like an "o", which is the beginning of an "oh, of course" rather than a gasp.

Of course, a blue whale's heart is about the size of a house with rooms tall enough for a person to stand.

Of course, a fig becomes possible when a female wasp lays eggs inside the flower and dies and rots, but the fruit is proof of her transformation.

Sometimes the poem is so bright that your silly words don't stick to it.

Sometimes the poem is so true that no one believes it.

I am a bird made of birds.

This blue heart is a house you can stand inside.

I will die here in this flower.

fine.

That's what I was put here for.

Please take this fruit.

That's what I have to offer.

It may not be the first, it may not be the best ever, but it's the only way I'm sure I was alive.

(applause)

I'm going to talk about some very fundamental changes taking place in the very fabric of the modern economy.

To talk about it, let's go back to the beginning. Because in the beginning it was a commodity.

Commodities are things that are grown in the ground, grown in the ground, or pulled from the ground, and are basically animals, minerals, and vegetables.

And then take them out of the ground and sell them on the open market.

Commodities were the basis of the agricultural economy that lasted for thousands of years.

But then came the Industrial Revolution, the economy became mainstream, and we started using commodities as raw materials to make and manufacture commodities.

So we moved from an agricultural economy to an industrial economy.

Now, what has happened in the last 50 or 60 years is that commodities have become commoditized.

Commoditization: When they are treated like commodities and people don't care who made them.

They only care about three things, they only care about three things: price, price, price.

Well, the antidote to commoditization is customization.

My first book, called "Mass Customization," came out a few times yesterday, and the way I discovered this advance in economic value was the realization that when you customize a product, it automatically becomes a service. Because it is only made for a specific person and it is delivered to that individual on demand, not in stock.

Therefore, we have moved from an industrial economy to a service-based economy.

But what has happened in the last 10, 20 years is that services are becoming commoditized as well.

Long distance phone service sold at price, price, price. A reasonably priced fast food restaurant. And even the Internet is commoditizing not only goods but also services.

What this means is that the time has come for economic value to move to new levels.

Beyond goods and services, it's time to use the same heuristic, what happens when you customize your service.

What happens when you design a service that is highly relevant to a particular person, exactly what that person needs at the moment?

Then you can't help but think they're "wow". You can't help but turn it into a memorable event. I can't help but turn it into an experience.

As such, we are moving into the experience economy, where experience is becoming the primary economic offering.

Now, when I talk about experiences, I almost always talk about Disney creating the best experiences in the world.

I'm talking about themed restaurants, experiential retailers, boutique hotels, and Las Vegas, the Experience Capital of the World.

But when you think of experiences here, think of Thomas Dolby and his group playing music.

Think about meaningful places.

Think about drinking wine, a journey back in time to the clock.

They are all experiences. Think about TED itself.

A capital of experience in the world of conferences.

These are all experiences.

Now, over the last few years, I've spent a lot of time in Europe, especially in the Netherlands, and whenever I talk about the experience economy there, I almost always end up with one specific question.

And this question is really more of an accusation than a question.

Dutch people always start with the same two words.

do you know what i want to say

I'm American.

They say, Americans.

You like fantasy environments, fakes, and Disneyland experiences.

They say we Dutch like real, natural, authentic experiences.

So much has happened that I have devised a rather familiar response. It is: First of all, he points out that we need to understand that there is no such thing as an inauthentic experience.

why? Because the experience happens within us.

It is our reaction to events unfolding before us.

Therefore, all our experiences are real as long as we are in some way real human beings.

Now, experiences may have more or less natural or artificial stimuli, but even that is a matter of degree, not kind.

And there is no such thing as a 100% natural experience.

Even if you take a walk through the proverbial forest, there is a company that makes cars that will take you to the edge of the forest. There is a company that makes shoes that you must wear to protect yourself from the forest floor.

There are companies that provide cell phone service in case you get lost in the woods.

right? They are all man-made, artifacts brought into the forest by you and by the very nature of being there.

And always at the end of the day, the thing that surprised me the most about this question, especially from Dutch people, is that Holland is all about as made as Disneyland.

(laughter) And the Dutch always go...

And they know I'm right.

Across the country, not a single square meter of land looks as if it has always been there that hasn't been reclaimed from the sea, moved, altered or tended.

The only place to take a walk in the woods with all the trees in rows.

(Laughter) But despite this, everyone, not just the Dutch, has a desire for authenticity.

Reliability is therefore becoming the new consumer sensibility, the purchasing criterion by which consumers choose who and what to buy from.

become the foundation of the economy.

In fact, if you look at how each of these economies has evolved, you can see that each has its own business imperatives tailored to consumer sensibilities.

We are an agricultural economy and supply goods.

It's about supply and availability.

to put a product on the market.

In an industrial economy, it is important to keep costs under control and to keep them as low as possible so that they can be offered to the masses.

In a service economy, improving quality is key.

Over the last 20 or 30 years there has been a general movement towards quality along with the service economy.

And now, in the experience economy, expressing authenticity is key.

Rendering Reliability -- The keyword is "rendering".

right? Rendering is necessary because consumers, as businessmen, need to perceive their products to be authentic.

Because there is a basic paradox. No one can have an inauthentic experience, but no company can.

Because all businesses are man-made. All business involves money. All business is a matter of using machines and all of them make something inauthentic.

The question is how to express authenticity.

Does it represent authenticity?

With this in mind, let us return to what Lionel Trilling, in his seminal 1960 book on authenticity, Honesty and Authenticity, points to authenticity as a milestone in the dictionary.

And, of course, so does Shakespeare and his play Hamlet.

And in this part of the play Hamlet, Polonius, the most impostor of Hamlet's characters, says something very real.

At the end of the long list of advice he gives his son Laertes, he says: And most of all, be true to yourself.

And it follows that day and night alike, you cannot lie to anyone.

And these three verses are the crux of authenticity.

Being authentic has two sides. One is true to themselves and very self-oriented.

The second is directed at others. It means being what you tell others to be.

And I don't know about you, but as soon as you encounter the 2D, oh, the 2D!

have understood? Are there other people like that?

Well, when you think about it, you actually get 2 by 2.

On one level, it's important to be true to yourself.

As a company, is the economic service you provide true to itself?

And another dimension is whether they are what they think they are of others.

Otherwise, it is "not true per se" and "isn't true", giving us a 2-by-2 matrix.

And of course, if you are true to yourself and what you claim to be, then you are truly real.

(Laughter) Of course the opposite is fake fake.

Now, fakes have value.

There will always be companies supplying fakes because the appetite for fakes will always be there.

Actually, there are general rules. Anything you don't like is fake. Even if you like it, it's fake.

(Laughter) Now, the other two sides of the coin are: It can be either real fake, i.e. true but not true in itself, or fake real, i.e. true in itself but not true in itself.

Both can be considered better than fake, but not as good as the real thing.

Think of Universal CityWalk and Disney World, or Disneyland, and you can contrast them.

Universal CityWalk is a real fake. In fact, the term is taken from Ada Louise Huxtable's book The Unreal America.

In this wonderful book she talks about Universal CityWalk: You know, she's blaming fakes, but at least it's a real fake, because you can see behind the facade, she says.

It's literally Universal Studios. It is located in the city of Los Angeles. You will be walking a lot.

right? I don't walk much in Los Angeles, but there are places outside the city that I do.

But is it really true?

right? Are they really in the city?

Is that so -- you can look behind it all and see what's going on on that facade.

So she calls it a real fake.

Disney World, on the other hand, is a false reality, or a false reality.

right? That's not what it says. It's not really a magical kingdom.

(laughter) But it's -- oh sorry, I didn't mean to -- (laughter) -- I'm sorry.

Then we won't talk about Santa Claus.

(Laughter) But Disney World is surprisingly faithful.

right? Amazingly true to themselves.

Being there, you can simply immerse yourself in this wonderful setting.

In other words, it's fake real.

Now, the easiest way to fall into this and not be true to reality, yes, the easiest way to be untrue to yourself is to not understand your own traditions and thereby deny them.

Yes, the key to being true to yourself is knowing yourself as a business.

Knowing where your traditions are, what you have done in the past.

And what you've done in the past basically limits what you can do and escape in the future.

So we need to understand that past.

Think Disney again.

Disney, 10 or 15 years ago, yes, Disney -- perhaps best known for its family-friendly values, Disney acquired the ABC network.

The ABC Network is affectionately known in the industry as the T&A Network. It's not a technical term.

Yes, the T&A network. Then it acquired Miramax, known for its NC-17 fare, so suddenly families around the world couldn't really trust what they were getting from Disney.

It was no longer true to that tradition. No longer loyal to Walt Disney.

That's one reason why they're having so much trouble today and why Roy Disney is trying to catch Michael Eisner.

Because it is no longer true in itself.

So please understand. Your past limits what you can do in the future.

A common mistake companies make when it comes to being what it is is promoting what it isn't.

Then you are perceived as advertising a fake, a fake company, something that is not you.

Think of every hotel, airline, and hospital.

That's right, if you can check in your ad, you'll have a great experience.

(Laughter) But unfortunately, if you don't experience a real hotel, airline, or hospital, then there's a disconnect.

When that happens, the perception that you are a fake is born.

So the best way to find out who you are is to give people a place to experience who you are.

To let people experience who you are.

That's right, it's not advertising.

That's why companies like Starbucks exist. Starbucks does not advertise at all.

They said if you want to know who we are, come experience us.

And think about the economic value they brought from that experience.

right? What is the essence of coffee?

right? It's beans. right? It's coffee beans.

Do you know how much coffee is worth if you treat it as a commodity as a bean?

Two to three cents a cup, that's what coffee is worth.

But when you grind it, roast it, package it, put it on the grocery store shelf, and treat it as a commodity, it costs you 5 cents, 10 cents, 15 cents.

If you were to actually brew that same product for your customers in a corner diner or bodega or some kiosk, you could make 50 cents, maybe $1, for a cup of coffee.

But surround that coffee brew with a Starbucks vibe, put some real cedar in there, and now you can charge $2, $3, $4, $5 for a cup of coffee thanks to that authentic experience.

In other words, authenticity is becoming the new consumer feeling.

For the business people in the audience, I will summarize and explain the three rules, the three basic rules.

First, don't say you're real unless you're really real.

Second, it's easier to be real if you don't say you're real.

And third, if you say you're real, it's better to be real.

And for the sake of the consumer, and the rest of the audience, let me just summarize this. What makes us happy is spending time and money satisfying our desire for authenticity.

thank you.

We talk about the most amazing machines in the world and what we can do with them today.

Some of the proteins found here in cells perform essentially all vital functions in our bodies.

Protein digests food, contracts muscles, fires neurons, and powers the immune system.

Almost everything that happens in biology happens because of proteins.

Proteins are linear chains of building blocks called amino acids.

Nature uses an alphabet of 20 amino acids, some of which you may have heard of before.

To scale, each bump is an atom in this illustration.

Chemical forces between amino acids cause these long filamentous molecules to fold into unique three-dimensional structures.

The folding process looks random but is actually very precise.

Each protein folds into its characteristic shape each time, and the folding process takes only a few seconds.

And it is the shape of proteins that allows them to perform their amazing biological functions.

For example, hemoglobin in the lungs has the perfect shape to bind oxygen molecules.

When the hemoglobin moves to the muscles, it changes shape slightly and releases oxygen.

The shape of a protein, and thus its prominent function, is completely specified by the sequence of amino acids in the protein chain.

In this diagram, each letter above is an amino acid.

Where do these sequences come from?

A gene in the genome specifies the amino acid sequence of a protein.

Each gene encodes the amino acid sequence of a single protein.

The translation between these amino acid sequences and protein structure and function is known as the protein folding problem.

This is a very difficult problem because proteins come in so many different shapes.

Because of this complexity, humans have only been able to harness the power of proteins by making very small changes to the amino acid sequences of proteins found in nature.

This is similar to the process our Stone Age ancestors used to make tools and other tools from sticks and stones they found in the world around us.

However, humans did not modify birds to fly.

(Laughter) Instead, scientists took inspiration from birds to discover the principles of aerodynamics.

Engineers then used these principles to design custom flying machines.

In a similar fashion, we have worked for many years to unravel the basic principles of protein folding and to encode those principles into a computer program called Rosetta.

We have made great strides in recent years.

It is now possible to design completely new proteins from scratch on a computer.

Once a new protein is designed, its amino acid sequence is encoded into a synthetic gene.

Since this protein is completely new, no gene encoding it exists in any living organism on Earth today, so a synthetic gene must be created.

Our improved understanding of protein folding and how proteins are designed, combined with the falling cost of gene synthesis and the increasing computational power of Moore's Law, has allowed us to computationally design tens of thousands of new proteins with new shapes and new functions, each of which is encoded into a synthetic gene.

Once we have these synthetic genes, we put them into bacteria and program them to make entirely new proteins.

Next, extract the protein and determine whether it works as designed and whether it is safe.

Despite the diversity in nature, it is interesting that new proteins can be made because evolution has only harvested a fraction of the total number of proteins available.

I mentioned that nature uses an alphabet of 20 amino acids, and that a typical protein is a chain of about 100 amino acids. So the total number of possibilities is 20, 20, 20, 100, which is on the order of 10 to the 130th power, and far more than the total number of proteins that have existed since life began on Earth.

And this unimaginably vast space can now be explored using computational protein design.

Now, the proteins that exist on Earth have evolved to solve the problems facing natural evolution.

For example, genome replication.

But today we face new challenges.

New diseases are important because we live longer.

We face many ecological challenges as we continue to warm and pollute our planet.

If we wait a million years, new proteins may evolve to solve those problems.

But we don't have to wait millions of years.

Instead, computational protein design can be used to design new proteins to meet these challenges today.

Our bold idea is to bring biology back from the Stone Age through innovations in protein design.

We have already shown that we can design new proteins with new shapes and functions.

For example, vaccines work by stimulating the immune system to mount a strong response against pathogens.

To make better vaccines, we designed protein particles that can fuse proteins from pathogens, like this blue protein from the respiratory virus RSV.

By creating a vaccine candidate that is literally enriched with viral proteins, we find that such a vaccine candidate provokes a much stronger immune response against the virus than any vaccine tested so far.

This is important because RSV is now one of the leading causes of infant mortality worldwide.

We have also designed new proteins to break down gluten in the stomach for celiac disease and other proteins to stimulate the immune system to fight cancer.

These advances are the beginning of a protein design revolution.

We have been inspired by the previous technological revolution, the digital revolution. The digital revolution was largely driven by advancements at Bell Labs.

Bell Labs was a place with an open and collaborative environment that allowed us to attract top talent from around the world.

And this led to an amazing array of innovations, including transistors, lasers, satellite communications, and the foundation of the Internet.

Our goal is to build a Bell Labs for protein design.

We are bringing together talented scientists from around the world to accelerate the protein design revolution, and we will focus on five grand challenges.

First, by taking proteins from influenza strains around the world and placing them on the engineered protein particles I showed you earlier, we aim to create a universal influenza vaccine that provides lifelong protection against influenza with a single dose.

The Ability to Design -- (Applause.) The ability to design new vaccines on a computer is critical not only to defend against natural flu epidemics, but also from deliberate acts of bioterrorism.

Second, we are using an alphabet of thousands of amino acids to design new therapeutic candidates for conditions such as chronic pain, well beyond nature's limited alphabet of just 20 amino acids.

Third, we are building advanced delivery vehicles to deliver existing drugs precisely where they are needed in the body.

Examples include chemotherapy for tumors and gene therapy for tissues in need of gene repair.

Fourth, we are designing smart treatments that can perform calculations inside the body and go far beyond current pharmaceuticals, which are actually blunt instruments.

For example, targeting a small subset of immune cells responsible for autoimmune disease and distinguishing them from the majority of healthy immune cells.

Finally, we take inspiration from excellent biological materials such as silk, abalone shells and teeth to design new protein-based materials to meet the challenges of energy and environmental issues.

To do all this, we are growing our lab.

We aim to bring together a dynamic, talented and diverse group of scientists from all over the world, at all career stages.

You can also join the protein design revolution through the online folding and design game Foldit.

You can also participate from your laptop or Android smartphone through our distributed computing project, Rosetta@home.

My life's work is to make the world a better place through the design of proteins.

I'm really looking forward to what we can do together.

Please join us. thank you.

(applause and cheers)

My job is play.

And I also play when I design.

I looked it up in the dictionary to see if I actually did, and found that the first definition of play is engaging in childlike activities or endeavors, and the second is gambling.

And I found myself doing both when designing.

Since I am a child, I am always gambling.

Otherwise, if you're a designer, there's probably something inherently wrong with the structure or the situation.

But the serious part is what hit me, and I didn't fully understand it until I remembered the essay.

This is an essay I read 30 years ago.

The book was written by Russell Baker, who wrote the "Observer" column for the New York Times.

he's a great humorist. Read this essay, or an excerpt from it. Because it touched me so much.

Here is a letter of kind advice.

It says take it seriously.

Of course, that means being solemn.

Being solemn is easy.

Being serious is difficult.

In most cases, children start off by taking things seriously, which is what makes the class so much more interesting than adults.

Adults are generally solemn.

Serious candidates like Adlai Stevenson are rare in politics, but solemn candidates like Eisenhower can easily overwhelm you.

That's because most people find it hard to recognize rare seriousness, but are more comfortable upholding solemnity that is commonplace.

Jogging, which is commonplace and widely accepted as good for health, is solemn.

Poker is serious.

Washington D.C. is solemn.

New York is serious.

Going to an education conference to say something about the future is solemn.

Taking long walks alone while coming up with a foolproof plan to rob Tiffany's store can be exhausting.

(Laughter) Now, when you apply Russell Baker's definition of solemnity and seriousness to design, quality doesn't necessarily have a special meaning.

Majestic design is often important and is a very effective design.

A majestic design is socially correct and acceptable to the right audience.

That's what every right-thinking designer and every client strives for.

Serious design, serious play are two different things.

First, it often happens spontaneously, intuitively, by chance, or by chance.

It can be achieved through naivety, arrogance, selfishness, and sometimes carelessness.

But most of the time it's achieved through some crazy part of human behavior that makes no sense at all.

A full-fledged design is imperfect.

It contains a kind of craft law that comes from the first of its kind.

Serious designs often fail at all when viewed from a solemn point of view.

Because the art of serious play is not perfection, but invention, change, and rebellion.

Perfection happens in solemn play.

Well, I always saw my design career as a surreal staircase.

If you look at the stairs, when you are in your twenties, the kick is very high and the step is very short, which is a big discovery.

When you're young, you leap so fast.

It's because you don't know anything and you have so much to learn that whatever you do is a learning experience and you're just jumping towards it.

As we age, our walking pace slows because our rises become shallower, our steps wider, and we discover less.

And as we get older and more decrepit, we slowly progress down these long, melancholic steps, leading to oblivion.

(Laughs) I think it's getting really hard to be serious.

I am hired to be solemn, but more and more I am sovereign when I don't have to.

And in my 35 years of working experience, I think I got serious about it four times.

They came from very specific conditions, so I'm going to show you.

Being a child is great.

Well, when I was in my early twenties, working in the record industry designing record covers for CBS records, I had no idea what a great job I had.

I thought everyone had a job like that.

And my view of design, my view of the world, what was happening around me, and what appeared when I stepped into design was the enemy.

I really, really hated the Helvetica typeface.

I thought Helvetica was the cleanest, most boring, most fascistic, downright oppressive typeface. And I hated anything Helvetica designed.

When I was a student, this kind of design was popular and popular.

This is actually a very nice book cover by Rudy de Halak, but I hated it. Because it was designed in Helvetica and made a parody about it.

I just thought it was completely boring.

(Laughter) So my life goal was to make something other than Helvetica.

And it was actually kind of hard to make one that wasn't made in Helvetica because you have to find it.

And there weren't many books about design history in the early '70s. There weren't a ton of design publications.

I actually had to go to an antique shop. You had to go to Europe.

I had to go around and find things.

And what I responded to was, you know, Art Nouveau, Deco, Victorian Typography, or something that's not Helvetica at all.

I taught myself design this way. This was my early days, using these things in really goofy ways on record covers and designs.

I was uneducated. I tried to summarize these.

Mixed Victorian design with pop, Art Nouveau with other things.

And I made these very gorgeous, very elaborate record jackets not because I'm a postmodernist or a historicist, but because I didn't know what they were.

I just hated Helvetica.

(Laughter.) And that kind of passion pushed me to play very seriously, the kind of play I would never be able to do now that I was too highly educated.

And there's something wonderful about that form of youth where you can develop yourself and play and really be a brat and get things done.

In fact, by the end of the 70's it became known.

So these covers have been published all over the world, won awards and are known to the public.

And suddenly I became a postmodernist and started my career with my own business.

And first I was praised, then criticized, but in fact I was solemn.

I haven't had a job that I consider to be a serious job again for about 14 years.

I spent most of the '80s very solemnly, putting out designs that I was expected to do because I was that kind of person, living in a cycle of going from serious to solemn, trite to dead and rediscovered.

So, now I have the second condition that I think I was able to achieve a full-fledged play.

One of my favorite movies is Paul Newman's The Verdict.

I don't know how many people have seen it, but it is very beautiful.

And in the film, he plays a fallen lawyer who becomes an ambulance tracker.

And he undertook a malpractice lawsuit—in fact, he's been given—it's kind of an easy deal. While trying to close deals, he began to empathize and empathize with his clients, regained his sense of morality and purpose, and continued to win lawsuits.

And in the depths of despair in the middle of the movie, it seems like he can't get through this case, and when this case is needed, he needs to win this case outright.

Paul Newman, alone in his office, said, "This is the case. There is no other case.

This is the fact. No other example. ”

And in that moment of desire and focus, he can win.

And it's a great position to create serious play.

Then in 1994, when I met a theater director named George Woolf, he asked me to design the identity of the then-known New York Shakespeare Festival, which later became Public Theatre.

And I started immersing myself in this project in a way I never had before.

Theatrical advertisements at the time looked like this.

This was in the newspapers and the New York Times.

So this is my comment at the time.

In fact, the public theater did much better publicity than this.

They had no logo or identity, but they did have a very iconic poster painted by Paul Davis.

Taking over from another director, George Wolfe wanted to change the theater and wanted it to be an urban, noisy, inclusive place.

So I used my love for typography and immersed myself in this project.

And what was different about the whole thing was that it really became the voice of the place, the visual voice, in a way that I've never done before. There, the smallest advertisement, ticket, whatever it is, every aspect was designed by me.

there was no format.

There was no department within the company that could impose these things.

I literally spent 3 years making every piece of paper, everything online in this theater.

It was my only job, even though I had other jobs.

Since then, I have lived and breathed differently than my clients.

It allowed me to express myself and grow.

And I think you know when this position will be given to you, which is rare, but when you are given it and you are given this opportunity, that is the moment to play seriously.

I have done these things and am still doing them.

I still work at the Public Theater.

I am on their board of directors and am still on it.

I think Public Theater's heyday was in 1996, two years after I designed it. It was a "Bring in da Noise, Bring in da Funk" campaign that ran all over New York.

But something happened and what happened was very popular.

And it's the kiss of death to something serious because it makes it solemn.

And what happened was, to some extent, New York City preyed on my identity because people started copying my identity.

Here is someone in the New York Times running an ad for a play called "Mind Games".

Then came 'Chicago', with similar graphics, which completely eroded and robbed the Public Theatre's identity and had to change.

So I kept making these posters, changing them to something different for each season, but they were so individual, they didn't have the weight of being all the same, so they didn't have the seriousness of the original identity at all.

Now, since Public Theatre, I must have done a dozen or so cultural identities for major organizations, but I don't think I've ever understood the seriousness of it again. We do them for very large and important organizations in New York City.

The institution is solemn, and so is the design.

It's better done than Public Theatre, and you spend more money on it, but I think those moments come and go.

The best way to achieve serious design, which I think we all have the opportunity to do, is to be completely unqualified for the job.

It doesn't happen very often, but it happened to me in 2000. That's when, for whatever reason, a ton of different architects started asking me to work with them on designing the interior of the theater where they would take the environmental graphics and incorporate it into the building.

I had never done a job like this before.

I didn't know how to read the building plans, I didn't know what they were talking about. And being used to the immediacy of graphic design, I really couldn't stand the fact that one job would last four years. That kind of attention to detail really sucks for someone like me with ADD.

It was a lot of work, but I didn't really know what I was doing, so I really fell in love with this process of integrating graphics into architecture.

I said, "Why can't the sign be on the floor?"

New Yorkers watch their feet.

And then it turns out that actors and actresses actually take their cues from the floor, and this kind of sign system started to make sense.

They became one with the building in a very strange way.

They turned corners, climbed the sides of buildings, and blended into the architecture.

This is Symphony Space on 90th Street and Broadway, type woven in stainless steel and backlit with fiber optics.

And the architect, Jim Porchek, basically gave me a canvas to experiment with typography.

And it was a serious game.

This is a children's museum in Pittsburgh, Pennsylvania, made entirely out of cheap materials.

Extruded typography backlit with neon.

Something I've never done before, something I've built before.

I just thought it would be fun to do.

Donor Wall made of Lucite.

And cheap billboards.

(Laughter) I think my favorite part of it all was this little job in Newark, New Jersey.

It's a performing arts school.

This is the building - they didn't have the money, so they had to rebuild it, and they said, if we give you $100,000, what can you do with it?

So I worked a little bit in Photoshop and said, "I think I can paint."

And we did. And it was play.

And there are buildings. Everything was painted and typography, including the air conditioning ducts.

I hired the people who paint the apartments that are fixed to the side of the garage to paint the building and they loved it.

They fell in love with it and took their work incredibly seriously.

They would often climb up a building and call me to tell me they had to fix my typography, meaning my spacing was wrong, and they would move it around and do great things with it.

They were pretty serious too. It was so wonderful.

By the time I moved to Bloomberg headquarters, my work was beginning to be accepted.

People wanted it in big, expensive places.

And it began to solemnize it.

Bloomberg is all about numbers, and we unveiled big numbers through the space, projected onto stunning LEDs programmed by my partner Lisa Strausfeld.

But that was the end of the seriousness of the play and it began to become solemn again.

It's an ongoing project in Pittsburgh, Pennsylvania, and I ended up doing something stupid there.

I was invited to design a logo for this district called the North Side, but I thought it was silly that the district had a logo.

I think it's pretty creepy, actually. Why is there a logo in the neighborhood?

There is something in the neighborhood. There are landmarks, there are places, there are restaurants. No logo included. I mean, what is it?

So I had to actually give a presentation to the city council and the voters in the neighborhood, so I went to Pittsburgh and said, "You know, what's really here is the underpass that separates the neighborhood from the center of town.

Why not celebrate them and make them landmarks in your underground passages? ”

So I started making crazy presentations about possible installations on these underpass bridges, and I have to admit that I was a little scared standing in front of the City Council.

But I was totally unqualified to be on this project, totally stupid, and so desperately ignoring the brief that I think they just wholeheartedly accepted the project simply because it was stupid from the start.

And this is the bridge they're actually painting and preparing while we're talking.

Scheduled to change every six months, it will be installed as an art installation on Pittsburgh's North Side and will become a landmark in the area.

John Hockenberry told me a little bit about my struggles with Citibank. I have been with Citibank for 10 years now and I still work with them.

And I'm actually interested in them and I like them. And I think as a very, very, very, very big company, they actually keep the graphics very good.

At the first meeting, I drew the Citibank logo on a napkin.

It was the play part of the job.

Then I spent a year in long, boring, boring meetings trying to tearfully sell this logo to big companies.

I thought I was going insane by the end of the year.

We did a silly presentation of how the City logo is meant and how it actually came from an umbrella, animated them, went back and forth, and back and forth.

They bought this, they rolled it out at such a large scale and it's internationally recognized that it was worth it, but for me it's actually been a very, very depressing year.

As a matter of fact, they never endorsed the logo until Fallon put it in their very good "Live Richly" campaign. After that, all over the world everyone accepted it.

So during this time, I had to kind of balance against this crazy, crazy life of attending such long, stupid meetings.

And I was in my country house and for some reason started drawing a very large, very complicated, laborious, complicated map of the whole world, listing all the places on the planet, typing them, spelling them wrong, putting things in the wrong places, having complete control over the information, completely and completely absorbed in it.

It took about 6 months at first, but it got faster and faster.

This is the United States.

All American cities are here.

And it stayed at Cooper Hewitt for about eight months, and people used to walk up there and point to a piece of the map and say, "Oh, I've been here before."

And of course it couldn't be because it's in the wrong place.

(Laughter) But what I loved about it was that I was in control of my own stupid information, creating my own palette of information, and playing utterly utterly.

One of my favorites is this painting of Florida after the 2000 election, with the election results floating in the water.

Keep it as evidence.

(Laughter) Someone was at my house and saw the painting and recommended it to the gallery. About two and a half years ago I had my first exhibition and showed these paintings that are now on display.

And a funny thing happened - they sold.

And they sold quickly and became quite popular.

We started making prints based on them.

This is Manhattan, one in the series.

This is a print from the USA, made in red, white and blue.

We started making these large silkscreen prints and started selling them.

So the gallery wanted me to have another exhibition in two years. So I had to do these paintings much faster than I ever had before. And I started doing these things because they started to get more political, picking areas that were in the news or that I had some feelings about.

And then this funny thing happened.

I realized that I was no longer playing.

In fact, I was in this solemn landscape that fulfilled my expectations of the show, but that's not where I started these things.

I mean, they succeeded, but I know how to succeed, so no beginners, they are no longer serious, they are solemn.

And that's the scary element -- when you start something and it goes in that direction -- because all you have to do is go back in time and find out what you can push next, what you can invent, be ignorant, be arrogant, be unsuccessful, be stupid.

Because that's how you grow, after all, and that's all that matters.

So, I'm doing my best here -- (Laughter) All I have to do is blow up the stairs.

thank you very much.

Until the last few days, I was kind of adamant about requesting slides, but was denied access to the slide projector.

(Laughter) I actually think the slide projector is more emotional and personal. The great thing about slide projectors is that unlike PowerPoint or other programs, you can actually focus on your work.

Well, I agree you have to -- yes, there are certain concessions, and you know, when you use a slide projector, you can't swing the bad type from behind, from the side, or from top to bottom, but that's probably fine. trade-off, exchanging focus for it.

(Laughs) It's an assumption. Just a thought.

If the slide gets stuck, something good is about to happen.

And sometimes what you really want is for them to burn out, which you won't see tonight. So.

So let's get the first slide up here.

As many have probably imagined, this is a recently emptied beer can in Portugal.

(Laughter) This is -- I just arrived in Barcelona for the first time, and I thought -- look, it's been flying all night, I looked up at the sky and thought it was so beautiful.

When you arrive at this major airport, it will simply say B.

I mean, how awesome is that?

All designs made simple. And here we have this huge airport. And hey, I took a picture.

I thought, oh my god, this is the coolest thing I've ever seen at an airport.

Until a few months later, I was back at the same airport, on the same plane, I think. And when I looked up, it had a C written on it.

(Laughter.) Only then did I realize that it was simply the gate I had entered.

(Laughter) I'm a big believer in design sentiment and messages sent before someone starts reading, before they have the rest of the information. A product, a story, a painting, whatever it is, what kind of emotional response do they have?

This area of ​​design interests me the most. I think this is very clear to me and a huge simplification of what I'm talking about.

These are two identically painted garage doors placed next to each other.

Now, here is the first door. I get the message.

You know, it's very clear.

Look at the second door to see if there are any other messages.

OK, which side would you like to park in front of?

(laughs) Same color, same message, same words.

The only difference is the expression put into the work by the individual owner of the door. And again, who is the psycho killer here?

(Laughter.) But it's not. It doesn't need to be said.

I think I'll probably park in front of another car.

Most people know that graphic design has become much simpler in the last five years or so.

It's become so simple that it's already starting to go back in the opposite direction and become a little more expressive.

But I was in Milan and saw this street sign and was very happy to see that apparently this idea of ​​minimalism was also translated by a graffiti artist.

(Laughter) And then this graffiti artist came along and improved this sign a bit and moved on.

(Laughter.) He didn't overwhelm it like they tend to do.

(Laughter) This is for the "Metropolis" book.

I took some pictures. This is a Florida sign. Either they haven't paid the rent or they don't want to pay the bill again. And the people in charge of the sign were too cheap to tear down the whole sign, so they only ripped off part of it.

And I would argue that it can be more effective than the original billboard when it comes to grabbing attention and getting people to look.

And hopefully you don't stop and buy that awful pecan, Stucky stuff.

This is from my second book.

The first book was called "The End of Print" and was produced alongside the film in collaboration with William Burroughs.

And "The End of Print" is now in its fifth printing.

(Laughter) When I first contacted William Burroughs about joining, he said no. He said he did not believe this was the end of printing.

And I said, well, that's fine. I wanted to get your opinion on this movie and this book, and he finally agreed.

And at the end of the film, he says in a wonderful voice, "I can't do it, but I'll try. But it's not. I remember going to the exhibition 'Photography: The End of Painting'," and then he says, "And of course it didn't happen at all."

Apparently, when the picture was finished, some people said, "That's it, you just ruined the painting."

Now people are coming to take pictures.

And of course it wasn't.

So this is from a book I wrote on intuition, 2nd Sight.

It's not the only element in the design, but it's probably the most important.

It's something we all have.

Teaching it is not a problem. In fact, most schools tend to downplay intuition as a component of the work process because it cannot be quantified. Teaching people the 4 steps to intuitive design is very difficult, but we can teach you the 4 steps to creating great business cards and newsletters.

Therefore, it tends to be discounted.

In the words of Albert Einstein, "Intelligence has little bearing on the path to discovery.

A leap of consciousness takes place and you can call it intuition, or you can call it that, and the solution just comes to you, but you don't know where or why it happened. ”

So it's like someone saying, "Who wrote that song?"

And the more you try to think, the further away the answer becomes, but the moment you stop thinking, in a way, your intuition gives you the answer.

I love this for several reasons.

If you've taken a design course, you'll be told that this is unreadable.

I think it will eventually, and more importantly, I think it's true.

"Don't mistake readability for communication."

Just because it's easy to read doesn't mean it's conveyed.

More importantly, it doesn't tell you what's right.

So what is the message sent before someone actually gets into the content?

And I think that's an area that is sometimes overlooked.

This is in collaboration with Marshall McLuhan.

I stayed with his wife and son Eric and came up with nearly 600 quotes of Marshall. They were truly amazing in that they were ahead of their time and foresaw much of what was happening in the world of advertising, television and media.

That's why this book is called "Probe". That's another word for quotes.

And many of them have never been published before, and basically, I interpreted various quotes.

So this was originally a table of contents page.

When I finished it, it was 540 pages, but the publisher, Gingko Publishing, eventually cut it down significantly, and now it's just under 400 pages.

However, I decided I liked the content page and liked the look of it, so I kept it.

(Laughter) This has nothing to do with the book, but I think it's a great spread.

(Laughter) So I'll open a few pages from this book: Here McLuhan says, "The new media is nature, not the bridge between humans and nature."

"The invention of printing removed anonymity and fostered the idea of ​​literary prestige and the habit of viewing intellectual endeavor as private property," which was not before printing.

“When new technology is forced upon a society that has long been accustomed to old technology, it creates all sorts of anxiety.”

"While man is engaged in creating an entirely different world, he always forms a vivid image of the previous world."

I hate this. It's hard to read.

(Laughter) (Applause) "For people in the electronic age, there is no other possible environment than the Earth, and no possible occupation other than information gathering."

that was it. It was the only option he considered. And not too far away.

So this is a Nine Inch Nails project.

And I bring it up because it suddenly seemed to gain such relevance, and it took place shortly after 9/11.

And I just recently found a bomb shelter in the backyard of a house I bought in LA that the realtor didn't point out.

(Laughter) It looks like the bomb shelter was built during the Cuban Missile Crisis in the '60s.

When I asked a passing real estate agent what it was, he said, "It has something to do with the sewage system."

I was. It's good.

When I finally got there, it was an old, rusty round thing and two beds, and it was very creepy and strange.

And, amazingly, it was made of some sort of cheap metal, completely rusted, with water all over it and spiders.

And I wondered what they were thinking.

You'd probably think it was cement or something.

Anyway, I'm going to use this for the Nine Inch Nails DVD cover, duct tape the bunker and I'm ready to go. I think we are ready. So.

This was actually an experiment for our client, Quicksilver, using a 6-shot sequence and trying to use print as a medium to bring people to the web.

So this is a 6-shot sequence.

I took one shot. I trimmed it a few different ways.

And a small line in the copy reads: If you want to see what this whole sequence, this whole ride is like, go to the website.

And my guess is that many surfing kids went there to see the big picture.

I have no way of tracking it, so it could be completely wrong.

(Laughter) We don't have a site. It's just the work itself.

This is a group in New York called the Tobacco Environment Coalition that commissioned me to make these posters.

They were scattered all over New York City.

In fact, you can't see it at all, but the second line is in some ways more of a payoff.

It reads, "If tobacco companies can lie, so can we." But -- (Laughter) (Applause) -- But I did.

These were literally posted all over New York City one night, and what definitely got the attention were people smoking cigarettes and going "huh!"

(Laughter) And it was done on purpose to look pretty serious.

It wasn't some weird grunge type or anything like that, you know. It looked like it might be real. anyway.

Poster for the Atlantic Arts Center, a school in Florida.

This surprises me. This is a product that I learned about recently.

I was in the Caribbean for Christmas and was just amazed that people still feel the need to lighten their skin, not that it still sells.

This was either an old product with new packaging or a completely new package. I just thought, "Wow!" is it still happening?

I do a lot of workshops all over the world. A special challenge this time was to come up with a new symbol for the toilet door.

(Laughter) I felt this was one of the most successful solutions.

Students actually cut it up that night and lined it up around bars and restaurants, and I always picture this old couple going to the bathroom...

(Laughter) I worked at Microsoft a few years ago.

It was a global branding campaign.

And that was interesting to me. My background is sociology. I had no design training. Sometimes they say that explains it, but I didn't have a product to sell, so this was a very interesting experiment. It was just the image of Microsoft they were trying to improve.

They thought some people didn't like them.

(Laughter) Working on this campaign all over the world, I've found that to be very true.

And our goal was to make them a little more human and what I did was add type and person to the ad. The previous campaign didn't have it, but no one remembered them and no one referenced them.

And we wanted to say that some of the people working there are actually fine. Some of them actually have friends and family, and they're not all terrible people.

And the umbrella campaign was "Thank God it's Monday."

Therefore, we tried not to run away from things that were seen as negative, such as excessive competition and long working hours, in a positive way.

As you know, thankfully today is Monday. You can go back to that little cubicle, the fake gray walls, and listen to everyone else's conversations for 10 hours before you go home.

Anyway, this is one of my most satisfying ads. Because every ad was elaborately art-directed. I thought this ad made it feel like a real girl looking at a computer.

It says "Wonder Around". And it's part of the software.

This is how advertising spread all over the world.

In Germany they made one small change without checking with me, it was done through an agency so I didn't even need to check but see if you can tell the difference.

In this way the advertisement was placed all over the world. Germany has made slight changes to their advertising.

(Laughter) Well, there are two problems here.

If you choose to include children in your ad, choose ones that appear to be alive.

(Laughter) I feel like he's been there for a week.

He just really wants it to boot, and you know...

(Laughter.) And as the agency explained to me, they said, 'Look, we don't have little green people in our country, so why would we have little green people in our ads, for example?'

So I can understand their logic. I totally disagree with that. I think that's a very narrow-minded approach. The world is certainly more global. I certainly think the German people could have dealt with a little black girl sitting in front of a computer, but we'll never know.

This is the work of Ray Gun.

And the purpose of this magazine was to read the articles, listen to the music and try to interpret it.

There are no grids or systems, nothing is preconfigured.

This is Brian Eno's opener and it's kind of my personal interpretation of the music.

This is what rock stars are talking about about the teachers they admired in school.

Ray Gun has a lot of great writing.

And I was lucky enough to find a picture of the teacher sitting on top of a book.

(Laughter) An article about Bryan Ferry -- a really boring article -- so I set the whole article to Dingbat.

(Laughter) You can also emphasize that. You can also use Helvetica or something similar. This is the actual article.

I think I'll be able to decipher it eventually, but it's really not very well written. It really wouldn't be worth it.

(Laughter) I've worked on a lot of magazines, so I was very interested in how the major magazines handled the big stories, and I was very interested in how Time magazine and Newsweek handled 9/11.

And I was basically pretty disappointed to see that they chose to show us a photo we've already seen a million times: a moment of impact.

And I thought People magazine probably got the best shot.

It's kind of a horsey type, but the texture-second plane wasn't quite hitting. If that's appropriate -- it's not the right word -- but there was something more appealing about this cover than Time or Newsweek.

But when it appeared in this magazine, something disturbing happened and it continued.

On the left you can see people dying. We see people running for their lives.

And on the right side you can see that there is a new way to support your chest.

The coveted right-hand page was not abandoned for an entire issue.

Look at the image of this woman. No one knows what she is going through. -- And the copy says: "He knows how to give me goosebumps."

Yes, he jumps off buildings. It -- unfortunately, it acts as a kind of spread.

And this continued throughout the magazine.

I never gave up.

This means "one clean fits all". .

Many orphans were born on this day, and their corpses were carried out here.

It seems to me that perhaps a blank page would have been more appropriate.

And I think this is probably the worst. Two women are facing the same direction, both wearing jeans.

One, no one knows what she's going through. Another is concerned about model behavior and milk.

And -- a few months later, I gave a talk in New York. Then someone came to me and actually emailed me. He said he was grateful for the lecture. And when I got back to my car, I saw a note on my car that made me think that perhaps after this event, New York was becoming New York again -- it's been a few months.

This was what they found in their car.

(Laughter) I'm rarely happy to find this on my car, but it seemed to indicate we'd be back.

Here is my desktop.

Someone told me today that there is something called folders, but I have no idea what they are.

These are my notes for the talk. There may be correlation here.

finish.

I saw this while on a plane looking for hot new products.

I don't know if this is an improvement or a good idea. Now that you can insert the plate into your keyboard without spending enough time in front of your computer, no more cheating. Either way, you don't actually have to sit at your desk all day eating and working.

Now that I have a plate, it would be really convenient if I could buy a pizza, fill in a few details, and then do that.

I don't know if this is an improvement.

If you ever doubt the power of graphic design, this is a very common sign that literally says 'Vote for Hitler'. I can't say anything else.

And this, to me, is an extreme example of the power of emotion in graphic design, even though it was actually a very common poster at the time.

what's next? Next comes people.

As technology orientation increases, human resources are more important than ever.

You have to let yourself be who you are in your work.

No one else can do that. No one can draw from your background, your parents, your upbringing, or your entire life experience.

If you allow it to happen, it's the only way to do unique work and you'll enjoy it more.

This I like found art. Hand lettering is making a big comeback and I thought this was a great example of both.

This woman has an ad for a lost pitbull.

It's friendly - she underlines friendly - which is probably why she calls it Hercules or Hercules. She can't spell

(Laughter) But more importantly, she's willing to give me $20 to go find this lost pitbull.

And I'm thinking, yeah, yeah, go find the $20 lost pitbill.

I have visions of people walking down an alley crying out for Hercules and you being accused of this and saying, Oh, be Hercules. Please be friendly.

(Laughter.) I'm sure she didn't find the dog because I got the sign.

(Laughter.) But I was asked to speak at a conference in Sacramento a few years ago.

The theme was courage and I was asked to talk about how courageous it is to be a graphic designer.

Then I remembered seeing a photo of my father, who was a test pilot. He told me that when he signed up to be a test pilot, he was told there was a 40 to 50 percent chance of dying in the line of duty.

That's a pretty high amount for most professions.

(laughter) But you know, the government will build planes. They say, why don't you go see if that thing flies?

Some of them did. Some did not.

Then I started thinking about the decision I had to make between serif and sans serif.

(Laughter) And most of the time they're not really life threatening.

Why not experiment? Why not have some fun?

Why not throw some of yourself into this work?

And when I was teaching, I would always ask my students, "What's your definition of a good job?"

And as a teacher, you will want to teach the correct answer after all the answers have been given.

And the best thing I've heard, and I'm sure some of you have heard this, is the definition of a good job: If you had money, if money was no problem, would you do the same job?

And if you do, you have a great job.

If not, what the hell are you doing?

You are going to die for a really long time.

thank you very much.

What is happening in genomics and how this revolution is going to change everything we know about the world, life, ourselves and how we think about them.

If you look at 2001: A Space Odyssey and hear a boom, boom, boom, boom, and see a monolith, that's Arthur C. Clarke's representation that we are at a defining moment in the evolution of our species.

In this case, it was picking up bones, crafting tools, and using them as tools. So the apes, in a way, understood that they could run around, eat, interact with each other, and build things with their tools.

And that took us to the next level.

And you know, especially over the last 30 years, we've seen an acceleration of knowledge and technology, and technology has created more knowledge and given us the tools.

And we've seen many original moments.

We saw the development of small computers in the 70's and early 80's, but who would have thought then that everyone would have maybe 20 computers in their home instead of one, and not just a PC, but a computer? But on any device, be it a washing machine or a mobile phone.

you are walking around Your car has 12 microprocessors.

Then we create the Internet and connect the world. we flatten the world

We have seen so many changes. And we are now giving ourselves these tools, these powerful tools, allowing us to turn the lens inwards on what is common to all of us: the genome.

How is the genome today? Have you thought about it recently?

Have you at least heard about it? You may have heard about the genome recently.

I wanted to explain a little bit about what a genome is.

It's like asking people, "What is a megabyte or megabit?" And what is broadband?

People never want to say, "I really don't understand."

So let me tell you straight to the point.

You've heard of DNA. You probably studied a little bit of biology.

A genome is actually a description of all the DNA in a living organism.

And one thing that all life has in common is DNA.

It doesn't matter if you are yeast or not. It doesn't matter if you are a rat or not. It doesn't matter if you are a fly or not. We all have DNA.

DNA is made up of words called genes and chromosomes.

And when Watson and Crick first deciphered this beautiful double helix we know as the DNA molecule in the 1950s – a very long and complex molecule – we began this journey to understand that there is a language in that DNA that determines our characteristics, traits, what we inherit and what diseases we get.

Along the way, I also discovered that this is a very ancient molecule, and that all the DNA in our bodies has been around forever since we were born as living beings.

There are historical archives.

Living in your genome is the history of our species, and of where you came from as an individual human being, going back thousands upon thousands of years, which is now beginning to be understood.

But at the same time, the genome is just an instruction manual.

That's the program. It is the norm of life.

That's what makes you work. That is what makes every organism work.

DNA is a very elegant molecule.

It's long and complicated.

All you really need to know is that there are four letters: A, T, C, and G. They represent the names of chemicals.

And with these four letters, we can create a language. It's a language that can describe anything, even the most complex things.

As you know, these are usually combined in pairs to create words, or what are called base pairs.

And if you think about it, you'll find that four letters, or four representations of things, make us work.

It may not sound very intuitive, but let's move on to another thing you know: computers.

Look at this screen. You can see pictures and letters, but really only 1's and 0's.

The language of technology is binary. You've probably heard of it at some point.

Everything that happens digitally is a transformation, or representation, of 1s and 0s.

So when you're listening to iTunes or your favorite music, it's really just 1's and 0's playing very fast.

When you're looking at these pictures, it's all 1's and 0's, and when you're talking on a phone or cell phone, when it flows over the network, your voice is all converted to 1's and 0's and magically flying around.

And look at the intricacies and amazing things we were able to create with just 1's and 0's.

Now, if you increase this to four, it becomes very complicated and there are many ways to describe the mechanics.

Now let's talk about what that means.

So if you look at the human genome, it's made up of 3.2 billion of these base pairs. It's a lot.

And they mix in different ways that make you human.

When converted to binary, it is actually smaller than the Microsoft Office program.

Not that much data actually.

I should also mention that it is at least as buggy.

(Laughter) This is a bug in my genome that I've struggled with for a long time.

When you get sick, it's a genomic bug.

In fact, many of the diseases we've battled for so long, such as cancer, remain untreatable because we don't understand how they work at the genomic level.

we are beginning to understand it.

So so far we have tried to solve the problem using so-called "fucking pharmacology". This means that if you throw chemicals at them, they'll probably have an effect.

But what if we could really understand why cells go from normal to cancerous?

What are codes?

What are the exact instructions to run it?

Then you can move on to the process of fixing and understanding it.

So here are a few facts to help you enjoy your next dinner with great wine.

In fact, we have about 24,000 genes that do things.

We have about 100, 120,000 other species that don't seem to function every day, but represent an archival history going back tens of thousands of years to how we worked as a species.

It might also be of interest that mice have about the same amount of genes.

They recently sequenced Pinot Noir, which also has about 30,000 genes, so the number of genes it carries does not necessarily represent the complexity or evolutionary order of a particular species.

Now look around. Look next to your neighbor, look in front of you, look behind you. We all look pretty different.

There are a lot of very handsome and cute people here, thin, chubby, different races and cultures. We are all 99.9% genetically equal.

It's one hundredth of one percent of our genetic material that makes the difference between us.

It is a small amount of matter, but the way it ultimately expresses itself makes a difference for humans and all species.

So now we can read the genome.

The first human genome took 10 years and cost $3 billion.

It was done by Dr. Craig Venter.

And the genome sequence of James Watson, one of DNA's co-founders, was completed in just two months at a cost of $2 million.

And if you think about the computer industry, how we've moved from big computers to small computers, and how they're always getting more powerful and faster, the same thing is happening now with gene sequencing. We are on the verge of sequencing the human genome in about 1 hour to 30 minutes for about $5,000. It will happen within the next five years.

What that means is that you walk around with your personal genome on a smart card. It will be here.

And when you buy drugs, you don't buy drugs that are used by everyone.

When you give your genome to a pharmacist, your medicine will be made for you, work much better than the previous one, and have no side effects.

Forget side effects like oily residue and what the commercials say.

They're going to wipe out all that stuff.

What does the genome look like?

Well, there it is. It's a long long series of these base pairs.

If you look at the genome of a mouse or a human, it will look no different. But what scientists are working on now is understanding what they do and what they mean.

Because what nature is doing is always double-clicking.

So the first few sentences make roots, branches, and flowers, assuming this is a grape plant.

In humans, it can produce blood cells and develop cancer.

In my case it might be: I come from a very cold climate, so every calorie I consume is saved.

To my wife: Eating three times as much and not gaining any weight.

It's all hidden in this code, and we're starting to figure it out at a furious pace.

So now that we have the Book of Life and can read the genome, what can we do with it?

Well, there are many things. Some are exciting.

Some people find it very scary. I'll tell you a few things that probably make you want to spit at me, but that's okay.

In other words, we can now learn the history of living things.

You can do a very simple test. Rub your cheeks. see it off

You can find out where your relatives are from. You can create genealogies going back thousands of years.

You can understand the functionality. This is really important.

For example, we can understand why plaque forms in our arteries, what produces the internal starch in grains, and why yeast metabolize sugars to produce carbon dioxide.

It also allows us to see on a larger scale what causes problems, what causes diseases, and how we can solve them.

We can understand this, so we can fix them and make better creatures.

Most importantly, what we are learning is that nature has provided us with a wonderful toolbox.

A toolbox exists.

A wise architect far better than us gave us that toolbox so we can use it.

We are not just reading the genome now. we write them.

The company I am involved with, Synthetic Genomics, has created the first complete synthetic genome of a tiny worm, a very primitive creature called Mycoplasma genitalium.

If you have a UTI, you've probably encountered this little bug. Or maybe you've had a UTI.

It's very simple, with only about 246 genes, but we were able to completely synthesize its genome.

Now, you have the genome, so you say to yourself, so if you plug this synthetic genome in, if you take the old one out and plug it in, will it boot up and stay alive?

Well, what do you think? To do.

That's not all. Taking a genome (synthetic genome) and connecting it to another organism, such as yeast, turns that yeast into a mycoplasma.

It's like booting a PC with Mac OS. software.

Actually, you can do it another way.

So by being able to describe a genome and connect it to an organism, software can change the hardware, so to speak.

And this is very deep.

So last year, the French and Italians announced that they would work together to sequence Pinot Noir.

There is now a genome sequence for the entire Pinot Noir organism and about 29,000 genes have been re-identified.

They discovered a pathway that produces flavor, but for us to understand and interpret that flavor it is very important to understand that the compounds it produces must match receptors on the tongue in the genome.

They also found a great deal of activity in the production of aromas.

They identified areas vulnerable to disease.

They now know exactly how this plant works and work is underway. And we have the ability to read the entire code and understand how it works.

So what do you do then?

If we know we can read it, we can write it, we can modify it and perhaps write its genome from scratch. So what do you do?

Well, one thing you can do might be what some people call franken noir.

(Laughter.) We can build better vines.

By the way, I want you to know that I get stressed out about genetically modified organisms. There is not a single non-GMO vine in this valley or anywhere else.

Not grown from seed. They are grafted onto the rootstock. They do not exist alone in nature.

So don't worry, don't stress about it. We've been doing this all along.

So, you know, we can focus on disease resistance. You can aim for higher yields without necessarily requiring dramatic farming techniques or costs.

You could probably enlarge the climate window as well. God forbid, you might be able to grow Pinot Noir on Long Island.

(Laughs) I was able to create a better taste and aroma.

Want a little more raspberry, a little more chocolate?

I will say that all of these things have the potential to happen, and I'm almost betting that they will.

But there is an ecosystem here.

In other words, we are not some kind of unique little creature running around. We are part of a large ecosystem.

In fact, I'm sorry, but there are about 10 pounds of microbes in your digestive tract that circulate quite a bit through your body.

Our oceans work with microbes. In fact, when Craig Venter examined the array of marine microbes, he discovered an entirely new microbe at a depth of 20 feet, tripling the number of known species on Earth in the first three months.

We now understand that these microbes have a greater impact on the climate and the regulation of carbon dioxide and oxygen than plants, which were always thought to oxygenate the atmosphere.

We find microbial life everywhere on Earth. In ice, in coal, in rocks, in volcanic craters, and so on. That is wonderful.

However, when it comes to plants, as far as we are beginning to understand and understand their genomes, we have also discovered that it is the ecosystems around plants, the microbes that live in their root systems, that have as much influence on the properties of those plants as the metabolic pathways of the plants themselves.

If you take a closer look at the root system, you will find that there are very many, very many and diverse colonies of microorganisms.

This is not big news for viticulture. You know, they've been concerned with water and fertilizer.

And again, this is kind of my ridiculous pharmacological concept. I know that certain fertilizers make plants healthier, so I put in more fertilizer.

We don't always know in detail which organisms provide which tastes and characteristics.

You can start to understand it.

We all talk about terroir. We adore our terroir. We say, "Wow, my terroir looks great!" It's very special.

I own this land and it produces an incredible terroir.

Well, we actually discuss and argue about it. We say it's the climate, it's the soil, it's this. Well, what do you think?

You can know what the terroir is all about.

It's there, waiting to be sequenced.

There are thousands of microorganisms in it.

They are easy to sequence. Unlike humans, they have a thousand or two thousand genes. I can understand what they are.

All we have to do is walk around and take samples, dig the ground, find those bugs, sequence them, and associate them with the types of traits we like and dislike. It's just a big database. Then just fertilize.

And understand what terroir is.

So some would say, "Oh my God, are we playing God?"

If we are manipulating living things now, are we playing God?

And you know, people always ask James Watson - he's not always the most politically correct man...

(Laughter) ...and they said, "Are you playing God?"

And he gave the best answer I've ever heard to this question. "Well, someone has to."

(Laughter) I consider myself to be a very spiritual person, but without the organized religion part, I'll tell you, I don't think there's anything unnatural about it.

I don't think chemicals are unnatural.

I said I'd make some of you puke.

It's very simple. We do not invent molecules or compounds.

they came they are in space.

It rearranges and changes things, but doesn't create anything unnatural.

Well, we can create bad influences and we can poison ourselves. We can pollute the earth, but that is the natural consequence of the mistakes we make.

So what is happening today is that nature has presented us with a toolbox, and we find this toolbox to be very extensive.

Believe it or not, there are microbes that actually make gasoline.

Microbes are present. Let's go back to yeast.

These are chemical factories. The most sophisticated chemical factories have been provided by nature and made available to us.

There are also certain rules.

Nature does not allow it. I could design a grape plant, but what would it be?

A vine cannot have babies.

Nature has set a set of rules there.

We can work within the rules. we can't break the rules. We are just learning what the rules are.

I ask because we know how it really works, whether we can cure all diseases, whether we can eliminate them. If we can eliminate hunger by creating nutrient-rich, healthy plants that grow in extremely hostile environments, if we can produce clean, abundant energy, then we are very much in synthetic genomics labs with single-celled organisms that suck up carbon dioxide and produce molecules very similar to gasoline.

So carbon dioxide, which we want to remove, is not sugar or anything.

Carbon dioxide and a little sunlight produce highly refined lipids.

We may be able to solve our energy problems. CO2 can be reduced. we can clean the ocean We should be able to make better wine.

Would you do it if you could?

Well, I think the answer is very simple. Working with nature, harnessing this toolset as we now understand it, is the next step in human evolution.

And all I can say is stay healthy for 20 years.

If I can stay healthy for 20 years, I might be 150, maybe 300.

thank you.

The contents of this metal cylinder could either revolutionize technology or be completely useless. It all depends on being able to harness the strange physics of matter on very, very small scales.

To get that chance, you need precise control over your environment. Thick table tops and legs block vibrations from footsteps, nearby elevators, and doors opening and closing.

A cylinder is a vacuum chamber, devoid of all gases in the air.

Inside the vacuum chamber is a small, very cold compartment that can be reached by a small laser beam.

Inside are ultra-sensitive particles that make up a quantum computer.

So why are these particles worth the effort?

Theoretically, quantum computers could exceed the computational limits of classical computers.

Classical computers process data in the form of bits.

Each bit can toggle between two states, labeled 0 and 1.

Quantum computers use what are called qubits, which can be switched between zeros, ones, and so-called superpositions.

A qubit carries much more information than a 1 or 0 in a superposition.

You can think of these locations as points on a sphere. The north and south poles of the sphere represent 1's and 0's.

A bit can only switch between these two poles, but if the qubit is in a superposition, it can switch at any point on the sphere.

we can't find it exactly. The moment you read it, the qubit resolves to 0 or 1.

However, although we cannot observe the superimposed qubits, we can manipulate them to perform certain operations while in this state.

So, as a problem gets more complex, a classical computer will need correspondingly more bits to solve it, but a quantum computer will theoretically be able to handle increasingly complex problems without needing as many qubits as a classical computer would.

The unique properties of quantum computers arise from the behavior of atoms and subatomic particles.

These particles have quantum states, and the quantum states correspond to the states of the qubits.

Quantum states are very fragile and easily destroyed by temperature and pressure fluctuations, stray electromagnetic fields, and collisions with nearby particles.

That's why quantum computers need such elaborate setups.

That's why the power of quantum computers is still mostly theoretical at this point.

So far, only a few qubits can be controlled simultaneously at the same location.

Effectively managing these fickle quantum states involves two key factors: the types of particles a quantum computer uses and how those particles are manipulated.

So far, there are two main approaches: trapped ions and superconducting qubits.

Trapped ion quantum computers use ions as particles and manipulate them with lasers.

Ions are contained in a trap created by an electric field.

Input from the laser tells the ions what operation to perform by rotating the qubit state around the sphere.

Using a simplified example, Lazer could enter the question, "What are the prime factors of 15?"

In response, the ion may emit a photon. The state of the qubit determines whether and how many photons the ion emits.

An imaging system collects these photons and processes them to reveal answers 3 and 5.

A superconducting qubit quantum computer does the same thing differently. That is, it uses a chip with electrical circuits instead of an ion trap.

The state of each electrical circuit is transformed into the state of a qubit.

They can be operated with electrical input in the form of microwaves.

In other words, qubits are obtained from ions or electrical circuits under the action of lasers or microwaves.

Each approach has advantages and disadvantages.

Ions can be manipulated very precisely and have long lifetimes, but as more ions are added to the trap, it becomes increasingly difficult to precisely control each one.

Currently, traps cannot contain enough ions to perform sophisticated computations, but one possible solution might be to connect many small traps that communicate with each other via photons, rather than creating one large trap.

Superconducting circuits, on the other hand, operate much faster than trapped ions, making it easier to increase the number of circuits in a computer than the number of ions.

However, the circuits are more fragile and have a shorter overall lifespan.

And even as quantum computers advance, the environmental constraints necessary to preserve the quantum state will still be imposed.

But despite all these obstacles, we have already managed to make computations in areas that we cannot enter or even observe.

The future we create may be the future we can be proud of.

I think about this every day. It's literally my job.

I am co-founder and senior columnist of Worldchanging.com.

Alex Steffen and I founded Worldchanging in late 2003, and since then we and our growing team of global contributors have documented an ever-growing variety of solutions that exist now and in the near future.

In just over two years, we've written about 4,000 items, including replicable models, technical tools, and new ideas. All of these offer a path to a more sustainable, fairer and more desirable future.

Our focus on solutions is quite intentional.

There are plenty of places to go, both online and offline, if you want to find out the latest news about how our hellish handbaskets are moving fast.

We want to give people an idea of ​​what they can do about it.

Our main focus is on the global environment, but we also address many other issues such as global development, international conflicts, responsible use of emerging technologies and even the rise of the so-called second superpower.

The range of solutions we discuss is actually quite broad, but it reflects both the range of challenges that need to be addressed and the kind of innovations that make it possible.

A quick sampling only scratches the surface, but to give you an idea of ​​what we're covering, tools for rapid disaster relief like this inflatable concrete shelter. Innovative uses of biological science, such as flowers that change color when exposed to landmines. Ultra efficient design for home and office. Distributed power generation using solar, wind, ocean and other clean energy sources. Futuristic super super high efficiency vehicle. Ultra high performance vehicles available now. And with good urban design, you don't have to drive that much in the first place. A biomimetic approach to design that leverages the efficiency of natural models in both vehicles and buildings. A distributed computing project that helps model the future of the climate.

Also, many of the topics we've been talking about at TED this week have been previously covered at Worldchanging. Cradle-to-cradle design, MIT fab labs, super longevity influences, the one laptop per child project, and even Gapminder.

As a generation X born in the mid-1960s, I am naturally pessimistic as I approach my 40th birthday. But working at Worldchanging convinced me, to my surprise, that it is still possible to manage the world's problems.

Furthermore, I realized that focusing only on the negative outcomes could obscure the very possibility of success.

Norwegian social scientist Evelyn Lindner said: "Pessimism is a luxury in good times...

In difficult times, pessimism is a self-fulfilling, self-imposed death sentence. ”

Truth be told, we can build a better world and we can do it now.

we have the tools As you saw that hint earlier, we're always coming up with new tools.

We are knowledgeable and our understanding of the Earth is improving every day.

Most importantly, we are motivated. We have a world that needs fixing, and no one is doing it for us.

Many of the solutions that my colleagues and I seek and write every day share some key dimensions: transparency, collaboration, a willingness to experiment, and an understanding of science (or better yet, science).

(laughter) Most of the models, tools, and ideas about Worldchanging involve a combination of these traits, so I wanted to give some concrete examples of how these principles fit together in ways that change the world.

We can see world-changing values ​​in the emergence of tools that make the invisible visible, revealing the state of the world around us that would otherwise be largely imperceptible.

It has been found that people often change their behavior when they can see and understand the consequences of their actions.

As a small example, many of us have experienced changes in driving behavior caused by displaying real-time mileage that shows exactly how our driving habits affect the vehicle's efficiency.

The last few years have witnessed the emergence of innovations in how we measure and display aspects of the world that are too big, too intangible, or too difficult to grasp easily.

Simple technologies, such as a wall-mounted device that displays how much power your home is using or what the results of turning off a few lights can actually have a direct positive impact on your energy footprint.

Community tools like text messaging can notify you when pollen counts increase, smog levels rise, or natural disasters strike, giving you the information you need to act in a timely manner.

Data-rich displays, such as maps of campaign donations and maps of vanishing polar ice sheets, give us a deeper understanding of the context and process flows that affect us all.

We see world-changing values ​​in research projects that seek to meet the world's medical needs through open access to data and collaborative action.

While some people now emphasize the dangers of knowledge-driven solutions, I believe the benefits of knowledge-driven solutions far outweigh them.

For example, open access journals like the Public Science Library make cutting-edge scientific research free for everyone in the world.

And indeed, more and more scientific publishers are adopting this model.

Last year, hundreds of volunteer biologists and chemists around the world worked together to decode the genomes of parasites responsible for some of the worst diseases in the developing world, including African sleeping sickness, leishmaniasis and Chagas disease.

Its genomic data can now be found in open-access genetic databanks around the world, a boon for researchers trying to come up with therapeutics.

But my favorite example is the global response to the 2003-2004 SARS epidemic. This response relied on global access to the complete gene sequence of the SARS virus.

The U.S. National Research Council, in its follow-up report on the outbreak, cited the availability of this sequence as a key reason SARS treatments could be developed so quickly.

And we can see the values ​​that change the world from something as small as a mobile phone.

You can probably count on your fingers how many people in this room don't have cell phones. And where is Aubrey?

(Laughter) For many of us, our phones have become a very part of who we are, and we're starting to see the social changes they can bring.

You may already know some of the big-picture aspects. Globally, more camera phones were sold last year than any other type of camera, and more and more people live their lives through lenses and networks, sometimes making history.

In developing countries, mobile phones are the engine of the economy.

Last year's study showed a direct correlation between increased mobile phone use and the resulting increase in GDP across Africa.

Mobile phone charges have actually become an alternative currency in Kenya.

The political aspect of mobile phones also cannot be ignored, from the text message swarms that help overthrow governments in South Korea to the UK's Blairwatch project, which monitors politicians who try to avoid the press.

(Laughter) And it's going to get even wilder.

Pervasive, always-on networks, high-quality sound and video, and even devices made to be worn rather than carried in your pocket will transform our lives on a scale most of us don't realize.

It is no exaggeration to say that mobile phones are one of the most important technologies in the world.

And in this rapidly evolving landscape, it is possible to imagine a world where mobile phones become much more than just a means of social interaction.

I've admired the Witness Project for a long time, and Peter Gabriel told us more about it in an inspiring presentation on Wednesday.

And I'm incredibly happy to see the news that Witness is launching a web portal that will allow users of digital cameras and camera phones to not only carry videotapes, but also send recordings over the Internet.

Not only does this add a new and potentially more secure means of documenting fraudulent activity, it also opens the program up to the world's growing digital generation.

Now imagine a similar model for networking environmentalists.

Imagine a web portal that collects records and evidence of what is happening on Earth. From activists and researchers to businessmen and politicians, all kinds of people will have news and data at their fingertips.

It will highlight the changes that are underway, but more importantly, it will give a voice to those willing to work to see a new, better world come to pass.

It will give ordinary citizens the opportunity to play a role in protecting the planet.

It would essentially be an "Earth Witness" project.

Now, let me be clear, in this talk, I am using the name "Earth Witness" as part of the scenario, but it is just a shorthand for what this fictional project aims to do, not to piggyback on the great work of the Witness Organization.

You could easily call it an "Environmental Transparency Project" or a "Smart Mob for Nature Safety", but Earth Witness is much easier to say.

Now, many of those who participate in Earth Witness will focus on ecological issues, whether man-made or not, especially environmental crime and significant sources of greenhouse gases and emissions.

It is understandable and important.

We need better documentation of what is happening to Earth if we are to have any chance of repairing the damage.

But the Earth Witness project need not be limited to problems.

In the best of world-changing traditions, the event may also serve as a showcase for great ideas, successful projects, and change-making efforts that deserve more attention.

Earth Witness shows us two worlds. The world we are leaving behind and the world we are building for generations to come.

And what makes this scenario particularly appealing to me is that it can be done today.

Key components are already widely available.

Of course, a camera phone would be the basis of the project.

And for many of us, they are as familiar as ever-connected and widely available information tools.

We may remember to take our digital cameras with us wherever we go, but few of us forget our mobile phones.

You can also imagine a version of this scenario where people actually build their own phones.

Over the last year, open-source hardware hackers have come up with multiple models of Linux-based mobile phones that can be used, and the Earth Phone could be offshoots of this sort of project.

On the other side of the network are servers for people to send photos and messages, accessible via the web, and are a combination of photo-sharing services, social networking platforms, and collaborative filtering systems.

Now, Web 2.0 folks in the audience know what I'm talking about, but for those of you who thought that last sentence was crazy moon words, my short answer is that the online portion of the Earth Witness project was created by users, working collaboratively and openly.

That's enough to start building a compelling chronicle of what's happening to our planet right now, but there's more we can do.

The Earth Witness site also serves as a collection spot for all kinds of data about conditions around the Earth as detected by environmental sensors attached to mobile phones.

Today, while we don't yet see these devices as phone add-ons, students and engineers around the world are attaching atmospheric sensors to bicycles, handheld computers, cheap robots and the backs of pigeons. This is an actual ongoing project at the University of California. Dr. Irvine uses sensors attached to birds as a way to measure smog-forming pollution.

It's not unreasonable to imagine putting the same thing on a person's mobile phone.

Now the idea of ​​connecting sensors to mobile phones is not new. Cell phone makers around the world offer phones that sniff out bad breath or tell you to worry about overexposure to the sun.

Taking things more seriously, Swedish company Uppsala Biomedical is developing an add-on for mobile phones that can process blood tests on site, upload data and view results.

Even Lawrence Livermore National Laboratory has embarked on the effort, designing a prototype cell phone with radiation sensors to detect dirty bombs.

With a wide variety of small, inexpensive sensors on the market today, it's easy to imagine someone building a phone that can measure temperature, CO2 or methane levels, and the presence of some biotoxins. Potentially, even the H5N1 bird flu virus could be measured in a few years.

Such a system would prove to be a very good fit for Larry Brilliant's InSTEDD project.

All this data is now geotagged and mashed up with online maps for easy viewing and analysis.

And it is especially noteworthy.

The impact of open access online maps over the last year or two has been absolutely staggering.

Developers around the world have devised a staggering variety of ways to overlay useful data on maps, from bus routes and crime statistics to the global progress of bird flu.

Earth Witness will take this a step further, connecting what you see with what thousands and millions of people around the world see.

It's kind of exciting to think what would happen if something like this existed.

We will have far better knowledge of what is happening ecologically on Earth than can be gleaned from satellites or a few government sensor nets alone.

It is a collaborative, bottom-up approach to environmental awareness and conservation, capable of responding to emerging concerns in a smart crowd-like manner. If you need more sensor density, just get more people to come.

And most importantly, we cannot ignore how important mobile phones are to young people all over the world.

It's a system that can put the next generation at the forefront of environmental data collection.

And as we work to find ways to mitigate the worst impacts of climate change, every little piece of information matters.

A system like Earth Witness will be a tool for all of us to participate in the advancement of our knowledge and ultimately in the improvement of the planet itself.

Now, as I suggested at the beginning, there are thousands of good ideas out there, so why did I spend most of my time talking about the ones that don't exist?

Because tomorrow may be bottom-up, technology-enabled global cooperation to address the greatest crisis our civilization has ever faced.

We can save the planet, but we cannot do it alone. we need each other

No one will solve the world for us, but by leveraging technological innovation and human communities alike and working together, we may be able to do it ourselves.

We have at our fingertips a treasure trove of compelling models, powerful tools, and innovative ideas that can make a meaningful difference in the future of our planet.

No need to wait for the silver bullet to save us all. We already have an arsenal of solutions waiting to be used.

There are a staggering number of wonders in the world, across different fields, but they all tell us the same thing. It means that if you are willing to try, you will succeed.

And as we say at Worldchanging, alternate worlds aren't just possible. Another world is here.

You just have to open your eyes. thank you very much.

What I want to talk about today is that we are being asked to take a long-term view, so I would like to tell you what I think are the three biggest problems for humanity from this long-term view.

Some of these have already been touched upon by other speakers and are encouraging.

It seems that I'm not the only one who thinks these issues are important.

The first is that death is a big problem.

If you look at the stats, the odds aren't very favorable to us.

Most of the people who have ever lived are dead.

About 90 percent of those who ever lived are already dead.

Therefore, the annual mortality rate totals 150,000. I'm sorry, but the daily death rate is 150,000 people per day, which is a huge number by any standard.

That would result in 56 million deaths per year.

Looking at the single biggest cause of death, aging alone, aging accounts for roughly two-thirds of all human deaths.

This adds up to more deaths per year than Canada's population.

Sometimes it's too familiar or too big to find the problem.

too big to see.

I suspect that for most people, death is too close, too big, to see it as a problem.

Once you think about it, you realize that this is not a statistical point. These are -- how far did we talk?

We talked for 3 minutes.

So, about 324 people have died since I started speaking.

People are saying - roughly the population in this room just died.

Now, the human cost of that is obvious, but once you start thinking about it, the suffering and loss is also very wasteful financially.

I am only looking at the information, knowledge and experiences that are lost through natural death in general and aging in particular.

Suppose you gave one person a book?

Of course, this is an underestimate.

There are too many lessons and experiences in a person's life to fit in one book.

But let's say we did this.

52 million people die of natural causes each year, equivalent to 52 million books destroyed.

The Library of Congress has a collection of 18 million volumes.

We are shaken by the arson of the Alexandria Library.

It is one of the great cultural tragedies that we still remember today.

But that's the equivalent of three US Library of Congress burning down and lost forever each year.

That's the first big problem.

And I hope that Mr. Godspeed and Mr. Aubrey de Gray and others like him will try to do something about this issue as soon as possible.

Existential risk -- the second big issue.

Existential risk is a threat to human survival or the long-term viability of our species.

Now, why would you say this is a big deal?

Now let's look at the probability first -- and it's very, very hard to estimate -- but it's surprising that only four studies have been done on this in recent years.

Given that the stakes are so high, you might think it would be interesting to take a closer look at this, but this area is so neglected.

But so far there have been four studies, one by John Leslie, who has written a book about it.

He estimated a 50% chance that humanity will not survive this century.

Similarly, astronomer Royal, whom we spoke to yesterday, estimates the odds to be 50 percent.

Another author does not give numerical estimates, but says the probability of failure is quite high.

I wrote a long paper on this.

I said it would be a mistake to assign a probability of less than 20 percent in light of the current evidence.

Now, the exact numbers here have to be taken with a grain of salt, but the consensus seems to be that the risk is high.

Anyone who has seen and researched this would agree.

Now, reducing the chances of human extinction by just 1 percentage point, which isn't that big, is the equivalent of saving 60 million lives if you just count the people alive today, the current generation.

Today, 1 percent of 6 billion equals 60 million.

that's a big number.

The numbers are astronomical when you consider future generations that will never exist if we self-destruct.

If we could eventually colonize a portion of the universe, the Virgo Supercluster, it would probably take 100 million years to get there, but if we went extinct, we would never get there.

Then even a 1 percentage point reduction in extinction risk could be equivalent to this astronomical number: 10 to the 32nd power.

Therefore, if we consider future generations as much as our own, all other moral obligations regarding the cost of philanthropy become irrelevant.

The only thing you should focus on is reducing existential risk. This is because even the slightest reduction in existential risk overwhelms other benefits that could be expected to be achieved.

And it should still be a high priority, even if we only look at the people we have today and ignore what we might lose if we go extinct.

Now I want to spend the rest of my time on the third big problem. This is because it is more subtle and perhaps harder to grasp.

Think of a time in your life. Some of you may never have, but some of you have had moments when life was wonderful.

It may have been a moment of great creative inspiration when you were just entering this flow stage.

Or when you realize something you've never done before.

Or maybe in the ecstasy of romantic love.

Alternatively, aesthetic experiences such as sunsets and stunning works of art are possible.

Sometimes we come across such moments and realize how wonderful life is when it's at its best.

And you wonder why it's not always like that?

You just want to hang on to this.

And of course, back to normal life, the memory fades.

And in a normal state of mind, it is very difficult to remember how wonderful life is at its best.

Or, at worst, how bad it could get.

The third big problem is that life is usually not as great as it sounds.

I think it's a big, big problem.

It's easy to say what you don't want.

There are many things we don't want: sickness, unwanted death, needless suffering, cruelty, stunting, amnesia, ignorance, lack of creativity.

Suppose we fix these problems. Suppose we do something about all of this.

we were very successful.

We got rid of all this.

You might end up with something like this. So much better than that.

But is this really the best we can dream of?

Is this the best we can do?

Or is it possible to find something a little more motivating?

With this in mind, I think it's clear that there are ways that things can change by not only eliminating negative elements, but also adding positive ones.

At least my wish list includes longer and healthier lifespans, improved subjective well-being, enhanced cognitive abilities, greater knowledge and understanding, unlimited opportunities for personal growth beyond current biological limits, better relationships, and unlimited potential for spiritual, moral and intellectual development.

If you want to achieve this, what exactly do you need to change?

This is the answer. we have to change.

Not just the world around us, but ourselves.

Not just how we think about the world, but how we are—our biology itself.

Human nature will have to change.

Now, when we think about altering human nature, the first things that come to mind are growth hormone therapy, cosmetic surgery, stimulants like Ritalin and Adderall, antidepressants, anabolic steroids, artificial hearts and other body-modifying technologies.

It's a pretty pathetic list.

They work great for a few people who suffer from certain conditions, but for most people, they don't change what it means to be human.

And it also seems like they're all little things. Most people certainly have an instinct that truly depressed people need antidepressants.

However, there is a kind of discomfort that these are unnatural in a way.

Remember that there are many other corrective and hardening technologies in use.

There are also skin enhancements and clothing.

As far as I can see, everyone in this room is a user of this enhancement technology, so that's great.

Mood-altering substances such as caffeine, alcohol, nicotine, boosting the immune system, enhancing vision, and narcotics have been used since time immemorial. We take it for granted, but think how big of an improvement this is. For example, I didn't enjoy having surgery before using anesthetics.

Birth control pills, cosmetics, brain-reprogramming techniques—weird as it may sound, but what technology is—gadgets will be the prototype—and other ways to alter and rewrite human nature are very fine.

So when you think about what it means to learn math or learn to read and write, you are actually literally rewriting your own brain.

As the disease progresses, the microstructure of the brain changes as well.

Therefore, in a broad sense, we need to think of technology not just as a small tool like the one here, but also including institutions, techniques, and psychological techniques.

Organizational morphology can have a great impact on human disposition.

Looking ahead, there are various technologies that will almost certainly be developed sooner or later.

We have no idea about the timescales of these things, but they are all in line with everything we know about the laws of physics, chemistry, etc.

Aside from the possibility of catastrophe, it is possible to assume that sooner or later all this will be developed.

And even just a few of these are enough to change the human condition.

So let's take a look at some aspects of human nature that we think could be improved.

Healthy life expectancy is an important and urgent issue. Because if you're not alive, everything else is of little use.

Intellectual Ability -- Let's take a look at the box. This is broken down into various subcategories such as memory, concentration, mental energy, intelligence, and empathy.

These are really great.

One of the reasons we value these traits is because they make us better at competing with other people. These are status assets.

But part of the reason, and it's also why we have an ethical basis for pursuing these, is that they're intrinsically valuable.

The more you understand and remember what you learn about the world around you and the people you communicate with, the better.

modalities and special features.

Now, the human mind is not a single single information processor, it is equipped with many different specialized and evolved modules that do specific things for us.

When we think about music, humor, eroticism, spirituality, aesthetics, nurturing and caring, gossiping, talking to people, and so on, all of which are very likely made possible by the special circuitry we humans possess, it is also possible that there are other intelligent life forms that lack these.

We are just lucky to have the necessary neural machinery to process music and appreciate and enjoy it.

All of these, in principle, will be ready for enhancements.

Some people have a better musical ability or ability to appreciate music than others.

It's also interesting to think about what the others are. So if all this makes great values ​​possible, why should we think that evolution happened to provide us with all the modalities we need to interact with other values ​​that might exist?

Imagine a species with no neural machinery for processing music.

And when we're spending time listening to a beautiful performance like the one we just heard, they just stare at us with bewildered eyes - they were really annoyed because people were making stupid moves and didn't try to understand what we were doing.

But maybe they have another ability, something that seems equally absurd to us, but they actually tap into the potentially great value there.

But we literally just don't listen to such values.

So you can think of adding a variety of new sensory and psychic abilities.

Bodily function and morphology, and emotional self-control.

Increased subjective well-being.

You can switch between relaxation and activity. You can speed it up slowly when you need to.

It would be great if we could switch back and forth more easily. It's easier to reach a flow state when you're fully immersed in what you're doing.

conscience and sympathy.

This is another interesting application that could possibly have a large social impact.

If you could really choose to maintain a romantic attachment to someone that doesn't wane over time, you don't have to. Love never has to go away even if you don't want it.

It's probably not that hard.

A simple hormone or something might make this possible.

Made in a vole.

Prairie voles, which are naturally polygamous, can be manipulated to become monogamous.

It's just one gene.

Humans may be more complicated, but probably less so.

This is the last photo I want to take. Now you have to use a laser pointer.

A possible mode of existence here is a way of life, a way of being, experiencing, thinking, seeing and interacting with the world.

This little nook, here is a small subspace of this great space that is accessible to humans, beings with biological capabilities.

It is part of the space accessible to animals. We are animals, so we are a subset of that.

And you can imagine some improvement in human ability.

For example, if you can live for 200 years, you will be able to experience various forms of existence.

Then you will be able to live a life and accumulate wisdom that is not possible for present-day humans.

So you can move into the larger realm of Human+ and continue that process, eventually exploring more of this larger space of possible existence.

So why is that a good thing?

Now, we already know that in this little human circle there is a very good and worthy way of life. Human life at its best is wonderful.

There is no reason to believe that in a cosmos this vast and vast, there could not possibly be a mode of existence of great value, far beyond our imaginations and even fantasies.

So, to solve this third problem, I think we need to slowly and deliberately, with ethical wisdom and constraints, develop the means by which we can get out and explore this larger space and find the great value that might be hiding there.

thank you.

So I want to start with this beautiful photo from my childhood.

I love science fiction movies.

That is "this island earth".

And leave it to Hollywood to get it right.

Two and a half years in the making.

(Laughter.) I mean, even creationists give us $6,000, but Hollywood chases.

And the movie features flying saucers, aliens, and other things we think are in space.

Every world has aliens, and every alien world has a flying saucer that moves at great speed. alien.

Well, my friend Don Brownlee and I finally got tired of turning on the TV every night and seeing spaceships and aliens and tried to write a counter-argument. And I tried to argue what it really takes for Earth to be habitable, for a planet to be Earth, to have a place where perhaps not only life but complexity can be obtained. It requires an enormous amount of evolution and thus conditions constancy.

So in 2000 I wrote "Rare Earth". In 2003, instead of thinking about where the Earth is in space, we asked how long it has been the Earth.

Go back two billion years and you are no longer on an Earth-like planet.

What we call Earth-like planets are actually very short time intervals.

Well, "rare earths" actually taught me so much about meeting people in general.

Shortly after, I received an invitation to attend a sci-fi convention and attended with great enthusiasm.

David Brin was trying to discuss this with me, and when I walked in, a crowd of 100 enthusiastically started booing.

A girl said, "Dad says you're the devil."

You cannot take aliens from people and expect them to be friends with someone.

Now for the second part right after that, I was talking to Paul Allen. I saw him in the audience, so I handed him a Rare Earth.

And Jill Tarter was there and she turned to me and stared at me just like the "exorcist" girl.

It was "Burning! Burning!"

Because SETI doesn't want to hear that.

SETI wants something to exist in the world.

I wholeheartedly applaud SETI's efforts, but haven't heard anything yet.

And I really think we have to start thinking about what is good Earth and what is not.

Now, I put this slide up to show that even if SETI heard something, would they be able to understand what they said?

Because this was a slide passed between the two major intelligences on Earth -- Mac and PC -- can't even get the letters right -- (laughter) -- so how do we talk to aliens?

And if they're 50 light years away and we call them and you blah blah blah and come back in 50 years and they say, "Repeat?"

I mean, there you are.

Our earth is a good planet because it can hold water.

Mars is a bad planet, but being protected is still enough to go to Mars and live on its surface.

But Venus is a very bad, worst planet.

Despite its Earth-like resemblance, and the possible existence of Earth-like life earlier in its history, it quickly succumbed to a runaway greenhouse, an 800-degree Fahrenheit surface, due to the prevalence of carbon dioxide.

Well, we know from astrobiology that we can actually predict what will happen to our particular planet.

We are now through the first terrifying microbial age and are now in the midst of beautiful Oreo beings, or at least life on Earth.

In the Cambrian Explosion, life emerged from swamps, creating complexity and, as far as we can tell, we're halfway there.

Until we reach the Second Microbiological Age, there will be time for animals to exist on Earth as ever.

And, paradoxically, all we hear about global warming is that when CO2 drops to 10ppm, there won't be any plants allowed to photosynthesise, nor will there be any animals.

So it will probably take 7 billion years after that.

The Sun will increase its intensity and brightness, and eventually, about 12 billion years after its first birth, the Earth will be consumed by the great Sun, and this will remain.

So, on a planet like ours, there is aging and aging, and we are now in the golden summer.

But everything has two destinies, right?

Now, many of you will die of old age, but some of you, fearfully, will die in accidents.

And that is also the fate of the planet.

Earth, if you're lucky - if you don't get hit by Hail Bopp in the next seven billion years or get hit by a nearby supernova - you'll find us at your feet.

But what about accidental deaths?

For the past 200 years, paleontologists have charted death. Curiously, until Baron Cuvier of France discovered this first mastodon, even the concept of extinction was inconceivable.

Unable to match it to any bone on earth, he said, "Ah!" It went extinct.

And shortly after that, the fossil record began to give us a very good idea of ​​how many plants and animals had been around since complex life actually started leaving a very interesting fossil record.

In the complex record of fossils, there have been periods when many things seemed to go extinct so rapidly that my father and mother geologists called these "mass extinctions."

It was long thought that this was either the work of God or long, slow climate change, but that all changed in 1980 when Walter Alvarez on this rocky outcrop near Gubbio tried to figure out the time difference between these white rocks, which are home to Cretaceous life, and the pink rocks above, which are home to Tertiary fossils.

How long did it take to move from one system to the next?

And what they found was unexpected.

They found a very thin layer of clay in this gap between them. And that clay layer, here this very thin red layer, is filled with iridium.

Iridium is not alone. It is packed with glassy globules and packed with grains of quartz under enormous pressure. That's shock quartz.

Now, the white stuff on this slide is chalk, and this chalk is deposited in the warm ocean.

The chalk itself consists of plankton that has fallen from the sea surface to the seafloor, and 90 percent of the sediments here are skeletons of organisms, followed by a red layer several millimeters thick, followed by black rock.

And black rocks are sediments on the ocean floor where plankton is absent.

And that's what happens in the asteroid catastrophe, because this is what really happened. The famous K-T.

A 10-kilometer object hit the Earth.

The impact spread this very thin impact layer across the planet and we soon experienced the death of dinosaurs, the death of these beautiful ammonites, the Luconteisera here, the Serasera here, and many others.

It would be true. Since then, there have been two Hollywood blockbusters, and this paradigm completely changed the way we geologists think about cataclysms from 1980 to about 2000.

Before that, unitarianism was the dominant paradigm. That is, the fact that whatever happened on Earth in the past, there is a current process that explains it.

But we haven't witnessed a big asteroid impact, so this is a kind of neocatastrophism, and it took the scientific establishment about 20 years to finally solve the problem. Yes we collided. And yes, the impact of that blow caused a massive mass extinction.

In the last 500 million years, there have been five major mass extinctions known as the Big 5.

They range from 450 million years ago to the last K-T (4th), the largest of which is P (the Permian extinction), sometimes called the mother of all mass extinctions.

All of these are believed to have been caused by subsequent collisions with large celestial bodies.

But is this true?

The latest, the Permian, is thought to have been influenced by this beautiful structure to the right.

This is Buckminsterfullerene, Carbon 60.

It's called a "buckyball" because it resembles the awful geodesic domes of the late 60's that I loved so much.

This evidence was used to suggest that a comet struck Earth at the end of the Permian period, 250 million years ago.

And when a comet collides, the pressure causes a buckyball to trap comet debris.

Helium 3: Very rare on the Earth's surface, but very common in space.

But is this true?

In 1990, after 10 years of working on the K-T extinction, I moved to South Africa and started working twice a year in the Greater Karoo Desert.

I was very lucky to see that South Africa transform year after year into a new South Africa.

And I worked on this Permian extinction, camping by this Boer cemetery for months at a time.

And fossils are special.

You are looking at your distant ancestors.

These are reptiles that resemble mammals.

They are culturally invisible. We don't make movies about these things.

This is a Gorgonopsian, or Gorgon.

It was an 18-inch long animal skull that was probably 7 or 8 feet, sprawled like a lizard, and had a head like a lion's.

This is Tyrannosaurus, the top carnivore of the time.

But there are so many things.

This is my poor son, Patrick.

(Laughter.) This is called paleontological child abuse.

Stay still, you are the scale.

(Laughs) There was something amazing at that time.

55 mammal-like reptiles.

The age of mammals began in earnest 250 million years ago.

...and then disaster struck.

And what happens next is the Age of Dinosaurs.

It was all wrong. It should never have happened. But it happened.

Well, luckily for you, this thrinaxodon, which is about the size of a robin's egg. This is the skull I found just before this photo was taken. I have a pen for the scale. It's really small - this is in the late Triassic, after the mass extinction ended.

The eye sockets are visible, and small teeth are visible in front.

If it doesn't survive, I'm not in a position to tell this story.

Something else exists. Because if it didn't survive, we wouldn't be here. No mammals. It's so close. One seed goes through.

Now, what can you say about the pattern of who survives and who doesn't?

This marks the end of 10 years of activity.

Range -- The red line is mass extinction.

But we have survivors and passing ones, and the preferential passing ones turned out to be cold-blooded.

At this time, warm-blooded animals have been hit hard.

Those who survive create this world inhabited by crocodile-like creatures.

Dinosaurs don't exist yet. Just this slow, keel-like, scaly, nasty, swampy place with a few small mammals hiding around it.

And they would hide there for 160 million years until they were liberated by the K-T asteroid.

So what if there is no impact?

And, I think, we've gone back again and again to the Precambrian world, the age of the first microbes, and the microbes are still there.

They hate us animals.

They really want their world back.

And they have tried again and again and again.

This suggests to me that the life that caused these mass extinctions is anti-Gaian in nature.

This whole idea of ​​Gaia is that life itself makes the world a better place. Did anyone believe in the Gaia theory and was on the highway in Los Angeles on Friday afternoon? no.

So I really doubt that alternatives exist. And I suspect that life is actually trying to do it for itself, not consciously, just by doing so.

And here is the weapon that seems to have been doing so for the past 500 million years.

There are microorganisms that produce large amounts of hydrogen sulfide through their metabolism.

Hydrogen sulfide is deadly to us humans.

Even as little as 200ppm will kill you.

Just go down to the Black Sea and some other places, some lakes, and you will find that the water itself turns purple.

It turns purple due to the presence of numerous microorganisms that require sunlight and hydrogen sulfide. We can detect their presence today, we can see them, but we can also detect their presence in the past.

And in the last three years, we've seen great progress in a completely new area.

I'm on the verge of extinction -- I'm a paleontologist who collects fossils.

But a new wave of paleontologists, my graduate students, are collecting biomarkers.

They can harvest the sediments themselves, extract oils from them, and produce compounds from them that are highly specific to certain groups of microorganisms.

That's because lipids are so hardy that they can be preserved in sediments for the necessary hundreds of millions of years, and extracted so that we can know who was there.

And we know who was there. At the end of the Permian, at many of the mass extinction boundaries, we find this to be Isorenieratene. Very specific.

This would only occur if the surface of the ocean was devoid of oxygen and completely saturated with hydrogen sulfide, for example, to the extent that it would come out of solution.

For this reason, Lee Kamp and others at Penn State University and my group proposed what I call the Kamp Hypothesis. In other words, many mass extinctions were caused by declining oxygen and increasing carbon dioxide. And it turns out that the worst effect of global warming is the production of hydrogen sulfide from the oceans.

Now what is the source for this?

In this particular case, the source was flood basalt many times.

This is what the Earth looks like today, extracting much of it.

And each of these looks like a hydrogen bomb. In reality, the impact is even more severe.

This is when deep earth matter appears on the surface and spreads across the surface of the earth.

Well, it's not the lava that kills anything, it's the carbon dioxide that comes out with the lava.

This is not a Volvo. This is a volcano.

But carbon dioxide is carbon dioxide.

These are new data that Rob Varner of Yale University and I put together. And what we're trying to do now is track the amount of carbon dioxide throughout the rock record. This can be done in various ways. And all the red lines here show when these things, what I call a greenhouse mass extinction, happened.

Two things are really clear to me here. That is, these extinctions occur when CO2 is increasing.

But a second thing not shown here is that there has never been ice on Earth during a time when there was 1000 parts per million CO2.

We will climb at an altitude of 380 degrees.

At most, it should reach 1,000 in three centuries, but my friend David Battisti, who lives in Seattle, thinks it's 100 years.

So the ice cap disappears and sea level rises 240 feet.

I live in a house with a view now. It will be by the water.

So what happened? The sea will probably turn purple.

And we believe this is why it has taken so long for complexity to occur on Earth.

We have had seas of hydrogen sulfide like this for a very long time.

They stop complex life from existing.

Hydrogen sulfide is now known to erupt in several places on Earth.

And I'm throwing in this slide -- this is actually me two months ago -- and I'm throwing this slide in because here is my favorite animal, the nautilus.

Since the birth of animals, they have existed on this earth for 500 million years.

This is a chase experiment. Scuba divers, if you want to participate in one of the greatest projects ever, do it outside the Great Barrier Reef.

And as we speak now, these nautiluses have us tracking their behavior.

But in this regard, we divers can sometimes run into trouble. So let's do a little thought experiment here.

This is a great white shark that ate some of my traps.

we pulled it up. come up. So stay with me at night.

So, I'm swimming with it, but my leg came off.

I'm 80 miles from the coast, what will happen to me?

Well, I die.

Five years from now, I hope this happens to me. I was taken back to the boat and given a gas mask. 80 ppm hydrogen sulfide.

They are then thrown into an ice pond, chilled to 15 degrees, and may be taken to a critical care hospital.

I was able to do this because we mammals have experienced a series of hydrogen sulfide events and our bodies have adapted.

And now we can take advantage of this as a major medical advance.

Mark Ross. He was funded by DARPA.

I tried to find a way to save Americans wounded on the battlefield.

He draws the pig's blood.

He injected 80ppm of hydrogen sulfide (the same substance that survived past mass extinctions) and turned mammals into reptiles.

"I believe this response is a result of a series of H2S exposures in mammals and reptiles."

I received this email from him two years ago. "I think I've answered some of your questions," he said.

So now he spends up to 4 hours, sometimes 6 hours on a mouse. These are brand new data he sent me on his way here.

At the top is the temperature record of the passing mouse. Dotted line is temperature.

In other words, the temperature starts at 25°C and drops steadily.

After 6 hours, the temperature will rise.

Now, on this solid line graph, let's feed the same mouse 80 ppm hydrogen sulfide and see what happens to its temperature.

Its temperature drops.

It drops from 35°C to 15°C and is perfectly fine from there.

Here's how to get people to critical care.

Here's how you can keep people cool enough to get to critical care.

Now, you're probably thinking, well, what about brain tissue?

And this is one of the big challenges ahead.

you are in an accident You have two options. Either die or ingest hydrogen sulfide and mentally save 75%.

what are you going to do

Should we all have a little button that says "let me die"?

This is coming towards us and I think this will be a revolution.

We will save lives, but it comes at a price.

The new way of looking at mass extinction is that yes we have been hit and yes we will be hit again so we have to think long term.

But a far more serious danger faces us.

You can easily return to the world of hydrogen sulfide.

Give us thousands of years - and we humans should live those thousands of years - will it happen again? If you continue, the same thing will happen again.

How many of us have flown here?

How many people this year spent all their quota in Kyoto just to catch a flight?

How many have crossed it? Yes, I'm definitely over it.

We as a species face a big problem.

You have to overcome this.

I want to visit this coral reef again. thank you.

(Applause) Chris Anderson: Peter, I just have one question.

Do you understand what you are saying here that we have a biochemical response to hydrogen sulfide in our own bodies that proves in your mind that there have been past mass extinctions due to climate change?

Peter Ward: Well, each of our cells can produce trace amounts of hydrogen sulfide in times of great crisis.

This is what Ross discovered.

So what we're looking at now is whether or not to leave a signal.

Does it leave a signal on bones and plants?

And we can go back to the fossil record and try to detect how many times these things have happened in the past.

CA: It's an incredible piece of medical technology, but it's also terrifying...

PW: Bless and curse.

It was the spring of 2011 and, as many commencement speeches say, I was preparing to enter the real world.

I just graduated from university and moved to Paris to start my first job.

My dream was to become a war correspondent. But the real world I found took me into a completely different kind of conflict zone.

At 22, I was diagnosed with leukemia.

Doctors have bluntly told me and my parents that my long-term survival chances are about 35%.

I couldn't understand what that premonition meant.

But it turned out that reality and the life I had imagined were shattered.

Overnight I lost my job, my apartment, my independence and became patient number 5624.

During the next four years of chemotherapy, clinical trials, and a bone marrow transplant, the hospital became my home, my bed, and where I lived 24/7.

I had to accept the new reality because it was unlikely to get any better.

And I adapted.

I became fluent in medicine, made friends with a group of other young cancer patients, built a huge collection of neon wigs, and learned to use a spinning IV pole as a skateboard.

My dream of becoming a war correspondent came true, although it wasn't what I expected.

It began as a blog reporting from the front lines of a hospital bed and morphed into a column for the New York Times called Life, Interrupted.

But -- (applause) Thank you.

(Applause.) But above all, my focus was survival.

And -- spoiler alert -- (laughter) I survived, yeah.

(Applause.) Thanks to an army of supportive humans, not only am I here now, but I am cured of cancer.

(Applause.) Thank you.

(Applause.) So when you go through a traumatic experience like this, people are treated differently.

They start talking about how inspiring you are.

They say you are a warrior.

they call you a hero. Someone who lived the journey of a mythical hero, endured the impossible, lived and told a story in the face of adversity, and came back better and braver than ever before.

And this definitely matches my experience.

Cancer completely changed my life.

I left the hospital knowing exactly who I was and what I wanted to do in the world.

Now, every day when the sun rises, I drink a glass of celery juice, followed by 90 minutes of yoga.

Then write 50 things you are grateful for on paper scrolls, fold them into paper cranes and send them out the window.

(Laughter) Do you really believe this?

(Laughter) I would never do that.

(laughs) I hate yoga and I don't even know how to fold an origami crane.

Truth be told, for me, the hardest part of my cancer experience started after the cancer was gone.

The heroic journeys of survivors we see in movies and on Instagram are myths.

Not only is that untrue, it is dangerous because it obscures the very real challenges of recovery.

Don't get me wrong. I am so grateful to be alive, and I am keenly aware that this struggle is a privilege many of us do not experience.

But it is important for me to convey how this projection of heroism and the constant expectation of gratitude affects those who are trying to recover.

Because healing does not end the work of healing.

It starts there.

I will never forget the day when I was finally discharged from the hospital.

The four years of chemotherapy have severely damaged my relationship with my long-term boyfriend, who recently moved.

And when I entered the apartment, it was quiet.

Eerily so.

The person I wanted to call at this moment, someone I knew would understand everything, was my friend Melissa.

She was a fellow cancer patient who died three weeks ago.

When I stood in the doorway of my apartment, I wanted to cry.

But I was too tired to cry.

The adrenaline is gone.

It felt like the inner scaffolding that had held me up since my diagnosis suddenly crumbled.

For the past 1,500 days, I have worked tirelessly to achieve one goal: survival.

And now that I've done that, I realize that I have absolutely no idea how to live.

Of course, on paper, I was doing better. I did not have leukemia, my blood count returned to normal, and the disorder diagnosis did not come immediately.

It was clear to the outside world that I no longer belonged to the kingdom of the sick.

But in fact, I never felt farther away from my health.

All that chemotherapy did permanent physical damage to my body.

I thought, "What kind of work can I do if I have to nap four hours in the middle of the day?"

When will my immune system malfunction routinely bring me to the emergency room? ”

And there was also the invisible psychological imprint left by my illness. Fear of relapse, unprocessed grief, the PTSD demon haunting me for days, sometimes weeks.

You see, we are talking about re-entry in the context of war and imprisonment.

But we don't often talk about it in the context of other kinds of traumatic experiences, such as illness.

Since no one had warned me of the difficulties of atmospheric re-entry, I assumed something must be wrong.

I was ashamed, and with a great sense of guilt, I reminded myself over and over again how lucky I was to be alive when so many, like my friend Melissa, were not.

But most days I woke up feeling so sad and lost that I could hardly breathe.

Sometimes I fantasized about being sick again.

And let me tell you, when you're in your 20s and recently single, you have a lot of good things to daydream about.

(Laughter) But I missed the hospital ecosystem.

Everyone there was broken, just like me.

But here in the living, I felt like an impostor, overwhelmed and unable to function.

I also missed the clarity I felt when I was most ill.

Looking straight at your own mortality can be a way to simplify things and shift your focus to what really matters.

And when I got sick, I swore that if I survived, it must be of some use.

It had to be a good life, an adventurous life, a meaningful life.

But after I am cured, the question is: "how?"

I was 27 and had no job, no partner, no organization.

And this time, there was no treatment protocol or discharge order to guide the way forward.

But what I got was an inbox full of internet messages from strangers.

Over the years, people around the world read my columns and responded with letters, comments, and emails.

As is often the case with writers, it varied.

I got a lot of unsolicited advice on how to cure cancer with essential oils and such.

I had some questions about bra sizes.

But mostly I heard it from people who understood what I was going through in a different way (laughs).

I had a Florida teenage girl, like me, coming out of chemo, write me a message composed mostly of emojis.

A former art history professor from Ohio named Howard told me that for most of his life he's struggled with a mysterious, debilitating health condition he's had since his youth.

We spoke with a death row inmate named Little GQ (short for "Gangster Quinn") in Texas.

He had never been sick for a single day in his life.

He does 1,000 push-ups every morning.

But he did relate to what I described as "crazy" in one column, and the experience of being trapped in a small, fluorescent-lit room.

"I know our circumstances are different, but the threat of death lurks in the shadows of both of us," he wrote to me.

During the lonely first weeks and months of my recovery, these strangers and their words became a lifeline, messages from people from so many different backgrounds, with so many different experiences, all telling me the same thing. It means you can be held hostage by the worst events that have ever happened and have the rest of your days hijacked, or you can find a way forward.

I knew I had to make some changes.

I wanted to free myself and move again to find my way back into the world.

So I decided to embark on a real journey. Not the shitty cancer journey or mythic hero journey that everyone thought I should be on, but a real, packing-up journey.

I put all my possessions in a warehouse, rented an apartment, rented a car, and convinced a very dear but stinky friend to join me.

(laughter) My dog ​​Oscar and I set off on a 15,000-mile road trip around the United States.

On the way we visited strangers who had written to me.

I needed their advice and I needed them to say thank you.

I went to Ohio to stay at a retired professor Howard's house.

Experiencing loss or trauma can create an urge to protect your heart.

But Howard urged me to open myself up to the possibility of uncertainty, new love, and new loss.

Howard's illness will never go away.

And as a young man, he had no way of predicting how long he would live.

But that didn't stop him from getting married.

Howard now has grandchildren and takes weekly ballroom dancing lessons with his wife.

They were celebrating their 50th anniversary recently when I visited them.

In a letter to me, he wrote, "Meaning is not found in the material realm. It is not in dinners, jazz, cocktails, conversations.

Meaning is what remains when everything else is removed. ”

I went to Texas to visit Little GQ, a death row inmate.

He asked me what I did to pass all the time I spent in the hospital room.

When I told him how good I was at Scrabble, he said, "Me too!" He then described how, despite spending most of the day in solitary confinement, he and other inmates in the neighborhood made board games out of paper and called out their plays through the frame of their meals. This is a testament to the incredible tenacity and creative ability of the human mind to adapt.

And my last visit was in Florida, where I went to see a teenage girl who had been sending me a lot of emojis.

Her name is unique. this is perfect. Because she is the most intelligent and curious person I have ever met.

When I asked him what he wanted to do next, he said, "I want to go to college, travel, eat strange foods like octopus, visit New York, and go camping. I'm afraid of bugs, but I still want to go camping."

I was in awe of her being so optimistic and full of plans for the future considering everything she's been through.

But as Unique has shown me, hope is far more radical and dangerous than living in fear.

But the most important thing I learned on that expedition is that there is no division between the sick and the healthy.

The border is porous.

As we live longer and longer through illnesses and injuries that would have killed our grandparents and even our parents, most of us move back and forth between these realms, spending most of our lives somewhere in between the two.

These are the conditions of our existence.

Now, I wish I could say that after returning from the expedition, I was completely healed.

I don't

But once I stopped expecting to be the same as before my diagnosis and accepted my body and its limitations, I actually started feeling better.

And ultimately, I think that's the trick. Stop thinking of our health in terms of the dichotomy between sick and healthy, healthy and unhealthy, perfect and broken. Stop thinking you should aim for beautiful, perfect health. And stop living in constant dissatisfaction until that is achieved.

We all have our lives interrupted at times, whether by a diagnostic tear or other types of heartbreak and trauma that bedeck us.

We need to find a way to live in-between while still managing the bodies and minds we have now.

Sometimes it just takes the ingenuity of a homemade Scrabble game, the discovery of family love and the pared-down meaning of a ballroom dance night, or the radical and dangerous hopes that one day will lead a bug-scare teenage girl to camp.

If you can do that, you've embarked on a true hero's journey.

You have actually achieved what it means to be healthy: to be alive in the messiest, richest, most holistic sense.

Thanks, that's all I have.

(Applause.) Thank you.

(applause)

As you know, I'm very tech shy, and when my daughter, now 41, was 5, I overheard a friend say, "If you don't bleed when you cut, you don't understand Daddy."

(Laughs) So, although the task given to me may be an insurmountable obstacle for me, I will definitely take on the challenge.

What have I heard in the last four days?

This is my third visit to TED.

One was attending TEDMED and the other, you know, was a regular TED two years ago.

I heard a story that I thought was an anomaly, something I'd heard very little in the last two TEDs. It's what's interlaced, interlaced, and mingled with a sense of social responsibility in so many talks. Global responsibility really appeals to enlightened self-interest, but it goes far beyond enlightened self-interest.

One of the most striking things about what some of the speakers, perhaps a dozen or so, said was that if you listened carefully, they weren't saying, "Yes, this is what we should do." This is what I want you to do.

It's like, "This is what I've done because I'm excited, and it's great, and it's done something for me, and of course, it's accomplished a lot."

It is the old concept of philanthropy in its truest sense, the true Greek concept: charity, love of humanity.

And the only explanation I can give you for what you have heard in the last four days is that it actually came out of a form of love.

And this gives me great hope.

And hope, of course, is the subject I should talk about, but I completely forgot about it until I arrived.

And when I did, I thought it would be better to look up this word in the dictionary.

So Sarah and I, my wife, walked four blocks away to the public library on Pacific Street, got the OED, looked it up, and found that there are 14 definitions of hope, none of which sounded right.

And, of course, it deserves it. Because hope is an abstract phenomenon. It is an abstract idea, not a concrete word.

Well, it reminds me of a little surgery.

If you have one operation for your disease, you will know it works.

If you have 15 operations, you'll find that none of them work.

So is the definition of words.

Appendicitis can be cured by removing the appendix.

For reflux esophagitis, there are 15 steps, Joe Schmo does one way, Will Blow does another, and none of them work. This applies to the word “hope” as well.

They all come down to the idea of ​​the expectation that something good is going to happen.

And do you know what I found?

In Indo-European, the root of the word "hope" is K-E-U. It is spelled K-E-U. It is pronounced koi and is the same etymology from which the word curve is derived.

But what it means in its native Indo-European language is to turn around, to go in another direction.

And I find this very interesting and very provocative. Because what you've heard over the past few days is a sense of things going in different directions, specific to the problem.

There are different paradigms.

You've probably heard that term several times in the last four days, and everyone is familiar with the Kufnian paradigm.

So when we think about hope now, we have to think about looking in a different direction than we have seen so far.

There is another explanation of hope that has always intrigued me, rather than a definition. It was in Vaclav Havel's utterly brilliant book Breaking the Peace. In it, he says, hope consists not of the expectation that things will happen exactly, but of the expectation that things will make sense no matter how they turn out.

I can't tell you how relieved I was to hear the last sentence of that great presentation by Dean Kamen a few days ago.

I found him during the session because I wasn't sure if I heard correctly.

He was talking to a very large man, but I didn't mind.

I interrupted and said, "Did you say this?"

“I think so,” he said.

I mean, what is this all about, I repeat.

"The world cannot be saved by the Internet."

That's excellent. Do you know what will save the world?

i'll tell you It is saved by the human spirit.

And by the human spirit I do not mean the divine or the supernatural. Of course, it does not come from this skeptic.

What I mean is this ability that each of us must become greater than ourselves. To rise from our mediocre selves and achieve something we probably thought was impossible at first.

At an elemental level, we have all felt that spirituality during childbirth.

Some of you may have felt it in the lab. Some of you may have felt it on your workbench.

I feel it in concerts too.

I felt it at my bedside in the operating room.

It is what elevates us above ourselves.

And I think it will eventually become an element of the human psyche that we've been hearing bits and pieces of from many speakers over the past few days.

And if there's one thing that permeates this room, it's just that.

I'm intrigued by a concept brought to life by a 27-year-old poet named Percy Shelley in the early 19th century, actually in the 20s of the 19th century.

Well, we all think Shelley is obviously a great romantic poet just like him. Many of us forget that he wrote some perfectly fine essays, but the one that is best remembered is the one called "The Defense of Poetry."

Now, this is about five, six, seven, eight pages long, and it gets pretty deep and difficult around page three, but somewhere on page two, he starts talking about a concept he calls "moral imagination."

And here's a rough translation of what he said: Man, man in general, for man to be a very good man, he must have a clear vision.

He must see himself and the world through the eyes of others, and many others.

See yourself and the world. See not only the world, but also yourself.

What do the billions of people who live in what Laurie Garrett aptly called despair and inequality the other day expect of us?

What do they have the right to ask of us?

What is it that we have the right to ask ourselves from our shared humanity and human spirit?

Well, you know exactly what it is.

There is much debate as to whether we, the Great Nation, should be the world's policemen, the world's police, but there is virtually no debate as to whether we should be the world's healers.

There was certainly no discussion of it in this room for the past four days.

So if we are to be the world's healers, all the underprivileged people around the world, including the United States, will be our patients.

All disadvantaged countries, and perhaps our own citizens, become our patients.

So it's fun to think about the etymology of the word "patient."

It originally comes from the Latin word ``patior'' which means ``to put up with'' or ``to suffer''.

So, going back to the roots of the old Indo-European languages ​​again, what do you find? We spell "P-A-E-N", and hey, mirabile dictu, which is the same root as "P-A-E-N" which is the root of compassion.

So the lesson is very clear. The lesson is that our patients, and the world's and the world's less fortunate, deserve our compassion.

But beyond our sympathy, and far superior to it, is our moral imagination and our identification with each of the individuals who inhabit the world, thinking of them not as giant forests but as individual trees.

Of course, in this day and age, Washington's bush can get in the way, so it's important that each tree isn't hidden.

(Laughter) So that's it.

We should be morally committed to being healers of the world.

And over and over again, we have set the example of people who not only made such dedication, but also had charisma and brilliance. And I think it's easy to use the word great in this room, God, the brilliance to succeed at least in the beginning of the quest, and no doubt it will continue to do so as more and more people join the cause.

Now, if we are talking about medicine, and about healing, I would like to quote someone who has not yet been quoted.

It seems to me that everyone in the world is being quoted here. Pogo is also quoted. Shakespeare has been quoted backwards and forwards.

I would like to quote one of my own home gods.

I don't know what Hippocrates actually said, so I doubt he really said this, but I'm pretty sure one of the great Greek physicians said: It is recorded in one of the books attributed to Hippocrates, which is called "Instructions."

and read out what it is.

Remember, I've been talking about philanthropy at heart. It is the love of humanity, individual humanity, and the individual humanity that can turn that kind of love into action and, in some cases, into enlightened self-interest.

And here he is 2,400 years ago. “Where there is love for humanity, there is love for healing.”

We have seen it here today with our senses and sensibilities, and for the last three days and with the strength of the indomitable human spirit.

thank you very much.

(applause)

I became an inventor by chance.

I retired from the Air Force in 1956. No, it's not. He entered the Air Force in 1956, retired in 1959, and worked at the University of Washington. I read an article in a magazine and got the idea for a new kind of gramophone tonearm.

Well, that was before cassette tapes, CDs, DVDs, and all the great products we have today.

And it was a radial, linear tracking tonearm that extended straight out rather than hinged and rotated as it traversed the record.

It was the hardest invention I've ever made, but it got me started and I got really lucky after that.

Without exaggerating too much, I would like to talk about the invention I brought with me today. It's my 44th invention. No, that's not true either.

I lost completely and completely.

My 44th patent. About the fifteenth invention.

I call this hypersonic sound.

I'll play it back in a few minutes, but before I do, I'd like to give you an analogy.

Whenever I show off this hypersonic sound, people say, "That's really cool, but what's the use of it?"

And I say, "What is the light bulb good for?"

Sound, Light: Let's use an analogy.

This is what Edison did when he invented the light bulb.

Not much has changed.

Light came out from it in all directions.

Before the light bulb was invented, people figured out how to put a reflector behind it to give it a little more focus. Put the lens in front and focus a little better.

Finally, we figured out how to make something like a perfectly focused laser.

Now, imagine what the world would be like if we had a light bulb but couldn't focus the light. With the switch on, you can go wherever you want.

Speakers are like that.

Turn on the speakers and they sound just the way you want them to, even after nearly 80 years of using these devices.

From almost every direction, even when you're standing in front of a megaphone.

There are some differences, but not much.

If lightbulbs were like speakers, unable to focus, sharpen edges, and define, there would be no movies, computers, televisions, CDs, DVDs, etc. And just below the list of what is important to be able to focus the light.

After almost 80 years of sound existence, I thought it was time to find a way to put it where I wanted it.

I have several units.

That guy was a demo I built early yesterday morning for a major Detroit automaker and they want to put a smaller version overhead in their car so they can actually get binaural sound in the car.

What if you could target sound like you target light?

This waterfall was recorded in my backyard.

Well, you won't hear anything unless it hits you.

It will probably bounce around the room if it hits the side wall.

(Applause) It's ringing right next to your ear. is that cool?

(Applause) Time is limited, so I'm going to round up a bit and talk about how it works and what's good about it.

Of course, just like lights, it would be nice to be able to add sound to accent things like clothes racks, cornflakes, toothpaste, and talking plaques in movie theater lobbies.

Sony has an idea -- Sony's biggest customer right now.

They tried to do this in the 60's but were too clever to give up.

But they want to take it seriously.

Inventors have the combination they need.

Some cleverness is required. I'm not a college graduate, but that doesn't mean I'm stupid. Because you can't be stupid and do much in today's world.

Too many smart people out there. So.

I just happened to be educated in a slightly different way.

I am not against education at all.

I think that's great. I think people sometimes forget that when they get an education. We become so smart that we don't want to focus on what we know better than ourselves.

And we live in wonderful times now because almost everything is being explored anew.

I have a little slogan that I use a lot. That is, "virtually nothing has been invented yet."

We are just getting started.

We are just beginning to really discover the laws of nature, science and physics.

I hope this is just part of it.

Sony has reclaimed the vision to keep itself on track: when you're in line at the supermarket checkout, you'll be watching new TV channels.

They know that when they watch TV at home, they have so many options to change channels that they may miss commercials.

151 million people line up in supermarkets every day.

Well, they tried this a few years ago and failed. Because Checker got tired of hearing the same message every 20 minutes and reached out to mute the sound.

And, as you know, if it doesn't sound, it usually doesn't sell.

For example, movies are shown while you are on an airplane and you can watch them for free. You pay when you want to hear the sound.

So ABC and Sony have come up with a new one that will be Safeways first when you get in line at the supermarket. It's Safeways. They're trying this now in three parts of the country - you'll be watching TV.

And I hope they're sensitive to not wanting to offend you with another outlet.

But, as you can see from the tests done so far, the beauty of this is that if you don't want to hear it, you can take a step to the side and you won't hear it.

In other words, we create silence just as much as we create sound.

An ATM that speaks to you. no one else has heard of it.

I sit in bed at 2am and watch TV. Your spouse or someone is sleeping next to you. I can't hear, I can't wake up

It also works on noise canceling such as snoring and car noise.

I've been really lucky with this technology. When I was ready, suddenly the world was ready to accept it.

They literally cut their way to our door.

We have been selling it since September and October last year, and it has been very well received.

If you're curious about the price -- we're not selling it today -- but this unit comes with the electronics and everything and is about $1,000 when you buy it.

By this time next year, it's expected to cost hundreds and hundreds of dollars to buy.

No more expensive than regular electrical appliances.

Well, when I played it for you, you didn't hear a roaring bass.

This unit I've played goes above the audible range from about 200 Hertz.

In fact, it emits ultrasound (low-level ultrasound) equivalent to approximately 100,000 vibrations per second.

And the sound you're hearing is emitted into the air in front of it, unlike a normal speaker where all sound is emitted from the face.

As we have always been taught, air is not linear.

Just a little more volume, just over 80 decibels. Then suddenly the air starts to interfere with the signal you propagate.

Here's why. The speed of sound is not constant. It's pretty slow.

It varies with temperature and pressure.

Now, without getting too technical, imagine me creating a small sine wave in the air here.

Well, increasing the amplitude too much will affect the pressure. This means that the wave propagation velocity changes during the generation of the sine wave.

Audio, as we know it, is all about trying to be more and more perfectly linear.

Linearity means higher quality sound.

Hypersonic sound is the opposite, based on 100% non-linearity.

The effect is an effect that occurs in the air and corrupts the emitted sound (ultrasound in this case), but is very predictable so that very accurate audio can be generated from it.

Now the question is where is that sound coming from?

It is not made in the face of a cone, but in literally billions of tiny discrete dots along this narrow cylinder in the air, so when I point it at you, what you hear is made right next to your ear.

I said I could shorten the pillars or spread them out to cover the sofa.

You can have one ear hear one speaker and the other ear hear the other speaker. It's just a binaural sound.

When I listen to stereo on my home system, I hear both speakers in both ears.

Sometimes, when I turn on the left speaker, I notice that the sound is also coming out of my right ear.

So the stage is more limited, a soundstage that should be spread out in front of you.

Because sound travels in the air along this pillar, it does not obey the inverse square law, which states that sound decreases by about two-thirds every time the distance doubles. For example, 6 dB every time you go from 1 meter to 2 meters.

I mean, if you go to a rock concert or a symphony orchestra, suddenly the people in the front row are on the same level as the people in the back row.

Isn't that amazing?

So, as I say, we've been very successful and very lucky for companies to catch this vision from cars. Automakers want to have a stereo system in the front for children and another system in the back. Oh no, the kids aren't driving today.

(Laughter) I was watching to see if you were listening.

Actually, I haven't eaten breakfast yet.

There may be a stereo system for mom and dad in the front and a small DVD player for the kids in the back. Parents don't want to be bothered with rap music or anything like that.

Again, this idea of ​​being able to place sounds wherever you want is starting to become very popular.

It also works for data transmission and communication.

It also works 5x more effectively underwater.

We have the military -- we've just deployed some of these to Iraq, where we can put fake military movements on hillsides 400 meters away.

(Laughter) Or you can whisper a Bible verse into the ear of a suspected terrorist.

(laughs) I'm serious. They have an infrared device and when they are playing this you can see their facial expressions and see the temperature change by 1 Kelvin from 100 yards away.

So we can expect another way to determine who is friendly and who is not.

Use this to build a version that emits 155 decibels.

Pain is 120.

So you can still communicate with people from nearly a mile away, and even if there's a public beach right next door, people may not even know it's on.

We are currently selling these to the military for about $70,000 and they are buying them as fast as we can make them.

We put it in a turret with a camera and when they shoot you you are there and it is there.

There are many other inventions.

I invented a plasma antenna to change gears.

One day, I was working on a ground penetrating radar project, and I looked up at my office ceiling and the physicist CEO came up to me and said,

It uses very short wavelengths.

I'm having an issue where the antenna rings.

Using very short wavelengths will cause the antenna to resonate like a tuning fork, leaving more energy coming out of the antenna than backscattered from the ground you are trying to analyze, taking too long to process. ”

“Would you like to make an antenna that exists only when you want it?”

turn it on; turn it off.

That's a refined fluorescent tube."

I just sold it for $1.5 million in cash.

After it was declassified and the patent issued, I took it back to the Pentagon and told the people there about it. Then they laughed. And when I brought the demo home, they bought it.

(Laughter) Has anyone ever worn Jabber headphones, those little cell headphones?

It's my invention. I sold it for $7 million.

It was a big mistake. It just sold for $80 million two years ago.

In fact, I drew this on my little-poor Mac computer in my attic, and one of the many designs they have now is the same one I drew a long time ago.

I mean, as an inventor, I was really lucky.

I'm the happiest person you've ever met.

And my father died before anyone in the family could hopefully realize that they might create something out of themselves.

It was a great audience. I know I jumped all over the place.

I usually get what I'm talking about when I'm in front of the group.

One last quick demo from this guy for those who haven't heard it yet.

You never know if it's on.

Raise your hand if you haven't heard.

do you have it there?

Please call the photographer.

OK, then.

I have a Coke can opening in your head. cool.

Thank you again.

I appreciate it very much.

Crowd shouts. Lion roar. metal collision.

Since 80 AD, these sounds have echoed in the stands of the Colosseum.

Hundreds of days a year, more than 50,000 Roman residents and tourists from all over the Roman Empire filled the four floors of the stadium to watch gladiatorial duels, animal battles and chariots racing around the arena.

And in the grand finale, the arena basin was flooded with water, submerging the biggest spectacle, the naval battle stage.

The Romans' epic simulated maritime encounters, called Naumachia, began during the reign of Julius Caesar in the 1st century BC, more than 100 years before the Colosseum was built.

These were held alongside other underwater shows in natural and man-made waters around Rome, starting with Emperor Flavius ​​Vespasian, who started building the Colosseum on the site of the lake in 70 AD.

The Colosseum was meant to be a symbol of Roman power in the ancient world, but what better way to demonstrate that power than with a body of water that can be drained and refilled at the command of an emperor?

Flavian Titus, son of Vespasian, used the spoils of war to complete his father's dream in 80 AD by completing the Colosseum (then known as the Flavian Amphitheater).

The grand opening was celebrated with 100 days of spectacular festivities and gladiatorial matches, setting the precedent for a program that included parades, musical performances, public executions and, of course, gladiatorial combat.

Unlike competitions in small amphitheaters funded by wealthy Romans, these extravagant displays of imperial power were financed by the emperor.

The parade of rare animals, theatrical performances, and the awe-inspiring Naumakie were all designed to increase faith in the god-like emperor, who would be declared a god after his death.

How engineers flooded the arena to create this watery effect is still a mystery.

Some historians believe that the giant aqueduct was converted into a stadium.

Some believe that the system of rooms and locks used to drain the arena was also used to fill it.

These rooms are filled with water prior to the event and then opened to submerge the stage in over a million gallons of water, potentially five feet deep.

But even with all that water, the Romans had to build miniature boats with special flat bottoms that wouldn't damage the floor of the Colosseum.

These boats ranged from 7 to 15 meters in length and were built like the famous Encounter ships.

During the battle, dozens of these ships floated around the arena, crewed by gladiators disguised as the opposing sides of a reenacted battle.

These warriors dueled across ships. Board them, fight, drown, and neutralize your opponents until only one faction survives.

Fortunately, not all of the watery displays tell such gruesome tales.

In some of these floods, the submerged stage allowed the charioteer to glide over the water as if he were a Triton, making waves as he maneuvered the chariot over the sea.

Animals walk on water, myths are recreated by death row inmates, and at night, naked synchronized swimmers perform under torchlight.

But the Colosseum's aquatic age didn't last forever.

The naval battle proved so popular that Emperor Domitian gave it a dedicated lake nearby in the early 90s AD.

A larger lake proved even more advantageous to the Naumatie, and the Colosseum was soon equipped with a series of underground animal cages and trapdoors to prevent further flooding.

However, for a short period of time, Emperor Flavian dominated warfare and water currents in spectacular displays of power.

I'm a celestial mechanic. Like Rich Parnell in the movie The Martian.

And my job is to study and predict the motion of objects in space.

We currently track about 1% of dangerous objects in orbit. This is dangerous to services like geolocation, agriculture, banking, television, telecommunications, and soon, very soon, even the Internet itself.

Today, these services are unprotected from roughly half a million objects ranging from paint flecks to school buses.

A reasonably fast-moving speck of paint that hits one of these objects can render it completely useless.

But it can't track something as small as a speck of paint.

We can only track small things like smartphones.

So out of this 500,000 objects that we should be concerned about, we can only track about 26,000.

And of those 26,000, only 2,000 actually work.

Everything else is garbage.

That's a lot of garbage.

To make matters worse, most of what we launch into orbit never returns.

You send a satellite into orbit, it stops working, runs out of fuel, and you send another...

Then send something else...

Then something else.

And sometimes two of these objects can collide with each other, or one of them can explode, or worse, someone happens to destroy one of the satellites in orbit, which creates even more debris, most of which never returns.

Now, these things aren't just randomly scattered in orbit.

Given the curvature of space-time, it turns out that there are ideal places to put some of these satellites. Think of these as space highways.

Much like highways on Earth, these space highways can only hold the maximum amount of traffic to maintain safe operations in space.

Unlike highways on Earth, there are no traffic rules in space.

nothing, okay?

oh.

What could go wrong with this?

(Laughter) Now, what's really cool is that if you have something like a space traffic map like Waze for Space, you can look at it and see what the current space traffic situation looks like, and maybe even predict it.

But the problem is asking five different people, "What's going on in orbit?"

You'll probably get 10 different answers.

why is that?

Information about what is in orbit is also not shared with the public.

So what if there was a globally accessible, open and transparent space traffic information system that could tell the public where everything is to keep space safe and sustainable?

And what if this system could be used to shape evidence-based codes of conduct—traffic rules in space?

So I developed ASTRIAGraph, the world's first crowdsourced space traffic monitoring system, at the University of Texas at Austin.

ASTRIAGraph combines multiple sources of information from government, industry and academia around the world and expresses this in a common framework accessible to everyone today.

Here you'll see 26,000 objects orbiting the Earth and multiple opinions, updated in near real time.

But let's get back to the problem of space traffic maps. What if we only had information from the U.S. government?

Then the space traffic map would look like this:

But what will the Russians think?

It looks a lot different.

who is right? who is wrong?

What should I believe?

what should i believe?

This is part of the problem.

Without this framework to monitor the actions of cosmic agents, monitor activity in the universe where these objects reside, reconcile these discrepancies, and generalize this knowledge, we are actually in danger of losing our ability to use space for the benefit of humanity.

thank you very much.

(applause and cheers)

Cheryl Shade: Hello, Amy. Amy Mullins: Hello.

SS: Amy and I wanted to talk a little bit, and I wanted you to tell us what makes her such a distinctive athlete.

AM: Well, if you've seen my little bio picture, you may have already figured out that I'm a double amputee and was born without a fibula on either leg.

I was amputated when I was 1 and have been running frantically here and there ever since.

SS: Well, why don't you tell us how you got to Georgetown? Why not start there?

Why not start there?

AM: I'm a senior in Georgetown's diplomatic service program.

I won a full scholarship when I graduated high school.

Each year they select three students from all over the country to participate in international affairs, so I won a ticket to Georgetown and stayed there for four years. I love it.

SS: When Amy got there, she thought she was kind of interested in track and field, so she decided to call someone and ask about it.

So why not tell that story?

AM: Right. Well, I think I've been involved in sports all my life.

I have been playing softball for 5 years since I was a kid.

I was passionate about skiing all through high school, but in college I got a little restless because I hadn't done anything sporty for a year or two.

And I never competed at the disabled level. I was always competing with other able-bodied athletes.

That's all I ever knew.

In fact, I hadn't even met another amputee until I was 17.

And when I heard that they were doing track events like this for all runners with disabilities, I thought, "Oh, I don't know about this, but let's see what it's like before we judge."

So I booked a plane ticket to Boston in 1995. Nineteen years old at the time, he was definitely a dark horse candidate for this race. I've never done it before.

A few weeks before this event, I went out on a gravel road to see how far I could run, and running 50 meters out of breath was enough.

And I had my wood-plastic composite feet attached with Velcro straps—I wore big, thick, five-ply wool socks—you know, not the most comfortable ones, but they were all I had ever known.

And I'm in Boston, facing people with legs made of carbon graphite, shock absorbers, and everything else. And they're all looking at me like, 'Okay, I know who can't win this race.

And I mean, I climbed there expecting, I don't know what I was expecting, but when I saw a man who had lost one leg, went up in the high jump, jumped on one leg, and jumped over the high jump at 6'2...

Dan O'Brien jumped 5:11 at Atlanta in '96. If you compare this, without limiting yourself to the word "athlete", they are truly accomplished athletes.

So I decided to give this a try. I ran a race for the first time with my heart pounding, and beat the Japanese record holder by 3/100th of a second, becoming the new Japanese record holder in my first attempt.

And people said, 'Amy, you have speed, you have natural speed, but you don't have the skill or the subtlety to go that route.

you were all over the place

We all saw how hard you worked. ”

So I decided to call Georgetown Track Coach.

And thank God I had no idea how great this guy was in the world of athletics.

He has coached five Olympians, and his office is lined from floor to ceiling with National Certificates of every athlete he has coached.

He's just a pretty scary person.

And I called him and said, "Listen, I ran one race and won..."

(Laughter) "I'd like to see if I can do it. I'd like to see if I can join your practice, what kind of practice you're doing, etc."

That's all I wanted. Just two exercises.

"Can I sit down and see what you're doing?"

And he said, "We should meet first before we decide anything."

He wonders, "What am I into?"

So I met the man, walked into his office, and saw posters and magazine covers of the people he mentored.

And then we got to talking and it turned out to be a great partnership. Because he had never coached an athlete with a disability. So he had no preconceptions about what I could or could not do, and I had never been coached.

So it was like, 'Okay, let's start this trip.

So he started giving me lunch breaks and free time four days a week, and I started coming to the track and training with him.

That's how I met Frank.

It was the fall of 1995. But when winter came, he said,

You can run on the women's track and field team here. ”

And I said, "No, come on."

And he said, "No, no, really. I can do it."

You can run with our women's track and field team. ”

In the spring of 1996, I joined the women's track and field team with the goal of making it to the US Paralympics team in earnest in May.

And no one with a disability had ever run at the college level before.

I don't know about that, but it started to become an interesting mix.

SS: Well, on the way to the Olympics, some memorable events happened in Georgetown.

why don't you tell them?

AM: Yes. And I knew I was training in Georgetown and had to get used to seeing the back of all these women's shirts. I'm playing the next Frojo, and they're all looking at me like, 'Hmm, what's going on here?'

And when you step out in the Georgetown uniform, you realize that to get better - and I'm already the best in the country - you have to train with people who are inherently better than you.

And I got out there and got to the Big East, which is kind of the end-of-season championship race.

It was really, really hot.

That was the first -- I had just gotten a new pair of legs in the bio, and I didn't know at the time that I sweated this much in my socks -- it actually acted as a lubricant, kind of pistoning in my socks.

And at about 85m into the 100m dash, I broke out of my legs in glory.

I almost slipped out in front of a crowd of about 5,000 people.

And I was, I mean, just frustrated. Because I was on 200 and it was over in 30 minutes.

(Laughter) I said to my coach, "Please, don't let me do this."

I can't do this in front of all those people. Your feet will come off.

And if it goes off at 85 degrees, you can't go 200 meters.

And he just sat there like this.

Thankfully my plea was not heeded.

As you know, the man is from Brooklyn. he is a big man He says, 'Amy, what do you do if your leg falls off because of that?

You pick it up, put it back together, and finish that damn race! ”

(Laughter) (Applause) And I did. So he kept me in line.

he got me on the right track.

SS: So Amy is very excited to be competing in the 1996 Paralympics. It's hard for her family to fall.

Has it been two years since you started running?

AM: No, one year.

SS: One year. And why not tell them what happened right before you left for the race?

AM: Okay, well, Atlanta.

Briefly, the Paralympics are the Olympics for the physically disabled: amputees, cerebral palsy, and wheelchair athletes, as opposed to the Special Olympics, which are for the mentally handicapped.

Well, one week after the Olympics and Atlanta, here I am. Exactly one year ago, I am amazed at the fact that I could not go out on a gravel road and run 50 meters.

And here I am - never get lost.

I was confident that I would set a new record and come home with a gold medal at the U.S. Olympic trials that May.

I was the only one with so-called "bilateral BK", that is, below the knee.

I was the only woman doing the long jump.

When I was just doing the long jump, a man who had lost both legs came up to me and said, ``How do we jump?

I said, "Well, I just did it. Nobody told me that."

So the funny thing is, I was 3 inches away from the world record and from that point on I kept running. In other words, you are enrolled in the long jump. Have you registered?

No, I did the long jump and the 100m.

And I'm sure of it, you know?

I decorated the front page of my hometown newspaper that I delivered for six years.

As if now was my time to shine.

And we're at the practice warm-up track a few blocks from the Olympic stadium.

These legs that I was wearing, I'm going to take them out now. I was the first person in the world to wear these legs.

I was a guinea pig, let me tell you, this was kind of about tourist attractions.

Everyone was taking pictures - "What is this girl running?"

And I'm always looking around, where are my competitors?

This is my first international competition.

I tried to get it out of everyone I could, you know, "Who am I playing here?"

"Oh, Amy, I'll get back to you on that."

I wanted to find out the time.

"Don't worry, you are doing well."

This was 20 minutes before the race at the Olympic stadium and they set up the heat seats. And I'll go and see

And my fastest time is 15.77 seconds, which is the world record.

Then check that the next lane, lane 2, is 12.8.

Lane 3 is 12.5. Lane 4 is 12.2. "What's going on?" I said.

And they squeezed us all into the shuttle bus and every woman there lost one hand.

(Laughter) So I'm just like, they're all looking at me like, 'Which one of these isn't like the other?' You know?

I'm sitting there thinking, "Oh my god, my god."

Whether it was scholarships or five gold medals in skiing, I never lost anything. I was first in everything.

And Georgetown, it was great.

Even though we lost, it was the best training since it was Atlanta.

It's the best result here and it's definitely going to be a big loss.

And you know, I'm just thinking, "Oh my god, my whole family got in a van and drove all the way here from Pennsylvania."

And as you know, I was the only female sprinter in the United States.

So they approached us and, you know, "Hey guys, give me a minute."

And when I put down the blocks, I just remember being terrified because I heard a murmur above the crowd that I could see from people close enough to the starting line.

And I'm like, "I know! Look! This is wrong."

And we believe this is the last card to play here. If I'm not going to beat them, I'm going to mess with their heads a little bit, you know?

(Laughter.) So me vs. Germany definitely felt like Rocky IV, and other countries (Estonia and Poland) were in this heat.

Then the gun went off and all I remember is finishing last and holding back tears of frustration and an unbelievable, unbelievable, just overwhelming feeling.

And I had to think, 'Why did I do this?

I was like, if I could win it all -- but what does that mean?

All this training changed my life.

I became a college athlete. I became an Olympian.

And it really got me thinking about how that accomplishment got there.

In other words, exactly 1 year and 3 months ago, with the goal of becoming an Olympian, I said,

And the fact that I asked for help, how many people jumped at it?

How many people have given their time, expertise and patience to deal with me?

And that was this collective glory. You know, there were 50 people behind me who were part of the amazing experience of going to Atlanta.

So I now apply this kind of philosophy to everything I do. In other words, sit back and realize your progress and recognize how far you are toward this goal today.

While it's important to focus on your goals, I think it's also important to recognize the progress you've made and how you've grown as a person.

I think that's the result. That's the real achievement.

SS: How about showing your legs?

AM: Oh, sure.

SS: Well, show me some legs.

AM: Well, these are my beautiful legs.

(Laughter) No, this is my leg makeup and it's really beautiful.

must come and see.

They have hair follicles and can paint their toenails.

And seriously, I can wear heels.

You don't understand what it means to be able to go to a shoe store and buy whatever you want.

SS: Do I have to choose my height?

AM: To be precise, you have to choose your height.

(Laughter) Patrick Ewing, who played for Georgetown in the '80s, comes back every summer.

And since he came in with a leg injury, it was constant fun teasing him in the training room.

I said, "Stop! Don't worry.

It can grow to be 8 feet tall. just take it off ”

(Laughter.) Anyway, I didn't think he was as humorous as I was.

Now, these are my sprint legs, and like I said, they're made out of carbon graphite. You should check if you have the correct socket.

No, there are a lot of legs here.

Do these really want to keep it?

It's another leg that I have for tennis, softball, etc.

It has a shock absorber, so when you jump, you will hear a pleasant "whooshing" sound. have understood.

And this is the silicone sheath. Roll this over and keep it on. When you sweat, the piston movement starts from there.

SS: Are they different heights?

AM: With this?

SS: In here.

AM: I don't know. i don't think so.

Maybe a little taller. I can actually wear both.

SS: She really can't stand on these legs. She has to move, so...

AM: Well, I definitely have to move, and balance is a bit of an art for them.

But I don't have silicone socks, so I'll try them on.

So I ran in these and shocked half the world.

(Applause.) These are supposed to simulate real-world form when a sprinter runs.

If you've ever seen a sprinter, the only thing that reaches the track is the ball of your toes.

So when you stand on this leg, your hamstrings and glutes contract just as if you had feet and were standing on the ball of your toes.

(Audience: Who made it?) AM: A company in San Diego called Flexfoot.

And I was a guinea pig. I would like to continue participating whenever new forms of prosthetic limbs appear.

But actually, as I said earlier, these are still real prototypes.

It was everywhere in the last competition, so we need to get a new one. You know, it was like a big one and it came full circle.

Moderator: Aimee and her designers will attend TEDMED 2 and talk about their designs.

AM: Yes, I will.

SS: Yes, then.

AM: So these are the sprint legs and you can put the other leg in...

SS: Could you tell me who designed your other leg?

AM: Yes. I got these in a place called Bournemouth, England, about 2 hours south of London, and I'm the only one in the US who has them, but they're so beautiful that it's a crime.

I'm not saying it's because of my toes or anything else.

For me, I am a serious athlete on the track, but off the track I want to be feminine. I think it is very important not to be restricted by any ability, such as mobility and fashion.

I mean, I love the fact that you can go anywhere and choose what you want, which is the shoes and skirts you want, and I want to bring them here and make them available to as many people as possible.

They are also silicone.

This is a really basic prosthetic leg.

This bottom is like Barbie's feet.

(laughs) Yes. I have to wear 2 inch heels because I can't move in this position.

And I mean, it really -- take this off.

I don't know how good it looks, but it really does.

The feet have blood vessels, the heels are pink, and the Achilles tendon moves a little.

And it's a really great store. I got it a year and two weeks ago.

And this is just a silicone skin.

So what happened was, two years ago, this man in Belgium said, "When you can go to Madame Tussauds and see Jerry Hall look so lifelike, even the color of his eyes, why can't you make human limbs that look like legs, arms and hands?"

In other words, they are making ears for burn victims.

They're doing great things with silicon.

SS: Two weeks ago, Amy was an Arthur Ashe nominee on ESPY.

And she came into town, hurried about, and said, "I must buy new shoes!"

An hour before ESPY, she thought she bought 2 inch heels when she actually bought 3 inch heels.

AM: And this is a problem for me. Because you will be walking like that all night long.

SS: 45 minutes. Luckily the hotel was great.

They had someone come and take off their shoes.

(Laughter) AM: I said to the receptionist -- I mean, I'm just in a hurry, but Cheryl's by my side -- "Look, is there anyone here who can help me?"

Because I have this problem..."At first they were going to ignore me,"I'm sorry if you don't like the shoes."It's too late. ”

"No, no, no, no. I have a special foot that requires a 2" heel. My heel is 3".

I need to rest for a while. ”

They didn't even want to go there.

They didn't want to touch it. they just did it.

Wow, those legs are amazing!

In fact, I plan to come back in a few weeks to get some improvements.

I can't wear them with sneakers, so I want to make a foot like this for flat feet so that I can wear sneakers.

So... Host: That's it.

SS: Amy Mullins.

(applause)

I mean, asking for help is basically the worst, right?

In fact, I've never seen it on the top 10 list of things people fear, like public speaking or death, but I'm pretty sure it does.

While it's foolish in many ways to be afraid to admit that you need help, whether it's from a loved one, friend, co-worker, or even a stranger, actually asking for help somehow always feels a little uncomfortable and embarrassing. Of course, that's why most of us try to avoid asking for help whenever humanly possible.

My father was one of many fathers who vowed to drive through alligator-infested swamps rather than ask someone to help them get back on the road.

When I was a kid we took a family trip.

We drove from our home in Southern Jersey to colonial Williamsburg.

And I remember we were really lost.

My mother and I begged him to pull over and ask someone for directions back to the highway, but he adamantly refused, in fact asserting that we weren't lost, we just wanted to know what was here all along.

(Laughter.) So if we're going to ask for help, and we should, we all do it almost every day. The only way to start getting used to it is to get better at it, increasing your chances of actually saying yes when you ask someone for help.

Not only that, but they will actually find it satisfying and rewarding to help you. Doing so will motivate them to continue helping you in the future.

So, a study that I and some of my colleagues conducted revealed why people sometimes say "yes" to our requests for help, while others say "no."

Now, let me tell you, if you need help, you have to ask for it.

OK？

We all suffer to some degree from what psychologists call the “illusion of transparency.” So basically it's the false belief that your thoughts, feelings, and needs are obvious to others.

This is not true, but we believe it is.

So most of the time we just stand by for someone to notice our need and volunteer to help with it.

This is a really, really bad assumption.

In fact, not only is it very difficult to communicate what your needs are, even people close to you often struggle to understand how they can support you.

In fact, my partner used to ask me, "Are you okay? Do you need anything?" multiple times a day.

Because I'm very bad at signaling when I need someone's help.

Now he is more patient than I would expect, and far more willing to help than any of us have the right to expect from others.

So if you need help, you have to ask for help.

By the way, even if someone tells you that you need help, how do you know that you want it?

Have you ever tried to unilaterally offer help to someone who turned out not to have wanted your help in the first place?

They get mean quickly, right?

Truth be told, my teenage daughter was getting dressed for school the other day, and I decided to help her about it without asking.

(laughs) I think she looks better in bright colors.

She tends to prefer darker, more neutral tones.

So I kindly suggested that she go back upstairs and try to find something a little more sober.

(Laughter.) So if looks were life-giving, I wouldn't be standing here right now.

You can't blame others for not volunteering their help without knowing it was actually wanted.

In fact, research shows that 90% of the help co-workers give each other in the workplace is in response to an explicit request for help.

Therefore, the words "I need help" must be said. right?

There is no way around this.

Now, to get better, there are a few other things that are very helpful to remember to make sure people actually help you when you ask for help.

First of all, when asking for help, be very specific about what you want and why.

A vague, sort of indirect request for help isn't really very helpful to the helper.

We don't really know what our customers want from us. And, just as importantly, we don't know if we'll be able to help our customers.

No one wants bad help.

Chances are you've had a few of these requests from totally hilarious strangers on LinkedIn who, like me, want to "socialize over coffee" or "scratch your brain".

I literally ignore these requests every single time.

And it's not that I'm not a nice person.

I'm not interested when I don't know what you want from me or what kind of help you expect from me.

no one is.

I would have been more interested if they had come out of me and said whatever they wanted to get out of me. Because I'm sure they had something specific in mind.

Say something like, "I'd like to discuss an opportunity to work for your company," "I'd like to propose a joint research project in your field of interest," or "I'd like advice on getting into medical school."

Strictly speaking, I'm not that kind of doctor, so I can't help you with the last question, but I can refer you to someone who can.

Okay, second tip.

This is very important. Avoid disclaimers, apologies and bribes.

Really, really important.

Do any of these sound familiar?

(clears throat) "I'm really sorry for asking you to do this."

"I really don't want to bother you with this."

"If there is a way to do this without your help, I will."

(Laughter.) Sometimes when people ask you for help, they want to prove they're not weak and greedy, and they feel like they're completely missing out on how much you're making them feel uncomfortable.

By the way, if you really don't like asking me for help, how can I be happy to help you?

It's perfectly fine to pay strangers to do things for you, but you have to be very careful about motivating your friends and colleagues.

When you're in a relationship, helping each other is actually a natural part of the relationship.

That way we can show each other that we care about each other.

Putting incentives and payments in there can make it feel like a transaction, not a relationship.

And it's actually experienced as distancing, ironically making people less likely to help you.

So it's perfectly fine to voluntarily give a gift to show your gratitude and appreciation after someone has given you some help.

The offer to pay your best friend to help you live in your new apartment is not.

OK, the third rule, this is what I really mean. Do not ask for help by email or text message.

Seriously, please stop.

Emails and text messages are impersonal.

Sometimes we have no other choice, but most of the time we want to ask for help via email or text message. Because it feels less awkward to do so.

What else is less awkward than emails and text messages?

Say no.

And it turns out there is research to back this up.

Asking for help in person is 30 times more likely to get a yes than asking for help by email.

So when something is really important and you really need someone's help, make a facetime and make a request or use your cell phone as a phone (lol) ask for the help you need.

OK。

The last one is actually very important and probably the most overlooked one when asking for help. Ask someone for help, and if they say yes, then follow up.

There is a common misconception that the act of helping others is what makes them worthwhile.

Not true.

The rewarding part of helping is knowing that your help was successful, impactful, and effective.

If you don't know how my help has affected you, how should you feel about it?

This happened; I was a college professor for many years and wrote a lot of letters of recommendation to people encouraging them to get a job or go to graduate school.

Probably 95% of them have no idea what happened.

Now, how do you feel about the time and effort you put into it when I had no idea if I helped you or if it actually helped you get what you wanted?

In fact, this idea of ​​feeling effective is part of what makes certain donor appeals so compelling. Because by donating, you can clearly imagine what kind of effect your help will have.

Consider something like DonorsChoose.

When you go online, you can choose individual teachers by name to help you in your classroom by literally purchasing the specific items the teacher requested, such as microscopes and laptops and flexible seating.

This makes it easier for people to imagine how their money will help them, and you can feel the immediate impact the moment you commit to donating.

But do you know what else they do?

they follow up.

Donors actually receive letters from children in the classroom.

they receive a photo.

They come to know that they have made a difference.

And this is something we all need to do in our daily lives, especially if we want to keep helping people long-term.

Take the time to tell your colleagues that the help they gave you led to a big sale or the interview you really wanted.

Take the time to let your partner know that the support they gave you helped them get through the tough times.

Take the time to tell your cat sitter that this time, for some reason, they're really glad they didn't break anything in your absence, so they must have done a really good job.

The bottom line is, I know, believe me, asking for help is not easy.

We are all a little afraid to do it.

It makes us feel vulnerable.

But the reality of modern work and modern life is that no one does it alone.

No one succeeds in a vacuum.

In fact, more than ever, we need to rely on others, their support and cooperation, to succeed.

So when you need help, shout out for help.

And when you do, do it in a way that increases your chances of getting a yes and makes them feel great that they helped you. Because you both deserve it.

thank you.

"Who is there?"

This question whispered in the dark begins a tale of intrigue, deceit and moral ambiguity.

And in a play where everyone hides something, the answer is never simple.

Written by William Shakespeare between 1599 and 1601, Hamlet depicts the eponymous character haunted by the past but stuck in the future.

Just months after his father's sudden death, Hamlet returns home from school as a stranger, with no idea what lurks in the shadows.

But his worries change when a ghost with his father's face visits him.

The ghost claims to be the victim of "the most vile murder" and convinces Hamlet that his uncle Claudius usurped the throne and stole the heart of Queen Gertrude.

The prince's grief turns to anger, and he plots revenge against the new king and his conspirators.

The play is a tragedy of a strange kind, lacking the sudden brutality and all-consuming romance that characterize Shakespeare's other works in this genre.

Instead, it delves into the depths of the protagonist's indecision and the tragic consequences it has.

The ghostly revelation leaves Hamlet in multiple dilemmas. What should we do, who can we trust, and what role can we play in the process of justice?

These questions are compounded by the entanglement of characters, forcing Hamlet to negotiate with friends, family, legal counsel, and romantic partners, many of whom have ulterior motives.

The Prince is always procrastinating and wondering how to deal with others and how to exact his revenge.

This may annoy Hamlet no less, but it also makes him one of the most human characters Shakespeare has ever created.

Instead of rushing into things, Hamlet becomes engrossed in the terrifying intrigues of thought itself.

And over the course of the play, his endless questions come to reverberate in our own heads.

To achieve this, Shakespeare uses the most introspective language.

From a usurped king's fiery musings about heaven and hell, to the prince's own gleeful meditations on mortal destiny, Shakespeare uses melancholy monologues to breathtaking effect.

This is perhaps best expressed in Hamlet's most famous declaration of anxiety. "To be or not to be, that is the question. Is it nobler in mind to suffer the slings and arrows of exorbitant fortunes, or to take up arms against a sea of ​​troubles and end them by opposing them?"

This monologue embodies Hamlet's existential dilemma: torn between thought and action, unable to choose between life and death.

But his endless questions raise yet another unease. Is Hamlet's madness part of the performance to confuse his enemies, or are we seeing characters on the brink of madness?

These questions weigh heavily on Hamlet's interactions with every character.

And he spends so much of the play inward that he often fails to see the destruction left behind.

He is especially cruel to Ophelia, the doomed lover who has been driven insane by the prince's erratic behavior.

Her fate is an example of how tragedy could have easily been avoided, demonstrating the ramifications of Hamlet's damaging psychological games.

Premonitions of similar tragedy are constantly overlooked throughout the play.

In some cases, this oversight is caused by deliberate blindness, such as when Ophelia's father ignores Hamlet's disturbing behavior as mere love sickness.

Tragedy can also result from deliberate duplicity, such as when mistaken identity leads to further bloodshed.

These moments leave us with the uncomfortable knowledge that tragedy stems from human error, even if our mistake was to leave things undecided.

For all these reasons, perhaps what we will never question is Hamlet's humanity.

But we always have to think about who the 'real' Hamlet is.

Is he a noble son who avenges his father?

Or a mad prince wreaking havoc in the court?

To act or to observe, to doubt or to trust?

who is he? why is he here

And who is waiting in the dark?

Most of the forest lives in the shadow of the giants that make up the highest canopy.

These are the oldest trees, with hundreds of children and thousands of grandchildren.

They keep in touch with their neighbors, sharing food, supplies, and the wisdom they have gained over the years.

They do all this with their roots in place, unable to speak, reach out, or move around.

The secret to their success lies beneath the forest floor, where a vast root system supports towering trunks.

Cooperating with these roots are symbiotic fungi called mycorrhizae.

These fungi have numerous branched filamentous hyphae that together form the mycelium.

The mycelium spreads over a much wider area than the root system of a tree and connects the roots of different trees.

These connections form a mycorrhizal network.

Through mycorrhizal networks, fungi can pass resources and signaling molecules between trees.

We know that the oldest trees have the most connections to other trees and have the largest mycorrhizal networks, but tracking these connections is incredibly complex.

That's because there are about 100 species of mycorrhizal fungi, each tree may be colonized by dozens of different fungi, each fungus connects to a unique set of other trees, and each has its own fungal associations.

To understand how matter flows through this network, let's zoom in on sugars moving from an adult tree to an adjacent sapling.

Sugar's journey begins high above the ground, in the foliage of the tallest tree above the canopy.

The leaves use the abundant sunlight available to produce sugars through photosynthesis.

This essential fuel travels through the tree in thick sap to the base of the trunk.

From there, the sugar flows down to the roots.

Mycorrhizal fungi encounter root tips and either surround or invade the outer cells of the root, depending on the type of fungus.

Fungi, like trees, require sugar for fuel, but cannot produce sugar.

However, they can collect nutrients from the soil much more efficiently than tree roots and pass those nutrients to tree roots.

In general, substances flow from more abundant to less abundant or from source to sink.

This means that sugars flow from the roots of the tree into the hyphae of the fungus.

When sugars enter the fungus, they travel along the hyphae through intercellular pores or special hollow transporter hyphae.

The fungus takes up some of the sugars, but some goes further and invades the roots of neighboring trees, which grow in the shade and have less opportunity to photosynthesize sugars.

But why do fungi carry resources from tree to tree?

This is one of the mycorrhizal network mysteries.

It makes sense for fungi to exchange nutrients and sugars in the soil with trees, which is a win-win.

Being part of a network between trees, this fungus may benefit in some less obvious ways, but exactly how it isn't entirely clear.

Perhaps the fungus benefits from connecting with as many different trees as possible, maximizing connections by shuttling molecules between trees.

Alternatively, plants may reduce their contribution to the fungi if the fungi do not promote exchange between trees.

Whatever the reason, these fungi carry an incredible amount of information between trees.

Through mycorrhizae, trees can learn whether nutrients and signaling molecules are coming from members of their own species.

They can even find out when information comes from close relatives such as siblings and parents.

Trees can also share information about events such as droughts and insect attacks through fungal networks, resulting in increased production of protective enzymes by neighboring trees to prepare for threats.

Forest health depends on these complex communications and interactions.

Everything is so deeply interconnected that what affects one species will inevitably affect another.

How can we investigate the viral flora around us and use it for medical purposes?

How do you turn the collective knowledge of virology into a single, simple, handheld diagnostic assay?

I want to translate everything we know today about detecting viruses and the different viruses out there into, say, a small chip.

When we started thinking about this project, how to create a single diagnostic assay to screen for all pathogens simultaneously, there were some problems with the idea.

First, viruses are very complex, but they evolve very quickly.

This is a picornavirus.

Picornavirus -- This includes the common cold and polio.

You are looking at the outer shell of the virus. The yellow part here is the very rapidly evolving part of the virus, and the blue part is not evolving very fast.

When considering the creation of panviral detection reagents, it is usually a rapidly evolving problem. Because how can you detect something that is constantly changing?

But evolution is about balance. Where there is rapid change, there is also superconservation, which changes little.

So I investigated this a little more carefully and I'm going to show you the data.

This is just a fraction of what you can do on your computer from your desktop.

I took a lot of small picornaviruses like the common cold and polio and split them up into smaller pieces.

So I took the first example called the Coxsackie virus and split it into smaller windows.

And if another virus shares identical sequences in its genome with that virus, we color these small windows blue.

These sequences here (not coding for proteins, by the way) are almost completely identical in all of them, so we can use this sequence as a marker to detect a wide range of viruses without having to create anything individually.

Well, there's a lot of diversity here and things are evolving rapidly.

We see slower evolution and less diversity here.

Now, by the time we get here, let's say the Acute Bee Paralysis Virus -- probably a bad virus if you're a bee -- this virus bears little resemblance to the Coxsackievirus, but I can assure you that the most conserved sequences among these viruses on the right side of the screen are in the same region here.

Therefore, by simply selecting the DNA or RNA elements of these regions and expressing them on the chip as detection reagents, we can encapsulate these regions that are ultra-conserved throughout evolution, how these viruses evolved.

OK, that's what we did, but how do we do it?

Well, for a long time since I was in graduate school, I've been making DNA chips, that is, printing DNA on glass.

And that's what we see here. Since these tiny salt spots are just DNA stuck to glass, thousands of them can be placed on glass chips and used as detection reagents.

We took the chip to Hewlett-Packard and used an atomic force microscope to observe one of these spots. Then this is what you actually see. Here you can actually see the DNA strands lying flat on the glass.

So what we're doing is printing DNA on glass -- little flat things -- that become markers for pathogens.

Well, I'm building a little robot in my lab to manufacture these chips. And we are passionate about spreading technology.

If you have enough money to buy just a Camry, you can build a Camry too. So we've put a detailed how-to guide on the web, essentially ordering off-the-shelf parts and completely free.

You can assemble a DNA array device in your garage.

Here we will explain the very important emergency stop switch.

(Laughter) Every important machine has a big red button.

But it's actually pretty sturdy.

In fact, you can make a DNA chip in your garage and decipher the genetic program pretty quickly. It is very fun.

(Laughter) So what we've done, which is a really cool project, is that we just started by making a respiratory virus chip.

I talked about the situation of going to the clinic and not being able to get a diagnosis.

Well, we basically put all the human respiratory viruses on one chip and added the herpes virus just in case.

The first thing we do as scientists is make sure things work.

So what we've done is take tissue culture cells, infect them with different viruses, take the material, fluorescently label the nucleic acid (mostly viral material) that is the genetic material that comes out of these tissue culture cells, stick it on an array, and see where it sticks.

If the DNA sequences match, they stick together and the spots become observable.

And if the spots glow, you know that a specific virus is present there.

Here's what one of these chips actually looks like, and those red spots are actually signals from the virus.

And each spot represents a different virus family or virus species.

This makes things hard to see, so we encode things as small barcodes grouped by family so that we can see the results in a very intuitive way.

What we did was take tissue culture cells and infect them with adenovirus. You can see this little yellow barcode next to the adenovirus.

And, similarly, they were infected with parainfluenza-3, the paramyxovirus. You can see a small barcode here.

I also did research on respiratory syncytial virus.

This is a preschool disaster, basically like nasopharyngemia.

(Laughter) You can see that this barcode belongs to the same family, but it's not like Parainfluenza 3, which causes a very bad cold.

So each virus gets a unique signature, or fingerprint.

Polio and rhino: They belong to the same family and are very closely related to each other.

A rhino is a cold, we all know what polio is, and we know these symptoms are different.

And Kaposi's sarcoma-associated herpesvirus is showing great signs here.

So it's not streaks or anything to indicate that you're infected with a particular type of virus here. A barcode represents the whole.

Yes, I saw rhinovirus. Here's a zoomed-in view of the small bar code of the rhinovirus. But what about another rhinovirus?

How do I know which rhinovirus I have?

There are 102 known variants of the common cold, but there are only 102 because people got tired of collecting them. New varieties are born every year.

Here are four different rhinoviruses. It can be seen that each of these barcodes can be distinguished visually without the use of computer pattern matching recognition software algorithms.

Now, this is kind of cheesy. Because I know what the gene sequences of all these rhinoviruses are, and in fact I specifically designed a chip to be able to distinguish between them. But what about rhinoviruses that have never seen a gene sequencer?

I'm not sure what that order is. Just drag it out of the field.

Here are four rhinoviruses we never knew existed. No one has ever parsed those arrays. You can also see that you get unique and distinguishable patterns.

You can imagine building a library of fingerprints for essentially any virus, real or virtual.

But it's also about shooting fish in barrels, right?

There are tissue culture cells. Viruses are in abundance.

What about real people?

As you know, you can't control real people.

I have no idea what someone coughs into the cup, and it's probably very complicated, right?

There can be many bacteria, there can be multiple viruses, and there is certainly host genetic material as well.

So how do we deal with this?

And how do we do a positive control here?

Well, it's very simple.

This is me during the nose wash.

And the idea is to experiment with inoculating people with the virus.

By the way, this is all IRB approved. they got paid.

And basically, we experimentally inoculate people with the cold virus.

Or, even better, get people with undefined community-acquired respiratory tract infections out of the emergency room right away.

You never know what will come in through the door.

So let's start with a positive control where the person is known to be healthy.

They injected the virus into the nose, let's see what happens.

Day zero: Nothing happens.

they are healthy They are clean, it's amazing.

In fact, I thought that even if I was walking around in good health, my nasal passages were full of viruses.

It's pretty clean. If you're healthy, you're pretty healthy.

Day 2: A very robust rhinovirus pattern was obtained. It is very similar to what you get when you do tissue culture experiments in the lab.

That's great, but it's still a cheesy shot, right?

I injected a large amount of virus into this man's nose. So -- (laughter) -- I mean, we wanted it to work. He had a real cold.

But what about people coming in from the street?

Here are two individuals represented by anonymous ID codes.

They both have rhinovirus. I have never seen this pattern in the lab.

We have sequenced some of their viruses. They are actually new rhinoviruses that no one has even seen.

Remember that with the evolutionarily conserved sequences we use in this array, we select for those that are conserved through evolution, so we can detect novel or uncharacterized viruses.

Here is another man. You can play the diagnostic game yourself here.

These different blocks represent different viruses in this Paramyxovirus family, so you can go down the blocks to see where the signal is.

Well, I don't have canine distemper. That's probably a good thing.

(Laughter) But by the time we get to 9 blocks, we'll find the RS virus.

Maybe they have children. And you can also see related family members. RSVB is shown here.

It is wonderful.

This is another individual sampled on two separate days. I visited the clinic repeatedly.

This individual is infected with parainfluenza-1, and you can see small streaks of Sendai virus here. This is mouse parainfluenza.

The genetic relationship is very close there. That's a lot of fun, isn't it?

So we developed a chip.

We have created a chip with every known virus ever discovered.

why not? Any plant virus, any insect virus, any marine virus.

All that can be obtained from GenBank, the national repository of sequences.

I am using this chip now. And what are you going to use it for?

First of all, when you have such a big chip, you need a little more informatics, so we designed a system to do automatic diagnostics.

And since we never get a sample of every virus, the idea is simply to have a hypothetical pattern. It's virtually impossible. But you can take a hypothetical pattern, compare it to what you observe (which is a very complex mixture), and come up with some kind of score as to how likely it is that this is a rhinovirus or something.

And this is what it looks like.

For example, if you used a cell culture that is chronically infected with papilloma, it's read a bit here by the computer and the algorithm probably says it's papilloma type 18.

And in fact, that's what these particular cell cultures are chronically infected with.

Now let's do something a little more difficult.

A buzzer was installed in the clinic.

When someone shows up, they call us when they don't know what to do because the hospital can't diagnose.

That's the idea and we're setting this up in the Bay Area.

And this case report happened three weeks ago.

We are a 28 year old healthy female. No travel history, [unintelligible], does not smoke or drink.

Ten days of persistent fever, night sweats, bloody sputum, hemoptysis, and muscle pain.

She went to the clinic, was put on antibiotics and sent back home.

She came back after ten days of fever, right? Still feverish, hypoxic, not getting enough oxygen in the lungs.

They did a CT scan.

Normal lungs are pretty dark and black here.

All this white stuff is bad.

The formation of trees and shoots of this species indicates that there is inflammation. You may have an infection.

OK. There, the patient was treated with third-generation cephalosporin antibiotics and doxycycline, which was ineffective on day 3 and progressed to acute failure.

She needed to be intubated, so they put a tube down her throat and started putting her on a ventilator.

She could no longer breathe on her own.

what next? don't understand.

Switch antibiotics: So they switched to another antibiotic, Tamiflu.

It's unclear why she thought she had the flu, but switched to Tamiflu.

And on day 6 they basically threw in the towel.

If there are no other options, an open lung biopsy is done.

Just following this procedure has an 8 percent mortality rate. So basically, what do we learn from it?

You're looking at her open lung biopsy.

I'm not a pathologist, but this doesn't tell me much.

All I can say is that it's bronchiolitis and the swelling is terrible.

It's "not obvious," that's what pathologists report.

So what were they testing her for?

Of course, they have their own tests and have tested her with over 70 different tests including SARS, Metapneumovirus, HIV, RSV and all types of commercially available bacterial, fungal and viral tests.

All the test results were negative, requiring more than $100,000 in testing.

I mean, they did their best for this lady.

And they called us basically on the 8th day of hospitalization.

They gave us an endotracheal aspirate - you know, a little liquid from the throat from this tube they put in there - and they gave us this.

put it on the chip. what do we see? Well, we saw Parainfluenza-4.

So what exactly is Parainfluenza 4?

No one tests for parainfluenza-4. nobody cares.

In reality, it's not so ordered.

I just tried to put them in order.

There is little epidemiology or research on it.

No one knew it could cause respiratory failure, so no one thought about it.

why? mere tradition. No data. There are no data to support whether it causes severe or mild illness.

Obviously, there are cases where healthy people are sick.

OK, this is one case report.

In these two minutes, I'll tell you one last thing that hasn't been made public. It will be published tomorrow. This is an interesting example of how this chip can be used to find new things and open new doors.

prostate cancer. You don't have to show a lot of statistics about prostate cancer. Most of you already know: it's the third leading cause of cancer death in the United States.

While there are many risk factors, there is also a genetic predisposition to prostate cancer.

For perhaps about 10 percent of prostate cancers, there are people who are predisposed to it.

And the first gene mapped in this early-onset prostate cancer association study was this gene, called RNASEL.

what is that? It is an antiviral defense enzyme.

So we're sitting and thinking, 'Why do men with mutations that are defective in the antiviral defense system get prostate cancer?'

That makes no sense -- unless the virus exists?"

So we placed the tumors on the array. There are currently over 100 tumors.

And we know who has defective RNASEL and who doesn't.

Here is the signal from the chip. Also shown is the blocking of retroviral oligos.

And what I'm telling you from the signals here is that men with tumors who have mutations in this antiviral defense enzyme often have a 40 percent chance of having the signature of a new retrovirus.

OK, that's pretty wild. what is that?

So we clone the whole virus.

First of all, I would like to say that a little automatic prediction turned out this virus to be very similar to a mouse virus.

But this doesn't tell us much, so let's actually clone the whole thing.

What is the genome of the virus I'm showing you here?

This is a classic gamma retrovirus, but something completely new. no one has seen it.

In fact, its closest relative is of mouse origin, and since it infects species other than mouse, we will refer to it as a xenotropic retrovirus.

Here is a small phylogenetic tree showing how it is related to other viruses.

We have done this with many patients and I would say they are all independent infections.

They all carry the same virus, but are different enough that there is reason to believe that each was acquired independently.

Is it really in the organization? And I'm done with this: yes.

We take biopsy slices of these tumor tissues and use the material to actually localize the virus. And here we find cells containing virus particles.

These people really have this virus.

Does this virus cause prostate cancer?

What I am saying here does not imply causation. don't know.

Is it related to carcinogenesis? don't know.

Are these people just more susceptible to the virus?

can be And it may have nothing to do with cancer.

But now it has become a door.

A strong association has been found between the presence of this virus and genetic mutations associated with cancer.

That's where we are.

So, I suspect it will raise more questions than answers, and that's what science is good at.

This was all done by people in the lab, most of which I can't take credit for.

This is a collaboration between me and Don.

This is the person who started the project in my lab and is doing prostate research.

thank you very much. (applause)

How can we get people involved in solving global warming?

I'd like to start by running two short experiments with you.

So your job is to notice if you feel any difference when I'm talking.

OK？

please.

Carbon dioxide levels are rising and are currently around 410 ppm.

Rapid decarbonization is needed to avoid the RCP 8.5 scenario.

The global carbon budget with a 66% chance of reaching the 2 degree target is about 800 gigatonnes.

(Laughter) Okay, so let's try something else.

We are headed for an uninhabitable Earth, with massive storms, murderous floods, devastating wildfires, and freak heat waves that cook us under the scorching sun.

2017 has already surprised climate scientists with unexpected warmth.

Emissions reductions have a grace period of three years. Three years.

Otherwise, we will soon be living in a boiling earth - hell.

OK. So -- (applause) So here's your challenge. How did you feel when you heard these ways of speaking?

The first is perhaps isolated or just confused?

what is this guy talking about?

The other is scary or just numb?

So again, the question I asked. How can we get people to participate in solving global warming?

And why don't these two methods of communication work?

As you know, the biggest obstacle in dealing with climate change is between our ears.

Building on my rapidly growing foundation in psychology and social science, I spent years researching five inner defenses that keep people from engaging.

When people hear news about the climate, they immediately think of their first defense: distance.

When we hear about climate, we hear about something far out in space. Think Arctic ice and polar bears. It is far away in time. Think of the year 2100.

It's a huge, slow movement - think gigatons, centuries.

That's why I'm not here. Not now.

It's so far away that it feels like you're outside your sphere of influence and you feel helpless.

There is nothing I can do.

In everyday life, most of us like to think about things close to us, like work, children, and the number of Facebook likes we have.

Well, that's true.

The next defense is doom.

Climate change is usually seen as an imminent disaster with losses, costs and casualties.

It terrifies us.

But once the initial fear is gone, my brain quickly tries to avoid the topic altogether.

After 30 years of horrifying information about climate change, more than 80% of media articles still use the disaster paradigm, but people have grown accustomed to it and desensitized to its catastrophic overuse.

Many of us are currently numbed by too much breakup porn and suffer from a kind of terminal fatigue.

The third defense is dissonance.

Now, when our knowledge that our use of fossil fuels contributes to global warming is inconsistent with what we do—ride cars, fly planes, and eat beef—the so-called cognitive dissonance sets in.

This is felt as an inner discomfort.

We may feel like hypocrites.

To get rid of this discomfort, our brain starts coming up with justifications.

For example, you can say, "My neighbor, he has a much bigger car than I do."

Or, "There's no point in changing my eating habits, even if it's just me."

Or you might be tempted to question climate science itself.

“The climate is always changing,” he says.

So while these justifications make us all feel better, the cost is to deny what we know.

Therefore, actions determine attitudes.

Recognizing that I flew from Oslo to New York and back to Oslo to talk about the climate creates my own personal cognitive dissonance.

(laughs) 14 minutes.

(Laughter.) So I want to move into denial.

(Laughter.) So if we remain silent, ignore or ridicule the facts about climate change, we may be able to find inner refuge from fear and guilt.

Denial does not actually come from a lack of intelligence or knowledge.

No, denial is a state of mind in which we may know some troubling knowledge, but live and act as if we did not.

So you could call it a kind of knowing-not-knowing double life, but often this is reinforced by other people, my family, my community, who have agreed not to bring up this thorny topic.

Finally identity.

Sensing the danger, climate change activists are demanding that governments take action, either through regulation or a carbon tax.

But consider, for example, what happens when people with conservative values ​​hear from an activist that the government should expand further.

Especially wealthy Western democracies are less likely to believe in that science.

How is it?

For example, if I had conservative values, I would probably prefer a big, decent car and a small government to a tiny little car and a huge government.

And if climate science comes along and says the government should expand more, I probably wouldn't trust that science too much.

In this way, cultural identity begins to overwrite facts.

Values ​​eat up facts, and my identity always trumps the truth.

So, after recognizing how these five D's stifle engagement, how can we move beyond them?

New research shows how to flip these five defenses into key success criteria for more brain-friendly climate communication.

This is the really exciting point, where we find the 5 S's, 5 evidence-based solutions that show what works.

First, distance can be turned social.

We can make climate change feel close, personal, and urgent. It can be achieved by propagating positive social norms for solutions.

My friends and neighbors, if you believe you can do something, so will I.

For example, this can be seen from rooftop solar panels.

They spread like viruses from neighbor to neighbor.

it is contagious.

This is the power of peer-to-peer to create a new normal.

Then you can turn Doom into something supportive.

Rather than counterproductive paradigms such as disasters and costs, climate can be reframed as relevant to human health. For example, a delicious plant-based burger is good for you and the climate.

We can also reframe climate as being about new technology opportunities, safety, and new jobs.

For example, solar power jobs are experiencing incredible growth.

The number of employees has just passed the 3 million mark.

Psychology tells us that in order to generate engagement, we need to present a balanced set of three positive or supportive frameworks for each climate change threat we mention.

That way you can turn cacophony into simpler action.

This is often called nudging.

The idea is that better choices in architecture can make climate friendly behavior the default and convenient.

Let me explain this. Take food waste home with you.

Slightly smaller plates and boxes can significantly reduce food waste at buffets. A small plate will appear full, but a large box will appear half-empty, so put more plates in it.

Therefore, smaller plates make a big difference in reducing food waste.

And there are hundreds of smart nudges like this.

Importantly, dissonance decreases as more behaviors are coordinated.

You can then reverse the negativity by adjusting the signals that visualize your progress.

You can provide motivating feedback on how well you're solving problems.

Imagine improving your transportation footprint or reducing energy waste in your building.

One app that does a good job of sharing this is Ducky.

The idea is that if you record your actions there, you can see how well your team or company is doing, so you get real-time signals.

Finally identity.

You can flip your identity with a better story.

Our brains love stories.

So we need better stories about where we all want to go, and we need more stories of heroes and heroines in all positions to make real change.

I am proud that my hometown of Oslo has embarked on a bold journey to electrify all transport: cars, bikes and buses.

One of the people spearheading this effort is Christina Boo.

She has been president of the Electric Vehicle Association for many years and struggles every day.

Britain, France, India and China have also announced plans to end the sale of fossil cars.

That's a big deal.

And in Oslo, you'll find avid EV owners telling their friends and neighbors stories about electricity and taking them along.

In other words, we come full circle from story and back to social.

That's why thousands of climate communicators around the world are now starting to use these solutions.

But while it is clear that individual solutions alone will not be enough to solve the climate problem, they build stronger bottom-up support for possible policies and solutions.

That's why it's so important to attract people.

I started this story by testing two methods of communicating climate to you.

There is another way, so I would like to share it.

It starts with reimagining climate itself as living air.

Climate is not really an abstract, distant climate far away from us.

It's the air that surrounds us.

This air, the air that is moving in my nose right now that I can feel in this room.

This air is the skin of our planet.

It's amazingly thin compared to the size of the Earth and the universe it protects us from, and much thinner than an apple skin when compared by diameter.

It may look endless when you look up, but the beautiful, breathable air is only eight to seven miles thin and fragile like enveloping a giant ball.

Within this skin, we are all intimately connected.

The breath you just breathed in contained about 400,000 of the same argon atoms that Gandhi breathed in his entire life.

Within this thin, fluctuating, unstable membrane, all life is nourished, protected and held.

It insulates and regulates the temperature just right for water and life as we know it, and the clouds that mediate between the blue ocean and the black eternity carry all the billions of tons of water the soil needs.

Air fills rivers, churns water, and waters forests.

While there are good reasons for feeling fear and despair due to global weather anomalies, we may first grieve over today's dire circumstances and losses, and then look to the future with sober eyes and determination.

The new psychology of climate action is not about science, but about letting go of the sticks of abstraction and fatalism and choosing to tell new stories.

These are stories about how we achieve drawdowns and reverse global warming.

These are stories of the steps we take as people, cities, businesses and public bodies to take care of our air despite strong headwinds.

These are the stories of the steps we take to establish who we are as humans, who we are as earthlings in this living air.

thank you.

(applause)

Natalie McMaster: I want to start here briefly with a little music. (Applause) (Music) (Applause) Thank you! (Applause.) I took off my shoes to dance, but I may explain that later.

Anyway, I... where do I start?

Well, I'm really looking forward to talking a little bit about my own musical background, family, and everything else. But I'm even more excited to hear a little bit more about Donnell's amazing family and perhaps how we met or something like that. But for those of you who don't know my background, I'm from Cape Breton Island, Nova Scotia, Eastern Canada, a very musical island with musical roots in Scotland. And all traditions, dances and languages ​​are sadly disappearing in Cape Breton.

The traditional language is Gaelic, but much of the music comes from Gaelic, in dancing, singing, and everything else, and although my lineage is consistently Scottish, my mother and father were two very musical dudes.

When I was five years old, my mother taught me to dance. When I was 9, my father taught me to play the fiddle.

My uncle is a very famous Cape Breton violinist.

His name is Buddy McMaster, a really great guy, and we have a great tradition in our house called square dancing, we had parties at our house and neighbors' homes, we had great parties, and you talk about Kitchen Celine.

First of all, kayrid means party in Gaelic, but kitchen parties are very common in Cape Breton, basically someone dropping by a house. No matter what house you go to in Cape Breton, there's a fiddle there. And, first of all, Cape Breton has more fiddle players per capita than anywhere else in the world, so chances are good that someone walking in your door will play it, and you'll have someone come to your house. Inviting them to play a song and what a little party started, someone danced, someone sang, and all that stuff, so it was a great, great way to grow up, and that's the beginning of my musical beginnings: my environment, my family, my lineage itself, and, oh, I've done so much with my music.

I have recorded many CDs.

I was nominated for a Grammy and won some awards and stuff, so that's great, but the best part was meeting my husband. In fact, I've known Donnell for probably 12 years. I'm going to talk a little bit about how music brought us together, and now I'd like to introduce you to my new husband, Donnell Leahy, dated October 5th. (Applause) (Applause) Donnell Leahy: Thank you. It's my first time at TED and I'm happy to be here. But I'm just trying to put it all together and get your understanding. It's been a while since I came here, and my understanding is deepening little by little.

So I asked Natalie, what should I do?

And she said, "Just talk about yourself."

It's a boring story, but I'll tell you a little bit about my family. I grew up on a farm, one of 11 siblings living in Lakefield, Ontario, an hour and a half northeast of Toronto.

My father and mother raise beef cattle and I am the eldest son.

I have 4 girls who are a little older than me.

We grew up without TV.

People find it strange, but for us it was a big blessing.

We had a TV for several years, but of course we gave it away because it wasted a lot of time and we weren't getting the job done.

We grew up playing together. As it happens, my mom is from Cape Breton.

Mom and Natalie's mother knew each other. We grew up playing and used to dance together.

(Laughter) We grew up playing a lot of music, playing by ear, and I think that's important to us because we haven't been exposed to a lot of different styles of music.

We learned to play an instrument, but we didn't watch TV, we didn't listen to much radio, so we had to come out or come out from within. We went to church sometimes, went to school, did farm work, played music. So I think we were able to develop a style of ourselves at a very important age, myself and a style that my mother played and my father played and that came from the Ottawa Valley in Ontario, we call it the French Canadian style, but it has its origins in the logging camps.

Years ago, hundreds of men went camping in northern Ontario and Quebec for the winter. They all had different cultures, Irish, French, Scottish, German, and of course playing cards, step dancing and playing the fiddle at night. And over the years, the Ottawa ballet fiddle has evolved, and so has the Ottawa ballet step dance. I mean, I started out in that style. I started doing my own thing right away, then I met Natalie and got exposed to some great Cape Breton fiddle playing.

That's how we met. (laughter) You tell them. (laughter) NM: Do you want it or don't you? (laughter) Well, I think I have to now.

Well, what's really interesting is that Donnell's upbringing was very similar to mine. I actually saw Donnell play when I was about 12 years old. He and his family came to Inverness, about 45 minutes from where I lived. So I was just blown away, it was really great. You'll soon find out why you're here. But I was playing the violin and I couldn't believe my mom was with me. And she said, -- Donnell's mom came over, and when she stood on stage and danced with the kids, she said, 'That's Julie McDonnell, I used to dance with her when I was a kid.

After 12, uh, 20 years, she hardly thought her children would get married, but anyway, so, after 7 years, I don't know, I got a call. I was 19, a freshman or sophomore in college, and it was Donnell. He said, "Hi, you probably don't know me, but my name is Donnell Leahy."

And I said, 'I know you.

I have your tape at home. ”

Then he said, "Well, I'm in Truro," and he invited me to dinner.

that's it. (Laughter.) (Applause.) So—shall we continue? (laughs) (laughs) Then we dated for 2 years, broke up for 10 years, got back together and got married. (Laughter) (Applause) DL: Anyway, we're running out of time, so let's get to the point.

play music for you

It's actually a Scottish piece that I chose.

Start with slow air.

In Europe air was played at burials, and the procession was led by a piper or fiddler as the body was carried from the wake to the burial ground.

I'm going to play a short part right away and then go into some crazy songs that are very difficult to play when you're not warmed up. So if I fail, pretend you like it anyway. It's called The Banks.

(tuning) (laughter) (music) (applause) NM: Well, let's play together now. (Applause.) We were laughing because, you know, our styles are completely different.

So, as you know, Donnell and I are writing new music that we can actually play together, but we don't have them ready yet.

I just started yesterday. (laughs) Anyway, we're going to play something together.

NM: One more minute.

(audience reaction) DL: You start. NM: No, we have to start. Because I have to do what I have to do.

(music) NM: It's out of tune. hold up.

(Tuning) NM: I feel like I'm doing duck or bird pose right now. (laughter) (music) (audience clapping) (applause) Announcer: Great news. I'm late downstairs.

You have 10 minutes left.

(Applause) NM: Okay. of course.

I get it.

let her go (Applause) (Tuning) DL: What do you want to play?

NM: Well...

(music) (laughter) NM: Oh, sure.

NM: Not too fast.

(music) (audience clapping along) (cheers) (audience clapping along) (music) (applause) DL: We're going to play the song and Natalie is going to accompany us on the piano.

The Cape Breton piano playing is really great. It's so rhythmic that it's easy to understand.

My mother plays the piano, and she took piano lessons before we had a piano in our house in Cape Breton. Before my mom's family had a piano in Cape Breton, my mom remembered to play rhythms on a board, and on cold winter nights, fiddlers would gather and play, and my mom would beat this board, so when it came time to buy a piano, I bought it in Toronto, had it delivered by train, and had it carried home by horse, horse, and sleigh.

It was the only piano in the area, and my mother said that when the piano arrived, she could basically play it right away because she knew all the rhythms. Anyway, we were able to find a piano last year and bring it home. I purchased it.

It was done across five or six families and was a big deal for us. Years ago, I actually found an old photo of a man and his family.

Anyway, I'm chatting here.

NM: No, I want you to tell me about Leahy.

DL: What about Leahy? (laughter) NM: What can I say— DL: She wants me to tell you— we have a band called Leahy.

I have 11 siblings. We're, uh, what do we tell them? (Laughter) We're open— NM: No surgery.

DL: No surgery, yes.

I had a great opportunity.

We opened for Shania Twain's two-year international tour.

It was a big deal for us. And now that my sisters are all having babies and the boys are all married, we will probably be staying closer to home for a few more weeks.

what can I say? I don't know what to say, Natalie. We, uh... (laughter) (laughter) NM: Is this what marriage is about?

(Applause) I like it. (Applause) (Laughter) DL: Yeah, okay, my family had seven girls, four boys, two fiddles and a piano. And of course, since we were all competing to play the instrument, Mom and Dad made a rule that no one should be kicked off the instrument. We had to wait until it was over, so of course what we do is because when we get on the piano you don't go down to eat and you don't want to give the piano to your brother or sister, they wait and wait and at midnight you'll still be sitting there at the piano, but that was their way of getting us to practice.

Shall we play a song?

NM: It worked. DL: It worked.

This is the final number, featuring Nat on piano.

(music) (applause)

As a robotics engineer, I get a lot of questions.

"When will breakfast be served?"

So I thought the future of robotics would be more like ours.

I thought it would look like mine, so I made eyes that mimic mine.

I've made my fingers dexterous enough to serve me...

baseball.

Such classic robots are built and function on a fixed number of joints and actuators.

This means that its function and form are already decided at the time of conception.

That said, while this arm throws very well, and even hits the tripod at the end, it's not meant to make breakfast per se.

Not so good for scrambled eggs.

At this time, I was struck by a new vision of futuristic robotics: Transformers.

They drive, run and fly, all depending on the ever-changing new environment and task at hand.

Achieving this requires a fundamental rethink of how robots are designed.

So imagine a polygonal robot module. Use that simple polygon to reconstruct multiple different forms to create new forms of robots for different tasks.

In the field of CG, computer graphics, that's no news. It's been around for a while and most movies are made that way.

But if you're trying to build a robot that physically moves, it's a whole new story.

It's a whole new paradigm.

But you've all done this before.

Who hasn't made a paper airplane, a paper boat, or an origami crane?

Origami is a versatile platform for designers.

You can make multiple shapes from a single sheet of paper, unfold and fold it if you don't like it.

You can create any 3D shape by folding from a 2D curved surface. This is mathematically proven.

And what if you had an intelligent seat that could automatically fold into any shape you wanted at any time?

And that's what I've been working on.

I call this robot origami "Robogami".

This is the first Robogami Henshin I made about 10 years ago.

From a flat-sheet robot to a pyramid, back to a flat-sheet, back to the space shuttle.

It is very cute.

Ten years later, along with my group of ninja origami robot researchers (currently about 22), a new generation of Robogami was born. They are a little more effective and do more.

So the new generation of Robogami actually serves a purpose.

For example, this actually moves autonomously across different terrains.

Therefore, it crawls on dry flat ground.

And when it encounters sudden rough terrain, it starts rolling.

It's the same robot, but it activates different sequences of actuators on board, depending on the terrain it encounters.

And when it encounters an obstacle, it jumps over it.

This is done by storing energy in each leg and releasing it to pop like a slingshot.

I also do gymnastics.

yay.

(laughs) So I showed you what a single Robogami can do.

Imagine what they can do as a group.

Together they can tackle more complex tasks.

Each active or passive module can be assembled to create different shapes.

Not only that, you can create different tasks and attack by controlling the folding joints.

The form is creating a new taskspace.

And this time, the most important thing is assembly.

They have to autonomously find each other in different spaces and attach and detach them according to the environment and tasks.

And now you can.

So what's next?

our imagination.

This is a simulation of what you can achieve with this type of module.

We turned our four-legged crawler into a small dog and gave it a small gait.

The same module can actually be used to do something else - a typical classic robot task, the manipulator.

So with the manipulator you can pick up objects.

Of course, you can add modules to lengthen the manipulator's legs to attack and pick up larger or smaller objects, or even add a third arm.

Robogami does not have a fixed form or role.

They can transform into anything, anywhere, anytime.

So how do we make it?

The biggest technical challenge for Robogami is to make it very thin and flexible while still maintaining functionality.

They consist of multiple layers of circuitry, motors, microcontrollers and sensors, all within a single body, and controlling individual folding joints can achieve such soft movements on command.

Robogami is optimized for multi-tasking, rather than a single robot built specifically for a single task.

And this is very important for challenging and unique environments not only in space but also on Earth.

Space is the perfect environment for Robogami.

We can't afford to use one robot for one task.

No one knows how much work we will encounter in space.

What you want is a single robotic platform that can transform to perform multitasking.

What we want is a deck of thin Robogami modules that can transform to perform multiple execution tasks.

Please don't take my word for it. Because the European Space Agency and the Swiss Space Center are sponsoring this very concept.

Here are some images of Robogami reconfigured to explore exotic lands on and off the surface, as well as excavate the surface.

It's not just exploration.

Astronauts also need additional assistance, as they cannot afford to bring interns to the field.

(Laughter) They have to do all the heavy lifting.

It may be simple, but it is highly interactive.

Therefore, we need a robot that simply docks to surfaces as a third arm that facilitates experiments, assists in communication, and holds various tools.

But how can Robogami be controlled outside the space station, for example?

This example shows Robogami holding space debris.

Sight can be manipulated to control vision, but it would be better to transfer the tactile sensation directly to the astronaut's hand.

And what you need is a haptic device, a haptic interface that replicates the sensation of touch.

Robogami makes this possible.

It is the world's smallest tactile interface that can reproduce the tactile sensation right under the fingertip.

This is achieved by moving Robogami on stage with microscopic and macroscopic movements.

By holding this, you can feel not only the size, roundness and lines of the object, but also its hardness and texture.

With this interface right under Alex's thumb, and using it with VR goggles and hand controllers, virtual reality is no longer virtual.

It becomes a concrete reality.

The blue, red and black balls he sees are no longer distinguished by color.

Currently, it is a rubber blue ball, a sponge red ball, and a billiard black ball.

This is now possible.

let me show off

I really hope this goes well as this is the first time it's been performed live in front of a large public audience.

So what you're looking at here is the Anatomy Atlas and Robogami's tactile interface.

Therefore, like all other reconfigurable robots, it multitasks.

It works not only as a mouse, but also as a haptic interface.

For example, I have a white background with no objects.

This means you don't feel anything and you get a very flexible interface.

Now use this as a mouse to approach the skin and muscular arms. Next, feel your biceps, or shoulders.

Now you can see how stiff it will be.

Let's take a closer look.

Let's approach the ribcage.

And as soon as you move over the ribcage and between the intercostal muscles (soft and hard), you can feel the difference in firmness.

believe me

In terms of force transmitted to the fingertips, they are much stiffer.

So I showed a non-moving surface.

For example, what happens when you approach something that moves, like a heartbeat?

what would i feel?

(Applause) This could be your heartbeat.

This could actually be in your pocket while shopping online.

Now you can feel the difference in the sweater you're buying, how soft it is, whether it's actually cashmere, or the bagel you're buying, how stiff or crunchy it is.

This is now possible.

Robotic technology is advancing to become more personalized and adaptable to adapt to our everyday needs.

This unique reconfigurable robot is actually a platform that provides an invisible and intuitive interface that meets exactly our needs.

These robots no longer look like movie characters.

Instead, they will be what you want.

thank you.

(applause)

In 2008, archaeologists found two 9,000-year-old human bones.

There's no definitive way to know what killed these ancient people, but we do know that their bones were infected with a very well-known bacterium.

The ancient Greeks knew its ingestion effect as physis. The Incas called it Chalky Onkey. And the British called it tuberculosis.

Even today, tuberculosis (TB) remains one of the world's leading infectious causes of death, killing more than malaria, HIV and AIDS.

But what exactly is this disease, and how did this pathogen persist for so long?

Mycobacterium tuberculosis, commonly called Mycobacterium tuberculosis, is airborne.

They enter our airways and infect our lungs.

Here, immune cells called macrophages rush to the site of infection and attempt to absorb and destroy invading bacteria.

In many cases, this reaction is sufficient to eliminate the bacteria.

But for people with other medical conditions, from malnutrition and HIV to diabetes and pregnancy, the immune response may not be strong enough to destroy the invaders.

If so, Mycobacterium tuberculosis will multiply within those macrophages and colonize the surrounding lung tissue.

After infecting more cells, the bacteria utilize cytolytic enzymes to destroy the infected tissue, causing chest pain and causing the patient to vomit blood.

Lung damage causes oxygen starvation.

This causes drastic hormonal changes, such as decreased appetite and iron production.

From here, microbes can spread to the skeletal system, causing back pain and limited mobility. It affects the kidneys and intestines and causes abdominal pain. It can even affect the brain, causing headaches and unconsciousness.

These symptoms create the classic image of tuberculosis: weight loss, hacking, bloody coughs and gray skin.

This ghostly appearance earned TB the title of "The White Plague" in Victorian England.

During this period, tuberculosis was considered a "romantic disease" because it tended to affect impoverished artists and poets with weak immune systems.

The apparent symptoms of tuberculosis have even fueled vampire myths.

Despite, or perhaps because of, these unscientific concerns, this period also marked the first advances towards a cure for tuberculosis.

In 1882, German physician Robert Koch identified the cause of the disease as a bacterium.

Thirteen years later, physicist Wilhelm Roentgen discovered X-rays, allowing doctors to diagnose them and track their progress inside the body.

These techniques have allowed researchers to develop reliable and effective vaccines. First for smallpox, in 1921 scientists developed the BCG vaccine to fight tuberculosis.

These developments laid the foundation for the modern antibiotic field, which is now home to the most effective tuberculosis treatments.

However, antibiotics cannot address significant diagnostic complications. About 90% of people infected with tuberculosis show no symptoms.

In such latent infections, tuberculosis bacteria are dormant and may only become active if the immune system is too weak to defend against them.

This makes the diagnosis of tuberculosis very difficult.

And even when properly identified, conventional treatments can take up to nine months, require multiple drugs, and are more likely to have side effects.

This discourages people from completing full treatment, and partial treatment may lead bacteria to develop resistance to these drugs.

The disease is still endemic in 30 countries, most of which face another health crisis exacerbating tuberculosis and creating potential cases.

Worse, access to treatment is difficult in many of these countries, and TB stigma can prevent people from getting the help they need.

Medical experts agree that we need to develop better diagnostics, more effective antibiotics, and more effective vaccines.

Researchers have already developed a urine test that gives results in 12 hours and a new oral treatment that can reduce treatment time by 75%.

We hope that progress like this will finally make tuberculosis a thing of the past.

Leah Chase: Oh, this is beautiful.

Oh, I've never seen such a room and beauty and strength as I do.

It is wonderful. that's right.

It's a beautiful room.

Pat Mitchell: You gave me permission to say your age, but I realized I was trying to make you look a year older.

You are 94 years old.

(laughter) (applause) LC: Yeah, I'm 94 years old.

(Applause.) I mean, at this age, parts start to wear out.

My legs start to get tired.

What my kids always say is, "But nothing happened to your mouth."

(Laughter) So you have to do something, so I move my mouth.

(Laughter) PM: So, Mrs. Chase, the first time we went there, I brought a group of young women working together at TED into the kitchen, and we were all standing, and you were already preparing lunch for hundreds of people on a daily basis, and you looked up at them.

You have to share with this audience what you said to these young women.

LC: Well, I talk to young women all the time, and it's starting to bother me. Because I have come this far.

The women I came with had to work really hard and hard and knew what it was like to be a woman.

They didn't disrespect the man.

And yes, we were not educated as you are today. God, I am so proud to see them receiving such an education.

That's why I worked so hard and tried to get people to use those resources.

So they just don't know their power, and I always tell them, look at my mother, she had 12 girls before she had a boy.

(laughter) You know how I came out.

(Laughter) Now she had 14 children.

She raised 11 of the 14 of us. And until last year we were all still alive and we had a lot of old buddies, but we're still here.

(Laughter) And sometimes we're just cranky, blah blah blah blah, blah blah blah, blah blah, blah blah, blah blah, blah blah blah blah blah blah, but we go on.

And I love looking at women.

You have no idea what it means to me to see a woman in the position you are in today.

I never thought I would see it.

I never thought women could be in the position and position they are today.

That's just powerful.

I had a young woman come to me.

She was an African American woman.

And I said, "So what do you do, honey?"

"I'm a former Navy pilot," she said.

Oh my god, I knew how hard it would be to integrate that navy, and it melted me.

As you know, the Navy was the last one that was actually consolidated, and it was done by Franklin Roosevelt as a courtesy to Lester Granger, an African American I knew very well.

He was president of the National Urban League at the time, and when asked by Roosevelt, he probably wanted to appoint Lester as one of his Cabinet members.

Lester said, "No, I don't want that.

All I want you to do is consolidate that navy. ”

And that's what Franklin did.

Franklin didn't live to do it, but Truman did it.

But when this woman told me, "I've flown bombers, all kinds of planes," just knowing how far she'd gotten was enough to make me melt.

And I said to her, "Well, you could join the space program."

She said, "But Mr. Chase, I'm too old."

She is already over 60 years old, and as you know, she has already crossed the threshold at that time.

(Laughter) I don't want you to fly into the sky when you're 60.

Please stay on the ground.

When I meet with women, and today when they all come to my kitchen, it upsets my daughter Stella, you know.

She doesn't like people in the kitchen.

But that's where I am and you meet me in the kitchen.

So when they come there, they meet all kinds of people.

And what really cheers me up is when I meet a woman on the move.

It's good for me when I meet women on the move.

Well, I'm not one of these flag-waving women.

You won't see me outside waving.

No, I won't.

(laughter) No, I wouldn't do that, and I don't want you to either.

Just be a good woman.

And as you know, my mother taught us...

She was tough on us, so she said, "You know, Leah," and gave us a shield that said, "To be a good woman, you must first look like a girl."

Well, I thought it was girly.

"Please behave like a woman."

I never learned how to do that.

(Laughter) “Think like a man.”

Don't behave like that man now. Think manly.

And "work like a dog".

(Laughter) So we learned it the hard way.

and they told you that.

They told me what women should do.

We have been taught that women control men's behavior.

How you act, they will act too.

So you have to, and I always tell you.

Don't take this guy lightly.

It pisses me off to think that my husband might not be as educated as you, but I still can't take him lightly.

I don't want to live with a rat, so I have to keep him up.

So you want him to be manly and do his thing.

Anyway, always remember he's running on cheap gas.

(Laughter) So fuel him up with cheap gas -- (Laughter) and you got him.

It's just -- (laughter) it's -- PM: Give us a minute to figure it out.

(laughs) LC: When I heard about this young lady before I came out, she was so beautiful and I wished I could be like her. And my husband, the poor darling, we lost him after 70 years of marriage, disagreed on one point. never agreed. Nothing but we got along as he came to understand me and it was just hard because he was so different.

And that woman reminded me.

I said, "If I was like her, Dookie would really love it."

(Laughter.) But I wasn't.

I was always pushy, always on the move, always doing this, and he always came to me and said, "Honey, God is going to punish you."

(Laughter) "You're just not grateful."

But it's not that I'm not grateful, as long as I'm alive I have to keep moving, I think I have to stand up and keep trying to do what I have to do.

(Applause) You can't sit down.

You have to keep trying and keep trying little by little every day.

Every day we will improve little by little.

And that was my whole life.

Well, I had to come to a small country town and do all sorts of things, I had to go fetch water, I had to wash my clothes, I had to do that, I had to do that, I had to pick stupid strawberries, all that stuff.

(Laughter.) Still, my father insisted that we be polite and kind.

that's all.

When I heard what this young lady said, I said, oh, how beautiful she is. "I wish I could be like that."

PM: Mr. Chase, we don't want you to ever change.

There is no question about it.

I will ask.

That's why it's so great to have a conversation with someone who has such a long view -- LC: That's a long time.

PRIME MINISTRIES: In memory of Roosevelt and the person he did the favor to.

What is in your head and heart, and what you have seen and witnessed...

One thing to always remember is that when you opened that restaurant, whites and blacks couldn't eat together in this city.

it was against the law.

Yet in Dookie Chase they did. Please tell me about it.

LC: That's right.

Well, it was my mother-in-law who started this in the first place. The reason was that her husband was sick and had to go out. People in Chicago and elsewhere would call his work Number Runner.

But in New Orleans we are very sophisticated. (Laughter) So it wasn't a number runner, it was a lottery ticket seller.

(Laughter) You know, we added a touch of class to it.

But that's how he did it.

And because he was sick, he couldn't go from house to house picking up customers and doing everything else. So she opened this little sandwich shop. He used to get sick a lot, so she was going to cut the numbers.

He had an ulcer. He's been really sick for a long time.

So she did it without knowing anything. But I knew I could make sandwiches.

Knowing she could cook, she borrowed $600 from the brewery.

Can you imagine starting a business today with $600 and not knowing what you were doing?

And I was always amazed at what she could do.

She was a good money manager.

it's not.

My husband used to call me a bankrupt sister.

(Laughter) "She's going to spend everything you got."

And so will I.

Prime Minister: But you kept your restaurant open during the controversy when people protested and almost boycotted.

I mean, it was a controversial act that you and your husband committed.

LC: It was, and I don't know how I did it, but like I said, my mother-in-law was kind and sweet, and there weren't any African Americans in the police force at the time.

they were all white.

But they came over and she said, "Baby, I'll make you a little sandwich."

So she decided to make them sandwiches.

I would call it a bribe now.

(Laughter) But she was just that kind of person.

She loved doing things for you.

She loved to give

So she would, and maybe that helped us, because no one cared about us.

There was also Jim Dombrowski and Albert Ben Smith, and they started all sorts of things in that restaurant, but nobody bothered us.

So we just did it.

Afternoon: Excuse me.

That day, you told me about the fact that people see restaurants as safe places to gather, especially for those working on civil rights and human rights and working to change the law.

LC: Well, once inside that door, no one bothered you.

The police will never come in and bother you.

So they felt safe coming there.

They could eat, they could plan.

Freedom Riders, that's where we planned all our meetings.

They came over and we served them gumbo and a bowl of fried chicken.

(Laughter.) So I said, I changed the course of America with a bowl of gumbo and fried chicken.

(Applause.) Come on, leaders, let's come in for a bowl of gumbo and some fried chicken, let's talk it over, let's go and do what we have to do.

(Applause.) That's all we've done.

PM: May I send you a list of invites to lunch?

(laughs) LC: Yes, invite me.

Because that's what we don't do.

we're not talking

please come together.

It doesn't matter if you're a Republican, unite.

Story.

And I know those old people.

I was friends with old people like Tip O'Neill and people like that.

They knew how to get together and talk, but you probably wouldn't agree.

that's ok.

But if you talk about it, a good story will come out and you will meet.

And that's what we did at that restaurant.

Oretha's mother, Oretha Haley's mother, ended up planning the meeting.

She was a big shot at CORE.

Her mother worked for me for 42 years.

And she was the same as me.

We didn't understand the program.

No one at our age understood this program and we certainly didn't want our kids in jail.

Oh, it's... oh my god.

But these young men were willing to go to prison for what they believed.

We worked with Thurgood and A.P. Turow and all the NAACP people.

But it was a slow move.

We would still be out here waiting for them to enter the door.

(laughter) PM: Are you talking about Thurgood Marshall?

LC: Thurgood Marshall. But I loved Thurgood.

he was making good moves.

They wanted to do this without offending anyone.

I will never forget the words of A.P. Turow, "But you can't offend the white man.

don't make them angry. ”

But these young people didn't care.

They said, "Go ahead. Ready or not, we're going to do this."

So we had to support them.

These were the children we know, the righteous children.

we had to help them.

PM: And they made a difference. LC: And they made a difference.

It's been hard, but sometimes you do hard things to make change happen.

PM: And you've seen a lot of those changes.

The restaurant became a bridge.

You were a bridge between the past and the present, but you don't live in the past, do you?

You live in the present moment.

LC: That's what we have to tell young people today.

OK, you can protest, but forget the past.

I can't hold you responsible for what your grandfather did.

that's your grandfather

You have to build on it.

Change has to happen.

I can't just sit there and say, "Oh, let's see what they did to us then."

See what they are doing to us now. ”

No, you remember it, but it keeps you going, but you don't harp it every day.

You need to move to make a difference and everyone must participate.

My kids said, 'Mom, don't say anything political.

(Laughter) "Don't say anything political, you know we don't like it."

But today has to be political.

You have to get involved too.

Be part of the system.

See what happens when we fail to be part of the system.

When Morial, a Dutchman, became mayor, the sentiment in the African-American community was different.

We felt part of things.

We now have a mayor.

We feel like we belong.

President Moon tried before the Dutch came.

PM: Mayor Landrieu's father, Moon Landrieu.

LC: Mayor Landrieu's father took a huge risk by putting African Americans in city hall.

He was whipped for a long time for it, but he was far-sighted and did what he knew would help the city.

He knew we had to be involved.

that's what we have to do.

we don't argue about it.

We just keep moving, and Mitch, you know, I always say to Moon, 'You did good things,' but Mitch was bigger than you and did better than you.

When he pulled those statues down, I said, "Boy, you're crazy!"

(Applause.) You're crazy.

But it was a good political move.

When I saw P.T., Beauregard, come down and I was sitting watching the news and suddenly it occurred to me what the hell was this all about.

For me, it wasn't about race. It was a political move.

So I was so furious that I went back to the kitchen the next morning and said, 'Come on, let's go get your pants and go to work.

And that's what you have to do.

You have to move people and move their actions.

It will bring visibility to the city.

So you've got that visibility - go for it, elevate yourself, do what you have to do, and do it well.

that's all we do.

That's all I'm trying to do.

PM: But you have now given the formula for resilience. right?

So you are clearly a prime example of our resilience. So you must be thinking -- LC: I like mental toughness.

I like people who are mentally and physically strong, so maybe that's what's wrong with me.

My favorite general of all time was George Patton.

You know, it wasn't very cool.

(laughs) Prime Minister: That's a surprise.

LC: I have George Patton in my dining room because I want to remember it.

He set himself a goal and was about to set out to achieve it.

he never stopped.

And I will always remember his words. "Lead, Follow or Do Not Disturb."

Now I can't be a leader -- (Applause) I can't be a leader, but I can follow a good leader, but I can't get out of the way.

(Applause.) But that's what you have to do.

(Applause.) If you can't lead, leaders need followers. So if I can help you up, I'm going to ride your coattails, and the coattails I've ridden countless.

(Laughter) Let me eat something nice. you will help me

(Laughter) And that's life.

Anyone can do it, but please join us.

please do something

What we have to do in this city, in every city, moms have to start being moms today.

Look?

They have to start understanding. If you are to bring this child into this world, you must make a man out of this child and a woman out of it, and that requires a certain amount of effort.

It requires sacrifice.

Maybe your nails aren't long or your hair isn't beautiful.

But the child will move on, and that's what you have to do.

We have to focus on education and focus on making these kids understand what it is.

Gentlemen, I hate to say it, but it takes a good woman to do it.

It takes a good woman to do it.

(Applause.) Men can play their part.

After that, I just do what I need to do and take it home, but I will handle the rest.

A good woman can do that.

PM: You heard that for the first time here.

We will take care of the rest.

LC: We can handle the rest.

Thank you very much, Mr. Chase -- LC: Thank you.

PM: Thank you for taking the time out of your day-to-day work in this community.

LC: But you never know what this will do for me.

People from all over the world come to my kitchen when I see these people and get together.

I had a person come from London, and this happened twice.

A man came in first and I don't know why he was like this. Every year the chefs do something called "Chef's Charity".

Well, I happened to be the only woman there and the only African American demonstrating on that stage. And he didn't leave until he saw another woman going up there too.

I won't go up - they're going to carry me up there until you get another woman here.

(Laughter) So they have another person now so I can step down.

But this man was from London.

So after that I found the man in the kitchen.

He came into my kitchen and said, "I have a question for you."

Well, I was going to ask you something about food.

"Why are white men hanging around you?"

(laughs) What?

(laughs) I didn't understand.

He didn't understand it.

I said, 'We are working together.

This is how we live in this city.

I may never go to your house and you may never come to mine.

But we will unite when it comes to work, such as fundraising for this special school.

that's what we do.

And here, another elegantly dressed woman came into my kitchen about a month ago.

"I don't understand what you're seeing in your dining room," she said.

I said, "What do you see?"

She saw whites and blacks together.

that's what we do.

we meet we speak

And we work together and that's what we have to do.

You don't have to be my best friend to work to make your city or country better.

We just have to work together and that's what we do in this city.

We are a strange bunch here.

(laughter) Nobody understands us, but we feed you well.

(laughter) (applause) (cheers) Thank you.

(applause)

We are all trapped in our own heads, our beliefs and understanding of the world limited by that perspective, which means we tell ourselves stories.

right? So we are in this endless data source.

The possibilities are endless, edit or delete.

We choose what we think and what we pay attention to.

we make stories...

Trying to understand what is going on, we all get it wrong.

Because we're all trying to sail with our own warped compasses and have our own baggage, but the story itself is perfectly compelling.

And we all do this, and many of the stories we live by aren't even our own.

The first thing we inherited from our parents when we were young, of course, they also have their own distorted beliefs, dissatisfaction, and lives they didn't live.

And for better or worse, we accept it all and go out into the world thinking maybe we have to be successful in order to be loved. Or that we must always put the needs of others first. Or maybe we have a big secret that we can't tell anyone.

And it's just fiction, just a story, and worrying about what other people think of us will be a lot less once you realize how rare they are.

(Laughter) So I think magic is a good representation of how we edit reality into stories and mistake those stories for truth. I have a 20-year career in the UK directing large-scale psychological experiments on television, now on Netflix.

I also do stage shows.

Actually, my first Broadway show "Secret" is coming up.

just throw it in there. No pressure.

(Laughter) It should be this year.

And I'm trying to do something new with mentalism, the weird art of getting into your head.

So the 1930s was the heyday of this kind of stage mind-reading.

That's why I dress like this in the least TED-like way.

And so the law known as the Oracle Law was enacted.

And in the oracle method, as you've probably done, the audience writes down a secret question, a question like you would ask a psychic, seals the question in an envelope, and writes on the outside of the envelope their initials and roughly where they sat in the audience.

And the mind-reading oracle took the envelopes one by one and, though he didn't open them, tried to tell what questions were sealed inside.

And if it's correct, I'll try to answer the question for that person as well.

And the deed spread like wildfire.

I think it's a testament to the seductive appeal of a powerful figure who offers easy, simple answers to life's complex and subtle questions and anxieties.

Thank you to everyone who submitted questions.

I have never seen these. I know someone is protecting them.

Thank you very much.

I will receive them from now on. Thank you to everyone who made this possible.

Perhaps a few things should be said before we begin.

To be honest, first of all, I can't see through these envelopes.

they are sealed. A thick black envelope.

You'll know when you write it. you can't see through them.

Second, and most importantly, I don't know anyone, and I don't have anyone to play with.

This is not the case.

Third...

I do not believe for a moment that I have any special psychological gifts.

Let's get started.

no.

(Laughter) Okay, this is -- oh, good.

I see, this is interesting. I have a couple here.

Probably start with this.

This is interesting because the text has ups and downs.

There are certain ups and downs that usually, but not always, mean that the person himself does not know the answer to the question. So it's usually a question about the future, isn't it?

It suggests uncertainty.

Therefore, I assume that this is a woman. Age-wise, it's a little hard to tell from this minimalist handwriting, but I'd guess it's probably in its 30s or 40s, but let's find out.

On it, and a question about the future, it says, "JN, Center."

I mean, it's going to be someone in the big middle section here.

If you think this is you, can you make a fuss if you wrote it?

It's a little hard to see in the middle.

hello wave

So J...

Jane? Jessica?

Jessica: Yes.

Derren Brown: Which one? Jessica: Jessica.

DB: Thank you. Just a guess. A small murmur of approval, thank you

(laughs) I agree.

Jessica, I'm not asking your age, but is your question essentially about the future?

Jessica: Hmm? DB: yes?

Jessica: Yes. DB: Yes. OK.

are you OK. So what did we ask? What did Jessica ask about the future?

Is late 30's to early 40's okay?

Jessica: Yes. I'm taking it

(laughter) DB: Well, that's important. Because we ask different questions as we age.

Say "I accept" again.

Jessica: Yes.

DB: Virginia? Are you from Virginia? Jessica: Yes, that's right.

DB: Right. So -- (Laughter) I think this is a woman, a woman who wants to leave Virginia.

I think you're looking at a plan, but the question is whether things come together for an escape.

Please show me your hand

Can you see the claws on the other side?

OK, I assume you have a farm, but are you going to sell it and move out of Virginia?

Is this correct?

Jessica: Sure, that's the question.

DB: Okay. wonderful. thank you. Great question!

what was the actual question? what did you put in

Jessica: "Shall we sell our farm in Virginia?"

DB: Would you sell the farm?

Ok, so that's a great question if you're pretending to be a psychic. Since this is about the future, it means I can answer yes or no to this.

It means nothing. There is no way to be sure of that.

And this is dangerous. If I say 'yes' or 'no' it can't help but stick in the back of your mind and influence your decisions.

Therefore, it is a dangerous act. But -- (laughter) Yes, I think you're going to sell the farm. Because I think you're the type of person who gets what you want in the best possible way.

I think that when we have something we want, we tend to focus on it at the expense of other things we know we should focus on more, do you agree?

Educated you spent several years here. Do you say the word "yes" again quickly? Jessica: Yes.

DB: No? Jessica: No.

DB: California? Berkeley? Just a guess, but...

Jessica: Yes, I went to Berkeley. Please stop doing this!

DB: Yes.

Oh, and you recently went to India, didn't you?

There are only small, small things going on there. yes? no?

Jessica: Yes, I just got back from India.

DB: That's a "yes" from me. I just don't want to say it like it's written on the stars. Because it really isn't. And you have to take responsibility for that.

DB: Please be seated. thank you. Let's do one more thing.

(Applause) Oh, in the center too? ah.

This is a male, a little older, probably in his late 40s.

Oh Central, if you think this is you, stand up for me.

ah. Hello, let's give this person the mic.

It would be great to be on camera as soon as possible.

Oh look! freezing. Don't move. Don't move.

Please be absolutely still.

are you standing? Where are you?

Man: I'm standing. I'm not that short.

DB: Okay.

Okay, now that's changed.

You just did something when you got up.

Yes, no, are you wearing anything here--not now, but did when you stood up--to use your left foot, left foot, left foot, yes, no?

Male: Yes.

DB: Okay. As he stood up, he gave us clear signals.

Put your weight on your left side and say yes.

Male: Yes.

DB: Take your hand out of that pocket, put your weight on the other side, switch hands with the mic, and say yes again.

DB: Is your left thumb dislocated?

Male: Yes.

DB: Thank you. wonderful. Sounds good! Please sit down. Please sit down.

Can I have a mic? I'm going to change the mic accordingly.

May I have a mic? thank you.

Thank you very much. That's great.

I'm going to change my mic. I hope you can still hear my voice

So I decided to cover it up.

And now that I'm doing this, I have no clue when you're standing.

I can't see where you put your hand.

I don't know how you will react to what I said.

I can't even see what the person next to me is doing.

It always helps a lot if they know the answer to the question.

I have no such merit, but strangely enough, this has set me free, and I want you to set it free, too. So even if you didn't write a question but wish you had, you can still participate.

The point of writing a question is just to have clear, concise words in your mind.

So if you find a question in your head, make it clear and concise and send it to me. Right now, I'm going to do this without writing anything.

Now create your question. But please also send your name.

"My name is", whatever the last guy is, "what's wrong with my leg", or whatever the question is.

Here are the names and questions.

there is someone already Since the name is clear, I think I'm quite far ahead.

It feels like you are in the middle of the front.

OK, let me just say… Alan?

I feel like I have Alan.

And I think you're pretty close to the front, vaguely in the middle.

I feel like that's where it's coming from.

There are people who are probably like men in their early 60s.

Alan: Yes.

DB: Do you have a mic? good. thank you.

Alan, please tell me to stop when I get to you. Because then you know where you are and where to go.

Alan: Stop it.

DB: Are you a Capricorn? Alan: Yes.

DB: So Alan has something in his head?

Now, did you hear it, did you hear the emotion in his voice?

It's going to be really difficult.

I'm thinking with you... say yes again?

Alan: Yes.

DB: It's going to be one or the other -- no, it's not.

It's access, passwords, or access to something.

Do you ever think of passwords in your head, just yes or no?

Alan: Yes.

DB: Computer passwords, something like that?

Alan: Yes.

DB: Great!

(Laughs) Okay, let me finish this. Let me tell you --- if I get this right they will all know what it is, and potentially millions of people will know it.

would you change that?

Alan: Of course.

(laughter) DB: Say "of course" again? Alan: Of course.

DB: Okay. If it's a word -- I'm assuming it's a word -- look at the password written in front of you. Look at it in big, clear block capitals and imagine a letter somewhere in the middle. Don't say it out loud, just visualize the letter in the middle.

do you have? Alan: Right.

DB: Okay, let me stop there.

Oh you changed.

That changed my mind.

I think you settled on a -- I think it's "B", right?

Alan: No.

I did not do it.

DB: So is it an "I"? Alan: Yes.

DB: But you had a B. Alan: Yes.

DB: Yeah, he changed his mind. he changed his mind.

(laughter) Look what's written there.

Keep telling yourself in your head.

Oh, you play the drums, don't you?

Alan: Yes.

DB: Get that out of your head, get that out of your head, and focus on this one thing for me.

(laughs) My job is to sell you stories, right?

I am going to do this to all of you. Make me pay attention to the one thing I want you to think is important, ignore the other things I want you to ignore, and then connect those story points to tell yourself a specific story about what I am doing. This works because we are story-forming creatures. So that means we do this every day.

We go out into this complex, nuanced world full of complex, nuanced people, like you and me, Alan, and reduce them to these neat characters who fit into whatever story we tell ourselves, saying, 'She's not confident', 'He's arrogant', 'They can't be trusted'.

And these are just stories about how I can somehow read your mind.

You are also thinking of selling the company now, aren't you?

Alan: Yes.

DB: Which one is skin related?

Alan: Yes.

DB: It's like skincare or something like that.

Alan: Oh, yes.

DB: And I think the reason I love doing this work is that it at least reminds us to try to pay attention to the complexities and subtleties of reality in a more vivid way, that there are always other things going on that we don't know about and that makes us less stuck, that we can be gentle with people because we can recognize that there's always fear behind stress, so we don't have to deal defensively, that we can see the story as it is and that life isn't everything. about us.

oh!

password, where are you? Where are you? where is he?

Alan: Right here.

DB: Please stand up for me. The password is "ariboy".

Ah Li Boy? is that so? Alan: That's right.

DB: Thank you very much. thank you very much.

(applause)

(music) (end of music) (applause) (end of applause) Hello everyone. I'm Sirena

I'm 11 years old and I'm from Connecticut.

(audience cheers) (applause) Well, I'm not sure why you're here.

(Laughter) So what does this have to do with technology, entertainment, and design?

Well, I count iPods, mobile phones and computers as technology, but this has nothing to do with it.

So I did a little research on it.

Well here is what i found.

Of course, it would be nice if you could memorize it.

(clears throat) A violin consists of a wooden box and four metal strings.

When the string is pulled, it vibrates and generates sound waves, which are amplified by passing through a tree called a bridge to a wooden box.

(Laughter) Placing your fingers in different places on the fingerboard changes the length of the string, which changes the frequency of the sound waves.

(sighs) Oh my God!

(Laughter) Well, it's a kind of technology, but you could call it 16th century technology.

But really, the most interesting thing I discovered was that even today's audio systems and radio transmissions are still based on the same principles of sound generation and projection.

Isn't that cool?

(Laughter) (Applause) Design -- I love that design.

When I was little, I remember my mother asking me, "Would you like to play the violin or the piano?"

I saw the giant monster and said, "I'm not going to lock myself up on that bench all day!"

(laughs) It's small and light.

You can play standing, sitting or walking.

And did you know?

The best part is that you can hide (in a whisper) if you don't want to practice.

(Laughter) The violin is very beautiful.

Some see it as a feminine form.

But, like it or not, it's been around for over 400 years, unlike modern ones that quickly seem obsolete.

However, even though each violin looks pretty similar, I think it's very personal and unique that no two violins sound the same, even if they're based on the same make and model.

Entertainment -- I love entertainment.

But the truth is, the instrument itself isn't all that interesting.

I mean, when I first got my hands on a violin and played it, it actually sounded really bad. Because it was different from what I had heard from other children. It was a very bad sound, a very scratchy sound.

So it wasn't fun at all.

But in addition to that, my brother thought it was very interesting. Yu! Yu!

(Laughter) Years later, I heard a joke about the great violinist Jascha Heifetz.

After Mr. Heifetz's concert, a woman came over and complimented him, saying, "Oh, Mr. Heifetz, your violin was so good tonight!"

Mr. Heifetz was such a cool guy, he picked up his violin and said, 'That's funny, I can't hear anything.

(Laughter) Now, as musicians, we realize that, with great minds, artistic hearts and skill, we humans can transform this 16th century technology and legendary design into great entertainment.

Now I know why I am here.

(music) (end of music) (applause) At first I was going to come here just to play, but unexpectedly I learned and enjoyed much more than that.

But... some stories were very interesting to me.

(Laughter) It's the same thing with multidimensional things.

So, to be honest, I would be happy enough if I could actually measure two dimensions accurately in school.

(Laughter.) But actually, the thing that strikes me the most is that I want to say to all the children, I want to thank all the adults who really care about us and make our future world better.

thank you.

(Applause) (Music) (Music ends) (Applause) (Applause ends) (Music) (Music ends) (Applause)

I was just 15 years old when I first became interested in solar energy.

My family moved from Fort Lee, New Jersey to California in the snow, avoiding a lot of heat and gas pipes.

In 1973 there was a rationing of gasoline.

The energy crisis was in full swing.

I started reading Popular Science magazine and was very excited about the potential of solar energy to solve the crisis.

I just took trigonometry in high school and learned about parabolas and how they focus light rays to a single focus.

It was so exciting.

And I had a strong feeling that it might be possible to build something that could focus the light.

This is a company that makes parabolas, and I remember going into a metal factory that made parabolas and Stirling engines.

And I was making a Stirling engine on a lathe, and all my bike buddies said, "You're making a bong, right?"

So I said, "No, it's a Stirling engine." But they didn't believe me.

I put the blueprints for this engine and this dish in the back of Popular Science magazine and sold them for $4 each.

Getting into Caltech was a really big excitement for me.

And in my first year at Caltech, I continued my business.

But in my second year at Caltech, grading began.

The first year was a pass/fail decision, but the second year was graded.

Unable to continue the business, he took a detour for 25 years.

My dream was to convert solar energy at a very real cost, but then I took a big detour.

Then came the IBM PC when I graduated from Caltech, and I fell in love with it in 1981.

Then in 1983 the Lotus 1-2-3 came out and I was completely blown away by the Lotus 1-2-3.

I started running my business on 1-2-3, started writing add-ins for 1-2-3, and wrote a natural language interface to 1-2-3.

After joining Lotus, he started an educational software company, then Idealab to have a roof over which he could launch multiple companies in a row.

Much later, in 2000, very recently came a new California energy crisis, what was described as the Great Energy Crisis.

And I was trying to figure out if I could use that to build something that could back up people's energies in case of a real crisis.

And I started looking at how to build a battery backup system that could give people 5 hours, 10 hours, or even a full day, or even 3 days of backup power.

I'm glad I heard from you earlier today. Batteries are incredibly dense compared to fuel.

With fuel you can store much more energy than with batteries.

To get four hours of battery backup, you'll need to fill a full garage's worth of parking spaces.

After researching all the technologies that could be deployed to store energy, such as flywheels and various battery formulations, I concluded that storing energy was not practical.

What about making energy? Maybe we can generate energy.

I thought - perhaps solar power is becoming more attractive.

It's been 25 years since I did this, so let's take a look back at what's happening with solar cells.

Prices dropped from $10 to about $4-5 per watt, but stabilized.

And to be cost-effective, the price had to drop significantly.

I was researching all the new things that happened with solar cells and was looking for ways to make solar cells cheaper.

So many new things are happening, but basically the process requires a lot of energy.

Some say that making a solar cell requires more energy than it can release over its lifetime.

If we could reduce the amount of energy required to make a cell, it would be more practical.

But right now, you have to put the silicone in a 1600°F oven for 17 hours to make the cells.

Many people are working to reduce it, but I haven't been able to contribute anything.

So I started thinking about what other ways to achieve cost-effective solar power.

What if we could collect the sun with a large reflector—an idea I had in high school, but it could be done much cheaper with modern technology—and focus the sun into a small converter, and the converter wouldn't have to be so expensive. This is because they are much smaller than solar cells, which need to cover the entire surface on which you want to collect sunlight.

With so much new technology coming up in the 25 years since I last looked, this seemed practical now.

Many new manufacturing techniques have emerged, not to mention very cheap small motors (brushless, servomotors, stepper motors) used in printers and scanners.

That includes, of course, cheap microprocessors and a very important breakthrough, genetic algorithms.

Genetic algorithms are rarely described.

Take a problem that cannot be solved with a purely mathematical answer and build an evolutionary system to make multiple guesses and add gender. That is, use half of one solution and half of another to create a new mutation. It then uses natural selection to eliminate less good solutions.

Genetic algorithms on today's computers, typically with 3 gigahertz processors, can solve many previously unsolvable problems in just a few minutes.

So we tried to figure out how to create a new type of concentrator using genetic algorithms.

And we'll show you what we came up with.

Conventionally, a concentrator looks like this:

Their shape is parabolic.

Takes all parallel incident rays and focuses them to a single point.

It has to point directly at the sun, so it has to track the sun.

The acceptance angle is typically 1 degree. More than 1 degree off, the sun's rays are out of focus.

So we tried to devise a non-tracking collector that has no moving parts and collects light well above 1 degree.

So I wrote a genetic algorithm to try this out and created a model of a multifaceted reflector in Excel. And from trying literally a billion cycles, a billion different trials, something amazing has evolved. The fitness function defined how to collect the most light from the sun from the most angles over the course of the day.

This shape has evolved.

This is a tuba-like non-tracking collector with six horns, each of which collects light in the following manner. If the sun hits here, it can be reflected directly into the central hot spot, but if the sun is off-axis and coming from the side, it can hit two places and reflect twice.

So for direct light it takes only one bounce, but for off-axis light it may take two and for extreme off-axis it may take three.

Efficiency decreases with more bounces. Because you lose about 10% with each bounce. However, this allowed light to be collected from angles of plus or minus 25 degrees.

So the fixed components were able to collect about 2.5 hours out of the day.

However, solar cells collect light for four and a half hours.

On an average alignment day, the solar cell has the sun moving across the sky, so the performance at off-axis angles degrades with a sinusoidal function.

It collects an average of about four and a half hours of sunlight per day.

So even this, which was good because there were no moving parts, could achieve high temperatures, but not enough.

We had to break out the solar cells.

We explored how to split the parabola into individual petals that track.

Here you can see 12 petals, each controlled by a separate microprocessor and costing just $1.

Now you can buy a 2 megahertz microprocessor for $1.

You can also buy a $1 stepper motor that has no brushes and therefore wears very little.

So you can control all 12 of those petals for less than $50. This way you don't have to move the focus, just move the petals.

The overall system will be much thinner, but it will still be able to collect 6.5 to 7 hours of sunlight per day.

Now that we've concentrated the sunlight, what do we put in the center to convert it into electricity?

So we looked at all the different heat engines historically used to convert sunlight and heat into electricity. And James Watt's 1788 steam engine, one of the greatest ever, was a major breakthrough.

James Watt didn't actually invent the steam engine, he just improved it.

But his sophistication was incredible.

He added new linear motion guides to the pistons, added a condenser to cool the steam outside the cylinder, and made the engine double-acting, doubling the power output.

Those were great advances. All the improvements he made, it's no surprise that today our measure of energy, the watt, is named after him.

So we looked at this engine, and it had several possibilities.

Steam engines are dangerous and have had a great impact on the world, including the industrial revolution, ships, and locomotives.

However, bigger is usually better, so they are not suitable for distributed generation.

Another type of engine is the hot air engine.

And the hot-air engine was also not invented by Robert Stirling, but he made a radical improvement when he appeared in 1816.

This engine is so interesting that over the years it has spawned hundreds of creative designs using the Stirling engine principle, as it only runs on air, not steam.

But after the Stirling engine came Otto. Also, he didn't invent the internal combustion engine, he just improved it.

He showed it in Paris in 1867, which was a great achievement as it greatly increased the power density of the engine.

Now you can get more power in a much smaller space and the engine can now be used for mobile applications.

So when you get mobility, you're going to build a lot of engines because you have a lot of units as opposed to a steamship or a big factory. So it was this engine that benefited from mass production that all other engines did not.

In short, the move to mass production has reduced costs, 100 years of improvements, reduced emissions, and provided enormous production value.

Thousands of Stirling engines are built, while hundreds of millions of internal combustion engines.

And small steam engines aren't built in great numbers anymore, only large ones for large-scale operations.

So after considering these 3 and 47 others, we came to the conclusion that the Stirling engine is the best one to use.

I would like to briefly describe how we looked into it and how it works.

So we tried to look at the Stirling engine in a new way. Stirling engines were practical and weight was no longer important for the application.

The internal combustion engine got going because weight was important for getting around.

But if you're trying to generate solar energy in a stationary location, weight doesn't really matter.

I also learned that efficiency doesn't matter as much if the energy source is free.

Efficiency is very important because the cost of fuel over the life of an engine is typically much smaller than the cost of the engine.

But if the fuel source is free, the only thing that matters is the initial capital cost of the engine.

So instead of optimizing for efficiency, we want to optimize for power per dollar.

So we thought we could take that new twist and rethink the Stirling engine with new criteria and introduce genetic algorithms as well.

Basically, Robert Sterling didn't have Gordon Moore to give him 3 gigahertz of processor power.

So we took the same genetic algorithm that we had used before to make a concentrator, and it didn't work for us. We've optimized the Stirling engine, optimizing its design size and all its dimensions to get the most power per dollar, regardless of weight, regardless of size. Because the sun is free, it maximizes the conversion of solar energy.

This is probably the simplest heat engine, or hot air engine, ever made. Think of a box with a piston, a steel container.

Put the flame down and the piston will rise.

Remove from heat and pour in water or let it cool and the piston will go down.

This is the most basic heat engine.

The problem is that you're heating all the metal in the chamber and cooling it each time, so you're 1/100th of a percent efficient.

And while you're just getting power from the air being heated at the same time, you're wasting the energy of heating and cooling the metal.

Then someone came up with a very clever idea.

What if, instead of heating and cooling the entire cylinder, we put a displacer inside (a little thing that moves air back and forth)?

It takes a little energy to move it up and down, but now it's just pushing the air down on the hot side and up on the cold side.

This means that instead of alternately heating and cooling the metal, you are only heating the air.

This improves efficiency from 1/100 percent to about 2 percent.

And then Robert Sterling came up with this genius idea. The thing is, with this kind of engine, it's not heating metal yet, but it's still reheating all the air.

I still heat the air every time and cool the air every time.

What would happen if you put a thermal sponge in the middle of the passageway where the air moves between hot and cold?

So he used a variety of materials, including fine wire and cracked glass, to create heat sponges.

Thus, air rises as it moves from the hot end to the cold end, adding heat to the sponge.

And when the cooled air comes back, it picks up that heat again.

This means that the energy will be reused 5-6 times with an efficiency of 30-40 percent.

This is a little-known, but brilliant genius invention of Robert Stirling, who took the hot-air engine from something somewhat impractical to a hot-air engine that, once made efficient, could become very possible, if it could be designed at a sufficiently low cost.

So we're serious about keeping costs as low as possible.

We have built a huge mathematical model of how the Stirling engine works.

applied a genetic algorithm.

we built the engine. So in the last two years we have built 100 different engines.

We measured each one and readjusted the model to fit what we measured, leading to our current prototype.

This resulted in a very compact and inexpensive engine. Here's what the engine looks like:

Let me show you what it looks like in real life.

So this is the engine. Here is a small cylinder that holds the generator and all the linkage inside. And that's the hot cap, the hot cylinder at the top. This part heats up, this part cools down, and electricity is generated.

Quite the opposite is also true.

When you turn on the electricity, this gets hot, this gets cold and you get a refrigerator.

So this is a fully reversible cycle, a very efficient cycle, and very easy to create.

Now let's combine the two.

What if we combine the petals with the central engine?

The petals move and the engine receives concentrated sunlight and converts that heat into electricity.

This is what the first prototype of the system looks like with the petals and engine in the middle.

Now that the sun is out, I would like to introduce the real thing.

(Applause.) Thank you.

These petals cost about $1 each. Lightweight injection molded plastic, aluminized.

Underneath is the mechanism that controls each petal, each with its own microprocessor.

The engine has a thermocouple, a small sensor that senses heat when the sun hits it.

Each petal is individually adjusted to keep the perfect temperature.

When the sun comes out in the morning, the petals seek out the sun and find it by looking for the highest temperature.

About a minute and a half or two after the light hits the hot cap, the engine is warm enough to start, after which the engine produces about six and a half hours a day, or six and a half to seven hours before the sun crosses the sky.

The key part that we can leverage is that we have these cheap microprocessors and each of these petals is autonomous and each of these petals can figure out where the sun is without the user having to set it up.

Therefore, it is not necessary to tell the latitude and longitude of the current location, the inclination angle of the roof, the orientation, etc.

I don't really care.

Search to find the hottest spots, then search again after 30 minutes, a day, and a month.

It basically determines where you are on Earth by observing the direction the sun is moving, so you don't actually have to type anything about it.

The mechanism of the unit is that when the sun comes out, the engine starts and power is supplied from here.

It comes in AC and DC and you get 12 volts DC so it can be used for certain applications.

It has an inverter in it so you get 117 volts AC.

And there will be hot water. Hot water is optional.

It cools automatically so you don't have to use it.

However, it can optionally be used to heat hot water, further increasing efficiency as some of the heat that would normally be rejected can be used as useful energy both in the pool and in the hot water.

This is the first test I took outdoors and looked for each petal individually.

And what they do is step very coarsely at first and then very finely.

Once it gets a thermocouple temperature reading, which indicates it has found the Sun, it slows down for a finer search.

After that, the petals will move into place and the engine will start.

We are very excited about the progress we are making, but there is a long way to go.

This is how we envision it in residential installations. There will probably be multiple units on the roof.

You don't have to have enough units to power your entire home. You save money every time you add a unit.

This means that applications of this kind are potentially using the grid as a backup power source. Of course, you can't use it at night, and you can't use it on cloudy days.

But it's very complementary in that sense as it produces peak power during peak usage hours by reducing energy usage during most of the peak hours i.e. when you have your air conditioner on.

This is how we envision residential applications.

We also see tremendous potential for energy farms, especially in remote, sunny locations.

It's a very good combination of these two elements.

Obviously, we've found a lot of powerful suns around the world, but it also happens to be a special place where solar can be installed relatively cheaply, and also where a lot of wind power is strong.

As an example, here is a map of the United States.

Most places other than green and blue are really ideal places, but even green and blue areas are good, but not as good as red, orange and yellow places.

But hotspots in the immediate vicinity of Las Vegas and Death Valley are very good.

Also, this only affects the payback period, it doesn't mean you can't use solar energy. Can be used anywhere on earth.

It only affects the payback period when compared to power supplied from the grid.

However, the issue of recovery is a completely different story when the power is off the grid.

It's about how many watts you can get for your dollar and how you can profit from it to change your life in some way.

Here's a map of the entire globe, with a vast area in the center where most of the population lives, and we can see that there is a great opportunity for solar energy.

And of course, look at Africa.

The potential for harnessing solar energy there is incredible and I'm really looking forward to talking more about finding ways we can help.

In conclusion, I can say that my journey has taught me that old ideas can be revisited from new perspectives, and that even ideas that were sometimes discarded in the past can now become practical with the application of new technologies and new twists.

We believe we are pretty close to being practical and affordable.

Our short-term goal for this is to cut the price of solar cells in half, and our long-term goal is a payback of less than five years.

The payback period is less than 5 years, making it very economical.

So you don't have to just feel good about your energy to want these things.

It only makes economic sense.

At present, the payback period for solar power is 30-50 years.

If it's less than 5 years, it's almost trivial because there's interest in owning it. Someone can fund it for you and start making money from day one.

This is a real powerful goal that we are really aiming for internally.

There are two other things I learned that really surprised me. One is how casual we are about energy.

I'm walking over here from the elevator, and even just looking at the stage, there's probably 20,500 watts of lighting right now.

The stage is flooded with 10,000 watts of light. At full power, 1 horsepower equals 746 watts.

That means 15 horses running full speed just to light the stage.

Not to mention the 200 horses that are probably running right now to keep the air conditioning on.

And it's amazing. When you get on the elevator, the lights inside the elevator will turn on.

Of course, now we are very sensitive if we accidentally leave the lights on at home.

But everywhere around us there is an insatiable use of energy because it is so cheap.

And it's cheap because it's subsidized from energy harvested by the sun.

It has been pounded with a lot of energy for billions of years to trap all the energy.

And I don't think we have a birthright to use it up any time soon.

And it would be great if we could make the use of energy renewable. I really hope that can be achieved as it produces energy at the same pace as it uses it.

Thank you very much for coming to so many audiences.

Most sexually active people will at some point become infected with the human papillomavirus, or "HPV." There are more than 100 types of HPV, most of which the body clears the infection without showing symptoms, but some strains can pose serious health risks down the road.

HPV causes contact transmission. This means that the virus stays in cells near the point of infection rather than spreading throughout the body.

Since HPV is often transmitted through sexual activity, this usually means cells in the vagina, vulva, penis, anus, mouth and throat.

Cells in these regions can be tested for HPV, but testing for the virus, while scientifically possible, is uncommon.

The main reason is that while there are treatments for the adverse health effects of HPV, there is no treatment for the virus itself.

So, while we get so many positive HPV tests and most of them are nothing to worry about, we still don't have a treatment plan to get rid of the virus in our bodies.

But there are other good ways to protect yourself from HPV.

Learn how HPV can cause harm, who is at risk, and how to minimize those risks.

The body's immune system can eradicate most strains of HPV before they do harm and without people even knowing they are infected.

Certain other strains, such as HPV 6 and 11, cause abnormalities in the cells of the infected tissue and can develop into genital warts.

Although they are infectious and usually require treatment with topical creams, the wart-causing strains do not cause long-term damage.

However, another 13 strains can cause DNA mutations that cause cells to divide at a much faster pace than normal, promoting cancerous growth.

Cervical cells are particularly at risk.

Two HPVs, 16 and 18 in particular, are responsible for the majority of cervical cancer, which is now the fourth most common type of cancer in women.

It can take up to 20 years for cancer symptoms to appear, but regular screening can detect cell abnormalities in the cervix before they develop into cancer.

Women over the age of 21 can have regular Pap smear tests. A Pap smear test involves gently scraping a tissue sample from the lining of the cervix to check for abnormal cells.

A positive test result does not mean that the person has cervical cancer, it just means that the cervix has irregular cells that could develop cancer in the future.

Patients are then monitored with more frequent Pap smears or, for more serious abnormalities, undergoing a procedure called colposcopy.

This involves a doctor examining the cervix under a microscope and taking a small biopsy of tissue for further examination.

In some cases, the affected tissue may be removed.

Throat HPV infection can lead to head and neck cancer, but there is currently no equivalent to a pap smear in the throat.

Condoms can help prevent HPV transmission during sexual intercourse.

And there are three safe and effective vaccines targeting HPV types 16 and 18.

The vaccine is given in two or three doses every few months, but is only effective if all doses are given.

Vaccines are now part of the standard of care for girls aged 11 to 18 in many countries, but are becoming available for boys as well.

Adult women and men in countries such as the United States and the United Kingdom can choose to be vaccinated, and evidence shows that vaccination of women and men could reduce global cervical cancer incidence by nearly 90%.

Researchers are also developing an injectable drug for people already infected with HPV types 16 and 18 that targets infected cells and prevents them from becoming cancerous.

Therefore, condom use, vaccination, and cervical cancer screening can each reduce harm from HPV, although screening, treatment, and access still need improvement.

When Ireneo Funes looked at the wineglass on the table, he said, "I saw all the grape shoots, the clusters, the grapes.

He remembered the shape of the southern clouds at dawn on April 30, 1882, and in his memory he was able to compare them to the marble grain of the leather-bound book designs he had seen only once, and to the lines of splashes oars raised on the Rio Negro on the eve of the Battle of Queblancho. Jorge Luis Borges explores what it is like to have a perfect memory in his short story Funes, the Memorias.

His character not only remembers everything he has ever seen, but he remembers it in perfect detail every time he sees it.

These details are so overwhelming that Funes has to spend his days in a dark room, only able to sleep by imagining parts of the town he has not yet visited.

According to Borges, the memory of Funes made him incapable of even real thinking, because "to think is to forget differences, to generalize, to abstract.

In the world of Funes, which was so fulfilling, there were only details. Funes' memory of infinity is just one of Borges' many quests into infinity.

Born in Argentina in 1899, he admired the revolutionaries of his mother's family, but followed in his father's bookish family.

His series of essays, poems, stories, or what he called them fiction, were the forerunners of the "lo real maraviroso" literary style known in English as magical realism, each only a few pages long.

Borges had no interest in writing long books, but he was an avid reader who recruited friends to read to him after he became blind in middle age.

He said that his image of paradise was an infinite library, and that he realized that idea with "The Library of Babel." The Library of Babel is a world of its own, made up of a myriad of identical rooms containing the same number of books of the same length.

Some of the books are profound because they contain all kinds of textual variations, but there are countless others that are completely gibberish.

The narrator has spent his life wandering this vast maze of information, perhaps in a futile search for meaning.

Labyrinths appear many times in Borges' works.

In "Forked Road Garden," Yu Tsun winds his way down a country road as he recalls a lost maze built by one of his ancestors.

Over the course of the story, he realizes that the labyrinth is a novel, not a physical maze.

And this novel reveals that the real "forked garden" is time. There are infinite courses of action at every moment.

And as one moment leads to the next, each possibility creates another divergent future.

Borges depicted the infinite expanse of time in the labyrinth, but also explored the idea of ​​condensing all time into a single moment.

In "God's Script", at the beginning of the world, God wrote just one message on the jaguar's spots, and the jaguar "loves and reproduces endlessly, in caves, in sugar cane fields, on islands, so that the last man can receive it." The final man turned out to be a tenacious old priest who had spent years memorizing and deciphering the jaguar's spots until he finally had the epiphany of understanding God's message.

Trapped deep underground, he has no one to share this meaning with, and it doesn't change his situation in any way, but he doesn't care. At that moment he experienced all the experiences of every person who ever existed.

Reading Borges, you may get a glimpse of infinity too.

Last week I wrote to you about the Foundation's work and shared some of the issues.

And Warren Buffett was encouraging me to do so. Be honest about what worked and what didn't, and make it an annual event of sorts.

So my goal was to get more people to work on those issues. Because I think there are some very important issues that nature doesn't address.

In other words, markets do not drive scientists, informants, thinkers, and governments to do the right thing.

And only by paying attention to these things and having good people who care and engage others can we progress as much as we need to.

So this morning I would like to share two of these issues and how they stand.

But before I get into those things, I'd like to admit that I'm an optimist.

I believe that any problem can be solved.

One of the reasons I feel this way is looking back.

Life expectancy has more than doubled over the past century.

Perhaps another of my favorite stats concerns childhood deaths.

In 1960, 110 million children were born, 20 million of whom died before the age of five.

Five years ago, 135 million children were born, more children were born, less than 10 million of whom died before the age of five.

This means that child mortality will be reduced by a factor of two.

It's amazing.

Each of those lives is very important.

And the main reason we were able to do that was not only the increase in income, but also some important advances in the wider use of vaccines.

For example, until 1990, measles killed four million people, but today it is below 400,000.

So we can really make a difference.

The next breakthrough is to cut that 10 million in half again.

And I think it will be possible within 20 years.

why? Diarrhea, pneumonia, and malaria are just a few of the diseases that account for the majority of those deaths.

Which leads me to the first issue I raise this morning. How to stop deadly diseases spread by mosquitoes.

Well, what is the history of this disease?

It has been a serious disease for thousands of years.

In fact, it's the only disease that, when examined in the genetic code, shows that people who lived in Africa actually evolved a few things to avoid dying from malaria.

In fact, the death toll peaked at just over 5 million in the 1930s.

So it was absolutely huge.

And this disease has spread all over the world.

It's a horrible disease. it was the United States. It was in Europe.

People didn't know the cause until the early 1900s, when British soldiers discovered it was a mosquito.

So it was everywhere.

And two tools helped reduce mortality.

One was killing mosquitoes with DDT.

Another was to treat patients with quinine or quinine derivatives.

And that's why the death rate went down.

Now, ironically, it happened that it was excluded from all temperate regions where wealthy countries exist.

So it turns out that the year 1900 is everywhere.

1945, most of the places are still there.

In 1970, the United States and most European countries abolished it.

In 1990 we got most of the northern area.

And these days we find it just near the equator.

And this leads to the paradox that not much investment is made because the disease is occurring only in poor countries.

For example, more money is spent on baldness drugs than on malaria.

Well, bald, that's scary.

(Laughter.) And the rich suffer.

That's why the priority is set.

However, malaria vastly underestimates the impact of even one million deaths annually from malaria.

Over 200 million people suffer from this disease at any one time.

That means we can't turn the economies of these regions around because it just holds things back so much.

Now, malaria is of course transmitted by mosquitoes.

I brought some for you to experience this.

Let them walk around the auditorium for a bit.

(Laughter) There is no reason why only poor people should have this experience.

(Laughter.) (Applause.) That mosquito isn't infected.

So we came up with some new things. There are mosquito nets.

And a mosquito net is a great tool.

What that means is that the mother and child are under a mosquito net to avoid late-night biting mosquitoes.

And spraying DDT and those nets indoors can reduce fatalities by more than 50%.

And it's happening in many countries now.

Great to see.

However, malaria evolves parasites and mosquitoes, so we have to be careful.

So all the tools we've used so far are ultimately useless.

And in the end you have two options.

If you enter a country with the right tools and the right methods and work hard, you can actually achieve local eradication.

And there we saw the map of malaria shrinking.

Alternatively, a half-hearted approach may reduce the burden of disease for a period of time, but eventually those measures will become ineffective and mortality will skyrocket again.

And the world has gone through a situation of paying attention and not paying attention.

Now we are on the rise.

Mosquito net funds are increasing.

New drug discoveries are underway.

Our foundation is supporting a vaccine that will enter Phase 3 trials starting in the next few months.

If it were effective, it would save more than two-thirds of lives.

So we introduce these new tools.

But that alone doesn't give you a roadmap.

Because the roadmap to getting rid of this disease involves a lot.

Communicators are involved to keep funding high, maintain visibility, and communicate success stories.

This involves social scientists, so we know how to get 90 percent of the population to use bed nets, not just 70 percent.

We need mathematicians to come and simulate this and run Monte Carlo methods to understand how these tools work together.

Of course, you need to get expertise from pharmaceutical companies.

Wealthy world governments should very generously provide aid for these things.

I'm pretty optimistic that if these elements come together, we'll be able to eradicate malaria.

Now let's move on to the second question. This is a rather different question, but I think it's equally important.

And this is, "How can I make a teacher great?"

It seems like the kind of question people spend a lot of time on, and we understand it all too well.

The answer is, in fact, no.

Let's start with why this is important.

Well, I'm sure all of us here have had great teachers.

We all received a great education.

That's part of why we're here today and part of why we're successful.

The same can be said for college dropouts.

I had wonderful teachers.

In fact, the US has a pretty well-functioning education system.

A limited number of places have fairly competent teachers.

So the top 20 percent of students have a good education.

And when you compare the top 20 percent to the other top 20 percent, these top 20 percent are the best performers in the world.

And they are revolutionizing software and biotechnology to keep America at the forefront.

Now the relative power of the top 20 percent is starting to wane, but even more worrying is the education the well-rounded people are getting.

It didn't just get weaker. It's getting weaker.

And if you look at the economy, it is currently only providing opportunities for better educated people.

And we have to change this.

We have to change that so that people are given equal opportunities.

We must change this situation so that our nation is stronger and stays at the forefront of things driven by advanced education such as science and mathematics.

When I first learned the statistics, I was quite surprised at the seriousness of the situation.

Over 30% of children never graduate from high school.

And this was covered up for a long time because they always took the dropout rate as the number of people who started in fourth grade and compared it to the number of people who finished fourth grade.

Until then, they hadn't tracked where the children were.

However, most dropouts occurred earlier.

They had to raise the stated dropout rate to 30 percent or more as soon as tracking was completed.

For minority children, the percentage is over 50 percent.

And even if you graduate from high school, you have less than a 25% chance of getting a college degree if your income is low.

If you're low-income in the US, you're more likely to go to jail than get a four-year degree.

And that doesn't seem entirely fair.

So how can we improve education?

Well, our foundation has been investing in this for the last nine years.

A lot of people are working on it.

We've worked on small schools, funded scholarships, and been active in libraries.

Many of these have had good effect.

But the more I thought about it, the more I realized that having a good teacher is very important.

And we met with some people who study how much variability there is among teachers, say between the top quartile, the best teachers, and the bottom quartile.

How much variation is there within or between schools?

The answer is that these fluctuations are totally unbelievable.

Teachers in the top quartile improve class performance (based on test scores) by 10% or more in one year.

what do you mean?

In other words, if the United States as a whole had the top quartile of teachers for two years, all the differences between the United States and Asia would disappear.

In four years, we will surprise people all over the world.

So it's easy. Only the top quartile teachers are needed.

So you say, "Oh, we should reward those people."

We should keep those people.

We should find out what they are doing and pass that skill on to others. ”

But today I can tell you that that will never happen.

What are the characteristics of this top quartile?

what do they look like?

You might think that they must be very advanced teachers.

And the answer is no.

If someone teaches for three years, the quality of that teaching will not change after that.

Variation is very small.

You might think of them as people with master's degrees.

They came back and got their Master of Education degree.

This chart looks at four different factors and shows how well they explain the quality of education.

The one at the bottom that says it doesn't work at all is the master's degree.

Now, as a mechanism of the salary system, there are two things as compensation.

One is seniority.

Because you get a pay rise and a pension.

The second is to give extra money to those with a master's degree.

But it has nothing to do with being a better teacher.

Teaching for America: A Small Effect.

For mathematics teachers majoring in mathematics, it has a tangible effect.

But overwhelmingly it's your past performance.

Some people are very good at this.

And we've done very little to study what it is, to adopt it, to replicate it, to raise the average ability, or to encourage those who have it to stay in the system.

Some might say, "Will the good teachers stay and the bad teachers leave?"

The answer is that, on average, slightly better teachers leave the system.

And the system has a very high turnover rate.

There are only a few places where good teachers are being produced today, but there are a few.

A good example is a series of charter schools called KIPP.

KIPP means "Knowledge is Power".

Unbelievable.

They have 66 schools, mostly middle school and some high school, but they have a great education.

They host the poorest children, and more than 96 percent of high school graduates go on to four-year colleges.

And the whole ethos and attitude of those schools is very different from regular public schools.

They are team teaching. They are constantly improving their teachers.

They got the data and the test scores and said to the teacher, "Hey, you're the one who caused all this increase."

They are passionate about making education better.

When you actually go to a classroom and sit down, it's very strange at first.

I sat down and thought, "What is going on?"

The teacher was running around and had a high energy level.

I thought, "I'm at a sports rally or something."

what happened? "

And the teacher was constantly checking which children were not paying attention and which ones were bored, calling the children in a hurry or writing things on the blackboard.

It was a very dynamic environment. Because especially in middle school, grades 5 to 8, it kept people interested and created an atmosphere that everyone in the classroom needed attention. No one made fun of it or took a stand like a child who didn't want to be there.

Everyone should participate.

And KIPP is doing it.

How does it compare to a regular school?

Well, ordinary schools don't teach the excellence of teachers.

No data collected.

Contracts with teachers limit the number of times principals can come to the classroom, sometimes to once a year.

And to do so, advance notice is required.

So imagine if you have an employee who runs a factory, some of them are making junk, and the management said, "You can only come here once a year, but let us know because we might actually trick you into doing a good job for a split second."

Teachers who want to improve don't have the tools to do so.

They don't have test scores, so they're trying to block the data.

For example, New York passed a law stating that teacher improvement data cannot be obtained and used to determine teacher tenure.

And it kind of works in the opposite direction.

But I am optimistic about this and think there are some things we can do.

First of all, more tests are underway, which has made our current situation clearer.

That way, you can understand who's doing it well, give them a shout out, and find out what their technique is.

Of course, digital video is cheap now.

Having a few cameras in the classroom and saying things are being recorded continuously is very real in every public school.

So every few weeks the teachers could sit down and say, 'Okay, here's a little clip of something I thought I did well.

Here's a small clip of what I think didn't work.

Advice -- what should I have done when this kid behaved? ”

And we could all sit down and work together on those issues.

You can take the best teachers and annotate it so everyone can see who is the best at teaching this thing.

By taking these great courses and making them available, kids can watch and learn from physics courses.

If you have a child who is falling behind, you will find that they will be assigned to watch the video and review the concepts.

And in fact, these free courses are not only available only on the Internet, but they can also be made available on DVD at any time, so anyone with access to a DVD player can meet the best teachers.

So you can do better by thinking of this as an HR system.

Well, there's actually a book written by news reporter Jay Matthews about KIPP -- where this is happening -- called Work Hard, Be Nice.

And I thought that was so wonderful.

It made me realize what a good teacher does.

I am sending this book free to everyone here.

(Applause.) Now, we're putting a lot of money into education, but I truly believe that getting it right is the most important thing if this country is to have the strong future it deserves.

In fact, we have it in the Stimulus Bill -- interestingly, the House version passed the Senate because there are people who are threatened by these data systems, because the House version actually contains money for these data systems.

But I am optimistic.

I think people are starting to realize how important this is. If we get it right, it can make a big difference in the lives of millions.

I had time to put these two issues together.

There are many other such problems, such as AIDS and pneumonia, but just hearing the very name of it, I can see people getting excited.

And the skill sets required to tackle these things are very diverse.

As you know, the system doesn't do that naturally.

Governments don't naturally choose these things the right way.

The private sector, of course, does not put resources into these things.

So we need smart people like you to research these things, get others involved, and come up with solutions.

And I think great things will come out of that.

thank you.

(applause)

It's an incredible find. An ancient abandoned alien space station packed with precursor technology.

But now, every species in the galaxy races to be the first to reach it and make it their own.

And soon problems arise.

Your ship's superluminal jump drive consumes 1 unit of fuel for each parsec traveled, while your ship only has 15 units of fuel.

But the space station is 23 parsecs away, and there's only empty space between it and here.

However, one thing helps. Dark matter fuel is stable in deep space.

This means you can drain the cache from the fuel chamber and come back to retrieve it later.

Your ship only has 15 units of fuel on board, but you are allowed to use all 45 units at your current location.

Stock up on fuel strategically along the way and you might be able to make it all 23 parsecs.

So how can we reach an alien space station?

Answer 3, 2, 1.

While it's possible to solve this riddle using just two cash points, there's also a viable solution using more cash points.

However you proceed, the key is deciding exactly where to cache the fuel on your route.

Let's work backwards from the alien space station.

To reach 23 parsecs, you must leave the 8 parsecs mark with a full tank of fuel.

8 parsec points is too far from the start to be used as a cache immediately. You can jump there, but you won't have enough fuel to return to your starting point, let alone store fuel for later use.

That means we need to find the cache somewhere between the first and 8.

But where?

There are interesting patterns that can help.

You have exactly 3 tanks of fuel at the start.

For 8 parsecs, you need exactly 1 parsec.

Is there a point (which we can call point X) that is exactly 2?

That way, you can refuel exactly two times and fully utilize your storage space, which is convenient.

Jump forward two times from wherever point X is. The first time deposits fuel in 8 parsec cash points, so the second time is forever.

That means you'll jump the distance from X to 8 parsecs a total of 3 times.

Point X has 2 tanks of fuel, and 1 must remain for 8 parsecs of cash points, so you can spend 1 tank (i.e. 15 units) for each round trip.

15 units divided by 3 trips is 5, so you can place these two cash points 5 parsecs apart.

Any further and you won't have enough fuel to reach the space station.

So the earliest you can place point X seems to be at the 3rd parsec mark.

Is it possible to transport 30 units of fuel there?

We left with 15 units full.

Jump 3 parsecs, drop 9 units at a cash point, then jump 3 units and go home, arriving with an empty tank.

Repeating this process will give you 18 units of fuel at the cache point, and one more jump will bring you to 3 parsecs of cache with a total of 30 units of fuel.

So far, so good!

Then jump to the 8 parsec mark, drop 5 units of fuel, and jump to the 3 parsec mark.

If you fill up the tank and move forward again, you will arrive with 10 units of fuel in the tank.

And now the end is in sight.

Beam 5 units of fuel from deep space to fill the tank and enter the coordinates of your final destination.

The 15-parsec jump will leave you smoking, but you're ready to dock with the progenitor space station.

It's time to harness this alien technology and make life better for everyone in the galaxy.

I'm a storyteller, but I'm also a troublemaker.

(laughs) And I have a habit of asking hard questions.

It started when I was 10 years old and my mom who was raising 6 kids didn't have time for them.

At 14, tired of my increasingly intrusive questions, she advised me to start writing articles for a local English-language newspaper in Pakistan to disseminate my questions nationwide.

(Laughter) When I was 17, I was an undercover investigative journalist.

I don't think the editor even knew how young I was when I posted articles that singled out and humiliated some very influential people.

The men I wrote wanted to teach me a lesson.

They wanted to embarrass me and my family.

They spray-painted my name and my family's names all over our front gate and neighborhood with unspeakable profanity.

And they felt that my father, who was a strict man of tradition, would stop me.

Instead, my father stood in front of me and said, "If you speak the truth, I will stand by you, and so will the world."

And he -- (applause) Then he got a group of people together and whitewashed the walls.

(Laughter) I always wanted my story to shake people up into difficult conversations.

And I felt it would be more effective to do something visually.

And at 21, I wanted to become a documentary filmmaker, directing my camera to frontline and marginalized communities in conflict areas, and eventually returning to Pakistan to document violence against women there.

200 million people live in Pakistan.

And films with low literacy levels can change the way people perceive problems.

Effective storytellers speak to our emotions, elicit empathy and sympathy, and encourage us to see things differently.

In my country, cinema had the potential to go beyond cinema.

It could be life changing.

The issues I have always wanted to raise have always been a mirror to society, but they have been driven by my anger barometer.

Then, in 2014, my anger barometer turned to respect for murder.

Honor killings are practiced in many parts of the world, where men punish women for violating their own rules. Or a woman thinking about divorce. or a woman suspected of having an illicit relationship.

In other parts of the world, honor killings would be known as homicides.

I always wanted to tell that story from a survivor's perspective.

However, the women cannot live to tell their stories and are instead sent to unmarked graves.

So one morning, when I was reading the paper about a young woman who miraculously survived being shot in the face by her father and uncle because she chose to marry a man of her own free will, I was convinced I had found my narrator.

Saba was determined to send her father and uncle to prison, but days after being released from the hospital, pressure began to mount on her to forgive her.

As you know, there was a loophole in this law that allowed victims to avoid prison sentences by forgiving their perpetrators.

She was then exiled and told that her family, her parents-in-law, all would be barred from the community. Because many felt that her father was well within his rights given her guilt.

She continued to fight for months.

But on the last day of court, she issued a statement forgiving them.

This was not the movie we set out to make, so as filmmakers we were devastated.

In retrospect, if she had sued and sued and won, she would have been an exception.

What chance do other women have when such a strong woman goes silent?

And we started thinking about using this film to change people's perceptions of honor killings and to influence legal loopholes.

And when our film was nominated for an Academy Award and honor killings became front page news, the Prime Minister congratulated us and offered to host the premiere of this film at his official residence.

Of course, no prime minister in the history of this country has done that, so we jumped at the opportunity.

And at a screening, broadcast live on state television, he resounded across the country when he said, "There is no honor in honor killings."

(Applause.) At the Academy Awards ceremony in Los Angeles, many pundits criticized us, but we felt we needed a victory to continue pushing for legislation.

Then my name was announced and I walked up the stairs in my flip flops, not expecting to be on stage.

(Laughter.) And I accepted the statue and told the billion people watching that the Prime Minister of Pakistan had vowed to change the law, because of course that is one way to hold him accountable.

(Laughter.) And -- (applause.) At home, Oscar winners have dominated headlines, and more people have joined the fight to close legal loopholes.

After months of campaigning, the loophole was actually closed in October 2016.

(Applause.) And now a man who kills a woman in the name of honor gets a life sentence.

(Applause.) But the next day, a woman was murdered in the name of honor, and another was murdered.

We've been influencing the law, but it's not enough.

We needed to bring this film and its message to the heart of the country, to small towns and villages.

For me, cinema can play a very positive role in changing and shaping society in a positive way.

But how do you get to these places?

How do you get to these small towns and villages?

We built a mobile cinema, a truck that criss-crosses the country and stops in small towns and villages.

Equipped with a large screen that illuminates the night sky, we named it "Look But With Love."

That would give the community a chance to get together in the evening to watch a movie.

We knew we could captivate men and kids with our mobile cinema.

They came out and watched.

But what about women?

How do you get women to come out in such a small, isolated rural community?

To do this, they had to follow the prevailing cultural norms, so they built cinemas inside cinemas with seats and screens that women could go inside and watch without fear, embarrassment or harassment.

We introduced everyone to movies that opened their minds to competing worldviews, encouraging children to ask questions and build critical thinking.

And we spoke and broadened beyond honor killings to talk about income inequality, the environment, ethnic relations, religious tolerance and compassion.

And internally, we showed women movies where they were heroes rather than victims, taught them how to navigate the court system and the police system, educated them about their rights, told them where to go if they were victims of domestic violence and where to go for help.

We were surprised at how welcoming we were in many of the places we went.

Many in town had never watched TV or social media and were eager to teach their children.

But there were also backlashes and backlashes to the ideas we brought.

Two members of the traveling film team have resigned due to threats from the village.

And in one of the villages we were inspecting, the village was closed because the women didn't want to know about their rights.

But on the contrary, in another village, when the screening was canceled, the plainclothes police stood up and ordered the screening to resume, telling everyone that it was their duty to stand by, protect our team, and show young minds a different world and this content.

he was an ordinary hero.

However, we have met many heroes on our journey.

In another town, where the men said they could only watch and the women had to stay home, the community elders stood up and gathered the people together for a discussion, after which both men and women would sit together and watch.

We document what we do.

we talk to people

we adapt.

We will change the lineup of films.

When we show men films about perpetrators who commit violence in prison, we want them to realize that when men commit violence, it has consequences.

But we also show movies where men are seen as defending women. Because we want to encourage men to take on such roles.

Talk to women and encourage them to step into the role when we show them films in which they are heads of state or in leadership positions such as lawyers and doctors.

We are changing the way people in these villages interact and taking our learnings elsewhere.

Recently, a group contacted us and wanted to bring our mobile cinema to Bangladesh and Syria, and we are sharing our learnings with them.

We feel it is very important to take what we do and spread it around the world.

In small towns and villages across Pakistan, movies change the way men relate to women, and children change the way they see the world from village to village.

thank you.

(applause)

I am a writer.

Writing books is my profession, but of course it's not the only one.

It is also my lifelong great love and fascination.

And I don't think that will ever change.

But with that being said, something strange happened in my life and career recently that necessitated a readjustment of my entire relationship with this piece.

And the strange thing is that I recently wrote this book, a memoir called Eat, Pray, Love. This memoir is definitely unlike any of my previous books and for some reason it has spread all over the world and has become such a big, huge sensation and a global bestseller.

As a result, wherever I go now, people treat me as if I'm doomed.

Seriously - destiny, destiny!

Now they come to me anxiously and say, "Can we never go beyond that?"

Don't you worry that if you write for the rest of your life, you'll never be able to write a book that will interest everyone in the world again? ”

That's reassuring, isn't it?

But things are worse. Except I happen to remember getting a similar fear-based reaction more than 20 years ago, when I was a teenager and first started telling people I wanted to be a writer.

And people say, "Aren't you afraid you'll never make it?"

Worried that the humiliation of rejection will kill you?

Aren't you afraid you'll spend your whole life working on this task and nothing will come of it, filling your mouth with the bitter ashes of failure and dying on a pile of scraps of broken dreams? ”

(laughs) That's right.

The answer is yes, the short answer to all these questions.

Yes, they are all scary.

And I always was.

And there are so many more scary things besides seaweed and other scary things a person can't even guess.

But what have I been thinking and wondering lately about writing, why?

is that reasonable?

Is it logical to be afraid of the work you feel your earth has given you?

What specifically makes us so sensitive about each other's mental health in creative ventures that we don't see in other careers?

For example, like my father, he was a chemical engineer, but in his 40 years of chemical engineering, no one ever asked him if he was afraid to be a chemical engineer.

"Hey chemical engineering block, John, how's it going?"

It just didn't come to me that way, you know?

But, in all fairness, chemical engineers as a group have not gained much of a reputation for being alcoholic, manic-depressive over the centuries.

(Laughter.) We writers kind of have that reputation. Creative people of all genres, not just writers, seem to have a reputation for being highly mentally unstable.

And all you have to do is look at the very harrowing death toll of some really great creative minds who died young and often of their own hand in the 20th century alone.

And even those who didn't literally kill themselves seem truly powerless by their talent.

In his final interview shortly before his death, Norman Mailer said, "Every time I read my book, it killed me a little bit more."

An extraordinary statement about your life's work.

But we don't even blink when we hear someone say this. Because we've been hearing stories like that for so long that we somehow completely internalize and collectively accept this notion that creativity and suffering are somehow intrinsically linked, and that artistry always ultimately leads to suffering in the end.

And what I want to ask you here today is, do you agree with that idea?

Is that all right?

Because you can see it even from an inch away. And I don't quite agree with that assumption.

I think it's disgusting.

And I also think it's dangerous, and I don't want to see it live into the next century.

I think it would be better to encourage our wonderful creative minds to live.

And in my case, I definitely know that in my situation, especially given the situation I'm in right now in my career, it's very dangerous to start leaking down the dark trail of assumptions.

It's -- look, I'm pretty young, still about 40.

I still have maybe 40 years of work left in me.

And what I write from this point on is very likely to be regarded by the world as a work after the extraordinary success of my last book, right?

Let's be frank, we're all kind of friends here now, so it's very likely that my greatest success is behind me.

So Jesus, what were you thinking?

With that in mind, some people might start drinking gin at 9 in the morning, and I don't want to go there.

(Laughs) I want to continue doing this job that I love.

So the question becomes, how?

So, come to think of it, the way I have to do it now to keep writing is that I need to create some kind of defensive psychology, right?

I have to find some way to keep a safe distance between myself as I write and my natural anxiety about how the writing will react.

And I've spent the last year searching for models of how to do that, searching beyond time and trying to see if other societies have better, wiser ideas than ours about how to help creative people manage the emotional risks inherent in creativity.

And that quest led me to ancient Greece and ancient Rome.

Stay with me as it comes round and round.

However, in ancient Greece and ancient Rome, people at that time did not believe that creativity came from humans.

People believed that creativity was a divine attendant spirit that came to man for a distant and unknown reason, from a distant and unknown source.

The Greeks famously called these divine spirits of creativity "daemons."

Socrates famously believed that he had a daemon who spoke wisdom from afar.

The Romans had the same idea, but called such disembodied creative minds geniuses.

This is great. Because the Romans didn't really think of geniuses as being particularly clever.

They believed that a genius was a kind of magical divine being, literally living within the walls of an artist's studio, like Dobby the house elf, coming out and invisibly assisting the artist's work and shaping the results of that work.

Very nice, just there is the distance I'm talking about, a psychological construct that protects you from the consequences of your work.

And we all knew this worked like that, right?

So the ancient artists were protected from certain things, like excessive narcissism, for example.

Even if your work was great, you couldn't take all the credit for it, and we all knew there was this disembodied genius who helped you.

If your job gets bombed, it's not all your fault.

Everyone knew your genius was a bit lame.

(Laughter) And in the West people have been thinking about creativity this way for a really long time.

Then came the Renaissance and everything changed. And then we came up with this big idea. The big idea was to put the individual human being at the center of the universe, rather than all the gods and mysteries. And there is no more room for mystical creatures who take orders from God.

And that was the beginning of Rational Humanism, where people began to believe that creativity came entirely from the individual self.

And for the first time in history, we start hearing people call that artist or that artist a genius instead of having a genius.

Let me tell you, I think that was a big mistake.

You know, to allow someone, a mere mortal, to believe that they are like a vessel, like the font, the essence, the source of all the sacred, creative, unknown, and eternal mysteries, I think is just a little too heavy a responsibility to rest on one fragile human mind.

It's like asking someone to swallow the sun.

It just completely distorts and distorts the ego, creating all these unmanageable expectations of performance.

And I think that pressure has been killing artists for the last 500 years.

And if this is true and I think it is true too, then the question is:

Can I do this another way?

We may return to a more ancient understanding of man's relationship to the creative mysteries.

maybe not.

Perhaps no 18-minute speech can erase 500 years of rational humanistic thinking.

And perhaps some in this audience will raise really valid scientific skepticism about the concept of fairies chasing people, basically rubbing fairy juice on their projects or whatever.

Perhaps I'm not going to bring you guys on this subject.

But I would like to raise the question, why not?

Why don't you think about it like this?

Because it makes as much sense as any other term I've ever heard in describing the utterly insane vagaries of the creative process.

As anyone who's ever tried to build anything, so basically anyone here knows, processes don't always work rationally.

And in fact, sometimes it feels like downright paranormal.

I recently met the extraordinary American poet Ruth Stone. Now in her 90s, she was a lifelong poet and said that when she was growing up in rural Virginia, working in the fields, she felt and heard poetry coming from across the landscape.

And she said it was like a thunderous air train.

And it would rain down on her over the landscape.

And she felt it hit the earth under her feet.

She knew there was only one thing left to do at that point. It's, in her words, "running with all your might."

She then ran frantically home and was chased by this poem. And all that mattered was that she had to get to paper and pencil quickly enough so that when the poem roared inside her she could collect it and grab it on the page.

Other times she doesn't go fast enough, she runs and runs but she doesn't get home, and the poetry just flows into her head and she misses it, she said, looking at it "for another poet," as she said, as the poem continues across the landscape.

And then there was this moment – ​​this is something I will never forget – she said there was a moment when she almost missed it?

So she was running home, looking for paper, and the poem flowed into her, and she grabbed the pencil just as the poem was passing through her. And it felt like reaching out with the other hand and grabbing it, she said.

She grabbed the poem by the tail and pulled it back into her body as she transcribed it on the page.

In such cases, the poem will appear perfect and intact on the page, but backwards from the last word to the first word.

(Laughter) So when I heard that, I thought -- that's weird, that's exactly what my creative process is like.

(Laughter) It's not my creative process. I'm not a pipeline

I'm a mule and I have to get up at the same time every day, sweating and working clumsily to work.

But even I, in my stupidity, have honed it at times.

And I think many of you think so too.

You see, even I have had work and ideas come to me from sources I honestly can't identify.

So what is that?

And how do you actually stay sane without losing your sanity?

And for me, the best modern example I know of how to do that is musician Tom Waits, whom I interviewed for a magazine job a few years ago.

We've been talking about this, and you know, Tom, for most of his life he was the personification of a tortured contemporary contemporary artist who was trying to control, manage, and dominate a completely internalized, out-of-control creative impulse.

But then he got older and calmed down. It all changed for him one day while he was driving on the highways of Los Angeles.

And he's speeding along, and suddenly he hears this little piece of melody, it's so elusive and charming that often comes to mind when inspiration comes, and he wants it, it's gorgeous, and he craves it, but he has no way of getting it.

He has no paper, no pencil, no tape recorder.

There, he began to feel an old fear welling up inside him, and he said, "I'm going to lose this, and I'm going to be haunted by this song forever."

I can't do that because I'm not good enough. ”

And he didn't panic, just stopped.

He stopped the whole mental process and did something completely new.

He looked up at the sky and said, "Excuse me, can't you see me driving?"

(Laughs) "Do you think you can write a song right now?"

If you really want to be present, please come back at a more opportune moment when I can take care of you.

Otherwise, bother others today.

Give Leonard Cohen annoyance. ”

And then his entire work process changed.

It wasn't work, and work was often as dark as ever.

But the process and the heavy anxieties surrounding it were released when he took the genie that had only caused trouble out of him and put it back in its place, realizing that it didn't have to be so internalized and tormented.

It could be like this weird, wonderful, weird collaboration, a conversation between Tom and a strange outsider who isn't Tom.

After hearing that story, I started to change the way I work, but this idea has already saved me once.

While I was writing Eat, Pray, Love, this book saved me. When I started to think that I was working on something that wasn't working and that it was going to be a disaster, I fell into the kind of despair that everyone falls into. It's the worst book ever written.

It's not just bad, it's the worst book ever written.

And I started thinking that I should stop this project.

However, I remembered that Tom was talking outside, so I gave it a try.

So I looked up from the manuscript and directed my comment to the empty corner of the room.

And I said out loud, "Listen, you and I both know that if this book isn't great, it's not entirely my fault, right?

You can see that we put all our effort into this, so it couldn't be better.

If you want it better, you have to show up and do your part in the deal.

But if you don't, you know what happens.

That's my job, so I'll keep writing anyway.

And I want the record to reflect that I got my job today. ”

(Laughter) Because -- (applause) it all comes down to this, you know -- centuries ago in the deserts of North Africa, people would gather for this sacred dance and musical moonlight dance that lasted for hours until dawn.

The dancers were professional and great, so it was always great, right?

But every now and then, something very rare happens and one of these performers actually becomes transcendent.

You've seen a performance like this at some point in your life, so you know what I'm talking about.

It was as if time had stopped, the dancers passed through some kind of portal, nothing different from what they had done 1,000 nights ago, but everything came together.

And suddenly it seems like he's no longer just a human being.

He will be illuminated from within, illuminated from below, and all will be ablaze with divinity.

And when this happened, in those days people knew what it was and called it by that name.

They put their hands together and started chanting "Allah, Allah, Allah, God, God, God."

It's God, you know.

Interesting historical footnote: When the Moors invaded southern Spain, this custom was brought in, and its pronunciation changed over the centuries from "Allah, Allah, Allah" to "Ole, ole, ole". This pronunciation is still heard in bullfights and flamenco dances.

In Spain, when a player does something impossible and magical, there are incomprehensible words: "Allah, ole, ole, Allah, great, bravo" - a glimpse of God.

We need it, so that's great.

But for the dancers themselves, a complication arises the next morning. You wake up to find that it's Tuesday at 11:00 am and you can no longer see God.

He's just an old man with a bad knee, and he'll probably never climb that height again.

And perhaps no one will chant the name of God again as he spins, and in that case what will he do for the rest of his life?

This is tough.

This is one of the most painful reconciliations in creative life.

But if you didn't believe that the most special aspects of your being came from you in the first place, it might not need to be so painful.

But maybe if you believed they were on loan from some unimaginable source to take over the good parts of your life with someone else when it was over.

And when you think about it this way, everything starts to change.

This is how I've come to think, and certainly this is how I've been thinking for the last few months while working on the soon-to-be-published book as the dangerously terrifyingly over-anticipated sequel to my extraordinary success.

And when I get really excited about it, what I have to keep telling myself is don't be afraid.

Don't flinch. just do your job.

Whatever it is, keep showing up for your work.

If dancing is your job, dance.

If the divine, cheeky genius in charge of your case decides through your efforts to catch a glimpse of some kind of wonder for just a moment, then "Ole!"

If not, dance anyway.

And "Ole!" Still to you.

I believe this and feel compelled to teach it.

"Ore!" To you for nevertheless continuing to display pure human love and stubbornness.

thank you.

(Applause.) Thank you.

(Applause) June Cohen: Ole!

(applause)

[This talk contains graphic language and is recommended at the viewer's discretion] So this is the first and last slide seen by my 6,400 students in the last 15 years.

I don't believe you can build a multi-billion dollar organization unless it's clear which instincts and organs you're targeting.

Our species needs a super-existence.

Our competitive advantage as a species is the brain.

Our brains are strong enough to ask these very difficult questions, but unfortunately do not have the processing power to answer them, creating a need for a super-being that we can pray to and seek answers from.

What is Prayer?

When you send a question to the universe, hopefully there will be some kind of divine intervention - though we don't need to understand what is going on - from an all-knowing, all-powerful super-being that will give you authority that this is the right answer.

"Is my child okay?"

You have a planet of things, a planet of work, a planet of friends.

If you have children, you know that when something goes off their rails, everything from your universe to the sun, your children, melts away.

"Is my child okay?"

"Croup symptoms and treatment" in the Google query box.

One in six queries submitted to Google has never been asked in human history.

Is there a priest, a teacher, a rabbi, a scholar, a leader, a boss, so trusted that one-sixth of the questions posed to him have never been asked before?

Google is the god of modern man.

Imagine your face and name over everything you put in that box. Then you will find that you trust Google more than anyone else in your history.

(Laughter) Let's go further down the torso.

(Laughter) Another great thing about our species is that not only do we need to be loved, we need to love others.

Children who are poorly nourished but well loved do better than those who are well nourished but poorly loved.

But there are three best signals that you might be part of the world's fastest growing demographic: centenarians and people living into triple digits.

In reverse order, genetics aren't as important as you think, so you can keep treating your body like shit and thinking, "Oh, Uncle Joe lived to be 95, the dice have been rolled."

It's less important than you think.

The second is lifestyle.

Don't smoke, don't get obese, get pre-screened, and we'll eliminate about two-thirds of early cancers and cardiovascular disease.

The biggest indicator or signal for you to reach triple digits: How many people do you love?

Attentiveness determines whether security cameras (what we call low-resolution security cameras in our brains) add value.

Facebook taps into our instinctive desire to not only be loved, but to love others, primarily through photographs that create empathy, catalyze and strengthen relationships.

Let's continue our journey to the torso.

Amazon is our consumption gut.

The instinct of “more” is built into us.

Too little and the penalty is starvation and malnutrition.

Open a cupboard or open a closet and you'll get 10 to 100 times more than you need.

why?

Because the penalty for too little is much greater than the penalty for too much.

Therefore, “doing more with less” is a business strategy that will never go out of style.

It's China's strategy, it's Walmart's strategy, and it's Amazon's strategy, which is now the most successful company in the world.

More goes into your gut for less. Digested and sent to muscle and skeletal consumption systems.

Going further, once you know your basic instinct, survival, move on to your second strongest instinct. It's about choosing the strongest, smartest, and fastest seeds spread across the four corners of the earth, or picking the best seeds.

This is not a watch.

I haven't had a scratch in five years.

It's my futile attempt to tell people, "Your children are more likely to survive if you mate with me than if you mate with someone who wears a Swatch watch."

(Laughter) The key to business is using the irrational organ.

“Irrational” is a Harvard Business School and New York Business School term referring to large profit margins and shareholder value.

"High calorie paste for children"

no?

I love you obsessed mom.

Why picky moms choose Jif: Because it makes them love their kids more.

From World War II to the advent of Google, the number one algorithm for shareholder creation was to take an average product and appeal to people.

Buy this average soap and this average soap and you'll be a better mother, a better person, a better patriot.

Now, the biggest algorithm for shareholder value isn't technology.

Look at the Forbes 400.

Take out the inheritance, take out the finance.

The greatest source of wealth creation is the appeal to the reproductive organs.

Loaders. LVMH, the richest man in Europe.

2nd and 3rd place: H&M and Inditex.

We want to target the most unreasonable institutions for shareholder value.

As a result, Apple, Amazon, Facebook, and Google are no longer clear about who we are.

God, love, consumption, sex.

You are the proportion of your approach to them and they have reframed who we are in the form of a commercial enterprise.

At the end of the Great Recession, the market capitalization of these companies was comparable to Niger's GDP.

It now rivals India's GDP and overtook Russia and Canada in 2013 and 2014.

Only five countries have a GDP greater than the combined market capitalization of these four companies.

But something is happening.

Exactly one year ago, the conversation was about which CEO is more like Jesus.

Who was running for president?

Now the worm has turned.

Everything they do annoys us.

We are afraid they are tax evaders.

Walmart has paid $64 billion in corporate taxes since the Great Recession. Amazon paid 1.4.

How will the world's most successful companies pay firefighters, soldiers and social workers if they don't pay their fair share?

Very easy.

That means unsuccessful companies have to pay more than their fair share.

Alexa, is this a good thing?

This is despite the fact -- (Laughter) This is despite the fact that Amazon added Walmart's market cap to its own market cap in the last 19 months.

Who is to blame? It's our fault.

We are electing regulators that do not have the backbone to actually pursue these companies.

Facebook has lied to EU regulators, saying, "It is impossible to share data between our core platform and our proposed acquisition of WhatsApp."

Please approve the merger. ”

They approved the merger, and then -- spoiler alert! -- They understand it.

And the EU "feels deceived.

We will impose a $120 million fine,” which is about 0.6% of the $19 billion purchase price.

If Mark Zuckerberg could take out insurance that the deal would be completed at 0.6%, wouldn't he?

Anti-competitive behavior.

$2.5 billion in fines, $3 billion in cash flow, and 3 percent of cash on Google's balance sheet.

We are telling these companies that ``the smart move, the shareholder-driven move, is to lie and deceive.''

We issue parking passes for 25 cents on the $100 hourly meter.

To be wise is to lie.

Job destruction!

Amazon only needs one for every two people at Macy's.

If they grow their business by $20 billion this year, we will lose 53,000 cashiers and clerks.

This is nothing new. This is happening across our economy and I have never seen a company this good.

It's one of the workers' Yankee stadiums.

Even worse in the media.

If Facebook and Google grow their businesses by $22 billion this year, they will, but we're going to lose about 150,000 creative directors, planners and copywriters.

Or you could fill two and a half Yankee Stadiums and say, "You're out of work, courtesy of Amazon."

We get most of our news today from our social media feeds, and most of our news comes from our social media feeds...

fake news.

(Laughter) You're not allowed to say anything political, or swear, or talk about religion in class, so you can never say, 'Zuckerberg has become Putin's bitch.'

Absolutely not.

(Laughter) Their defense: "Facebook is not a media company. It's a technology company."

Create original content, pay sports leagues to provide original content, and advertise against it. --You are a media company.

Over the past few days, Sheryl Sandberg has repeated the lie that "we are not a media company."

Facebook openly embraces the interests of celebrities and the influence of media companies, but seems to be allergic to the responsibility of media companies.

Imagine McDonald's.

It turns out that 80 percent of their beef is fake and it's giving us encephalitis and we're making horrible decisions.

And we say, "McDonald's, we're mad!"

And they say, "Wait a minute, we're not a fast food restaurant. We're a fast food platform."

(Laughter) These companies and CEOs are dressed in neon blue pink rainbows and blue blankets, creating fantastic tricks out of their everyday actions. This alludes more to the birth of Darth Vader and Ayn Rand.

why? Because, as progressives, we are seen as good people but weak.

If Sheryl Sandberg was writing a book about gun rights and the pro-life movement, would they fly her to Cannes?

no.

And while I don't question their progressive values, it goes against shareholder values. Because as progressives we are seen as weak.

They're very nice -- remember Microsoft?

They didn't seem to be such good people, regulators stepped in much sooner than they do now, and regulators never stepped in on those kind, good people.

I'm about to board a flight tonight and I'm supposed to be molested by a guy named Roy from the TSA.

If you suspect a drunk driver on your way home, you can have your blood drawn.

wait a minute! Your iPhone is sacred, don't touch it.

This is our new cross.

It should be called "iPhone Cross" instead of iPhone X.

we have our religion. Apple.

Our Jesus Christ is Steve Jobs and we have decided that this is more sacred than our people, homes and computers.

We are completely spiraling out of control with innovation and a terrible idolatry of youth.

We are no longer an altar of character and kindness, but an altar of innovation and those who create shareholder value.

Amazon has become so powerful in the market that it can now perform Jedi mind tricks.

Just looking at other industries can start to hurt.

After Nike announced its sale on Amazon, Nike's inventory rose while all other shoe inventories fell.

As Amazon stock goes up, the rest of the retail stocks go down. Because they assume that what is good for Amazon is bad for others.

They cut salmon costs by 33% when they bought Whole Foods.

Between announcing the acquisition of Whole Foods and closing, Kroger, America's largest pure grocery store, lost a third of its value as Amazon bought a grocery store 1/11th the size of Kroger.

I was very lucky.

I predicted Amazon's acquisition of Whole Foods the week before it happened.

I am proud of this. I have said this publicly in the media.

This was the largest acquisition in their history, and they had never had an acquisition above $1 billion, so people asked, "How did you know this?"

So I introduce the secret to this very impressive audience.

how did you know this?

I will tell you how I found out.

I bark at Alexa all day long, trying to figure out what's going on.

(Scott Galloway) Alexa, buy whole milk.

(Alexa) I couldn't find one for whole milk, so I added whole milk to my shopping list.

SG: So I asked (SG) Alexa, buy organic food.

(Alexa) The top search results for organic foods are Plum Organics Baby Foods, Bananas, Pumpkins, 12 packs of 4 oz each.

$15 total.

Why not buy?

SG: And, as is often the case at my age, I was confused.

(SG) Alexa, buy whole foods.

(Alexa) I bought the outstanding shares of Whole Foods at $42 per share.

We charged 13.7 billion to your American Express card.

(laughs) SG: I thought that would be more interesting.

(Laughter) We've personified these companies, but just like when you're really upset about every little thing someone does in your life or relationship, you have to ask yourself, "What's going on here? Why am I so disappointed in technology?"

I think this is because the ratio of 1 percent chasing shareholder value and 99 percent enhancing humanity that was once driven by technology has been reversed, and now it's completely focused on shareholder value and not humanity.

The Manhattan Project attracted 100,000 people and literally saved the world.

Technology saved the world.

My mother was a four-year-old Jew living in London at the beginning of the war.

Would she have survived if we hadn't won the race to split the atom?

It is unlikely.

Twenty-five years later, perhaps the most impressive achievement in human history is landing a man on the moon.

430,000 Canadians, British and Americans once again rallied with very basic technology to land mankind on the moon.

Today, we have 700,000 top talent. These are the brightest people selected from the four corners of the earth.

They literally play with lasers compared to slingshots and water guns.

They earn India's GDP.

And after 10 years of studying these companies, I understand what their mission is.

Is it to organize the world's information?

Is it to connect us?

Is it to create more politeness in humans?

it's not.

I know why we came together - the greatest collective of IQ capital and creativity, and I know their sole mission is to sell another fucking Nissan.

My name is Scott Galloway and I teach at New York University. Thank you for your time.

(Applause.) Chris Anderson: By no means, Scott, you prompted me to ask a few questions.

(Laughter) It was a beautiful rant.

SG: Is this like Letterman?

If you do well, will he call you to the couch?

CA: No, no, we're going to get to the heart of the conversation now.

We all know that suddenly, after years of worshiping Silicon Valley, the worm has taken such a big turn.

For some people here, just piling up will feel like you're kicking kids who've already been kicked anyway.

Don't you feel any sympathy for them?

SG: Nothing.

See, here's the problem. It's not their fault, it's our fault.

they are a commercial enterprise.

They don't care about the state of our souls.

They are not going to take care of us when we are old.

We are building a society that puts shareholder value above all else, and they are doing what they are supposed to do.

But we need to pick people and subject them to the same scrutiny that other businesses endure.

CA: There is another theory that fits the facts almost as well. That is, many, but not necessarily all, employees actually have good intentions in their leadership.

We all know the people who work for those companies, and they're still pretty convincing that their mission is next -- so another story is that there are unintended consequences here, and the technologies, algorithms, that we're unleashing, trying to personalize the Internet, say A, have had weird effects like filter bubbles that we didn't expect. And B became vulnerable to strange things like Russian hackers creating accounts and doing things we didn't expect.

Are there possible unintended consequences?

SG: I don't think so -- statistically they are definitely better people than any other organization with over 100,000 employees.

I don't think they are bad people.

In fact, I would argue that there are many decent leaders who are very civic-oriented.

But here's the problem. If you're trying to grow your market share by controlling 90 percent of the market share in the search market, which is currently larger than the entire advertising market in any country, and you're primarily paid to ensure the financial security of yourself and your employees' families, you can't help but use all the power at your disposal.

And that is the basis of regulation and the historical truism that power corrupts.

They are not bad people. We just let them spiral out of control.

CA: So maybe this is a little exaggerated?

I know at least a little bit of people like Larry Page and Jeff Bezos, but I don't really believe they wake up in the morning and think, 'I have to sell a fucking Nissan.

I don't think they think so.

I think they're trying to build something cool, and I think they're probably just as horrified as we are by some of the things that happened in the past.

So is there a way to express this in another framework? I mean, can we say that when a model is advertising, there's a danger and we should take it more seriously?

SG: I think it would be very difficult to set up an organization like ours to pursue shareholder value above all else.

They are not non-profit organizations.

People go to work there mostly because they want to ensure the financial security of themselves and their families first and foremost.

And once you have too much economic power under your control, you end up using all the weapons at your disposal.

I don't think they're bad people, but I think the role of the government, and ours as consumers and those who choose officials, is to ensure that there are some checks here.

And we gave them the mother of all hall passes because we found them so appealing.

CA: Scott, you said it eloquently and beautifully.

Mark Zuckerberg, Jeff Bezos, Larry Page, Tim Cook, if you're watching, please come and respond.

Scott, thank you very much.

SG: Thank you.

(applause)

Hello.

It is said that in his career he was asked to speak at TEDx twice. Once on the way up and once on the way down.

(Laughter.) And let me say, "I'm glad you're back."

(Laughter) Laughter, that's our topic today.

Laughter - I may not be able to express it very well, but let's shine a light on it and ask the question: what is it and what role does it play in our lives and society?

I would like to tell you four jokes today.

That's all.

I'm going to tell you four jokes. And all lessons are drawn from these four jokes.

Before I tell my first joke, I'm in Munich and I want to do a little experiment.

There are also terrible things said about the Germans' sense of humor, especially that they have no sense of humor.

(Laughter) And I'd like to do an experiment to test this scary assumption.

Therefore, when I tell this first joke, I ask that only Germans here respond.

(laughter) It's up to you to laugh or not.

But don't force yourself to laugh to distort the results.

(Laughter) This is a science experiment, very serious.

Now for the first joke.

There is a man He's dying in his bed at home (laughs). And from the kitchen he smelled the most sublime smells.

It smells like his favorite chocolate chip cookie.

With the last of his strength, he got out of bed and went to the kitchen to find his wife of 50 years cooking up beautiful chocolate chip cookies.

Fresh out of the oven, four are on the plate.

Then, with the last of his human strength, he reaches out for one of the biscuits. When his wife saw him, she ran up and clapped his hands and said, "No, it's for the funeral."

(laughter) Newsflash, "It's finally clear at the TEDx talks that Germans have a sense of humor.

(Laughter) So, the next statement. Here is the statement to you. A person who has lost the power to laugh loses the power to think.

When you lose the power to laugh, you also lose the power to think.

In other words, the smartest people in the world I know are the funniest people.

The smarter they are, the more interesting they are.

And why should it be?

The answer for me is that seriousness is not the right response to life's absurdity.

Human comedy creates beings like us who are sophisticated enough to ask the big questions, 'Why are we here?' and 'Who are we?

Two elderly couples are walking down the street.

Two women were walking in front of two men, and one of the men said to the other, "What did you do last night?"

And the second man said, "Oh, I've been to this restaurant.

It was amazing.

The food was great and the price was great.

Absolutely super awesome. ”

And the first one says, "Wow, that's great.

What was the name of that restaurant? ”

Then the second man said, "Oh!

What is the name of that flower that smells good?

The stems are red and have small thorns. ”

And the first people say, "It must be a rose."

Then the second man said, "Of course."

"Rose, what's the name of that restaurant we went to last night?"

(Laughter) (Applause) To me, that joke is as precious as a Monet painting or a Shakespeare sonnet.

Laughter has always been very important to me.

Seriousness - I hope you agree with me - seriousness is dangerous.

Seriousness is dangerous not only to oneself but also to society.

And why should it be?

I think that's partly because seriousness, the power of seriousness, and the lack of humor limit us to narrow thinking, rigid ideologies, cruelty, and tunnel vision, while humor obliges us to be open-minded.

It mandates empathy and forgiveness.

Humor always forgives.

The relationship between humor and seriousness has long been understood.

The famous witty Winston Churchill once said, "You can't hope to understand the most serious things in life unless you understand the most humorous things."

American civil rights activist Clarence Darrow wrote, "When you lose the ability to laugh, you lose the ability to think."

When you lose the power to laugh, you also lose the power to think.

These two men dealt with politics at a very high level and knew well that sometimes only humor can break entrenched positions and rigid ideologies.

There was a Lufthansa flight from Munich to New York.

The flight went very smoothly.

When we were almost in New York, there was a huge explosion from the right wing of the plane, and the captain's voice came over the loudspeaker and said (in a German accent), "Hey guys, please, there's a problem with engine number 3 on the right wing of the plane.

Don't panic. This aircraft has four engines.

We have... (bang) We have problems with the first engine, but we have two very good engines... (bang) We have one engine, but the pilot swears it's the most capable of flying a plane by itself...

(explosive sound) Everyone, we'll land on the water soon.

(Laughter) I'm talking from above the water. Don't panic. ”

Of course, the Lufthansa pilot lands beautifully.

Then the captain's voice came through the loudspeaker again and said, "Thank you for following my instructions.

Now listen very carefully to what I am about to say.

If you can swim, line up on the right wing of the plane.

If you can't swim, line up on the left wing of the plane and I'll speak from the water. ”

So they did everything he said, and finally saw a little captain rowing in front of the plane in a rubber dinghy, and he held a loudspeaker and said, "Ladies and gentlemen, congratulations again for following my instructions.

Now listen carefully to what I say.

First, on the right wing of the plane, New York is here.

(Laughter) The distance is only three nautical miles, the water is warm, the current is with you.

Good luck.

To everyone on the left wing of the plane, thank you for flying with Lufthansa. (Laughter) (Applause) Why do we laugh? why did you just laugh

Why do some people laugh?

Now, this question has puzzled philosophers for thousands of years.

And the best of them are Plato, Freud, Wittgenstein and Nietzsche.

Here's what they came up with.

They said the reason we laugh is our ancient reaction when animal danger has passed.

That's the best they can come up with, and we laugh because it's our ancient reaction to the animal danger gone. From there, I think we can conclude that asking a philosopher for a definition of comedy is like asking Stevie Wonder to help you find your car keys.

(Laughter) Just as you can't have a mathematical proof that isn't built from pure mathematics, you can't have a theory of unfunny laughter.

So let's try again.

Let's go here today to define comedy better than Plato, Nietzsche or Freud.

I hunted around for the oldest jokes I could find and found one.

The tree is 1,000 years old.

At the end of the first millennium, this was knocking them out (laughs) and it goes like this.

There was a funeral at the church.

Imagine a medieval church. Everyone is crying big tears, except for one man.

And the priest realized that one man was not crying, and at the end of the service he approached the one man and said, "Do you know the dead?"

The men said, "Yes, we did."

And he said, "So why aren't you crying?"

And he said, "Yes, but I don't belong to this parish."

You'd have to accept that 1000 years ago it was a murderer.

(Laughter) But this show tells us something interesting about comedy. That means you have to belong to a parish to understand the joke.

Tell me what I mean

To understand jokes, one must belong to a parish, a community of understanding. And if you feel that you belong to that community of understanding, that community of understanding jokes, you will laugh at almost anything that reinforces your sense of belonging to that group.

Jokes bring us together and envelop us.

And in pure gratitude for that embrace, our mouths open, our chests fill with air, and our bodies do utterly amazing things. They emit a sound that no other creature did or never in the entire history of the universe: laughter.

And what a privilege it is to be able to make others laugh.

So when you make other people laugh, it's not just funny.

It's not trivial.

You are the bringers of hope, the hosts of the stranger, the eradicators of despair, the physicians, the peacemakers.

I would like to read a little statement.

It's a quote, so I wrote it.

“Comedy is the collision of one point of view with another, one sensibility with another, lofty with low, east with west, light with dark, old with young. It is the clash of two worldviews of two civilizations.

I thought it was a great name. I wrote this morning.

(Laughter) I want to give you an example of how you can use humor to break out of entrenched ideas and entrenched positions.

In 1995, during the Second Palestinian Intifada, I was in London to see the great Jewish comedian Jackie Mason.

Great, some of his comments are very controversial.

He was doing his usual show very funny, but at one point he said he wanted to be very serious. Of course, if you know Jackie Mason, audiences were very apprehensive that Jackie would say something very controversial, and he did.

“I want to talk about the Palestinian issue,” he said, and you could feel the tension in the room.

And he said - this is what he said.

"I believe that Prime Minister Benjamin Netanyahu wants peace.

I believe this

In fact, I think he will give the West Bank back to the Palestinians this very day, this very day. But I can't do that because it's already in my wife's name. ”

(laughter) And the laughter from the audience, which was mostly Jewish, was so loud it lasted five minutes.

It was hysterical.

And in those five minutes, I couldn't help but feel that the possibility of peace had somehow advanced, that compromise had somehow come a little closer, and that it was something to laugh about.

If we can laugh together, we can live together.

Do you know what I think the secret of life is?

Some would say it's knowledge, but it seems to me that we haven't learned much in human evolution.

History is a great teacher, but we seem to be very poor students.

I think it's a laugh for me.

Laughter, true husband, doctrine's greatest enemy, turning the wreckage of existence into gold.

Someone asked me recently, "How would you like to die? Do you have any ideas?"

And I thought for a moment and said, "I want to die in my sleep, quietly, without screaming, like my father did."

(Laughs) The last line of a joke is called a punchline in English, but I think in German it's ``die Poente'' in ``Deutsch''.

It's the line where miracles happen. The line that surprises with the revealing of something and releases joy from that surprise.

And my farewell wish to all of you here today is that your own life becomes a joke.

(laughter) Yes, I hope your life is all jokes and has a punch line. (in German) "No, it's for the funeral" "It's already my wife's name" "I'm not yelling like a passenger" "Thank you for flying with Lufthansa", he says, as much as "di poente".

keep it funny laughing peace.

(applause)

"Theme and Variations" is one of those forms that requires some kind of intellectual activity to compare the themes and variations that are always in your head.

One might say that the theme is natural and everything that follows is a variation on that theme.

About six years ago, I was asked to paint a series of paintings that somehow celebrated the birth of Piero della Francesca.

And it was very difficult to imagine how to make a painting based on a clown, until I realized that I could see the clown as nature, that is, I could see Piero della Francesca in the same way that I look at the tree outside the window.

And it was a big release for me.

It may not be a very insightful observation, but it was a real start for me on the path to being able to paint certain themes and variations based on Piero's work, in this case the remarkable painting The Duke of Montefeltro, in the Uffizi, confronting his spouse Batista.

Once I realized that I had some leeway with the subject matter, I did the following series of drawings.

That's the real Piero della Francesca. One of the greatest portraits in human history.

These are presented without comment.

This is just a series of variations on the head of the Duke of Montefert, a great figure of the Renaissance and perhaps the basis for Machiavelli's The Prince.

He seems to have lost one eye in battle, so he is always depicted in profile.

And this is Batista.

Then I decided to move them around a bit. Then, for the first time in history, we will all be heading in the same direction.

husband! We passed each other.

And a visitor from another painting of a clown, this one from "The Resurrection of Christ" - it was as if the cast had just come out of the set to have a chat.

And now four large panels. This is top left. upper right; lower left; lower right.

By the way, I don't quite understand the conflict between abstraction and naturalism.

There seems to be no controversy there, since all paintings are abstract in nature.

On a different note -- (Laughter) -- one day my wife and I were driving through the country and saw this sign and said, "Great design."

And she said, "What are you talking about?"

I said "It's very convincing, because the purpose of the sign is to direct you to the garage, and most people are very suspicious of garages and know they'll get ripped off, so they use the word 'reliable.'" But they say, 'reliable.'

But he's a good Dutchman." -- (laughter) -- "Great!"

Because as soon as you hear the word Dutchman - it's an old-fashioned word, no one calls the Dutch "Dutchman" anymore - but as soon as you hear the Dutchman you think of a picture of a child sticking his finger in a dike to prevent it from falling and flooding Holland.

And this whole problem is detoxified by the use of "Dutchman".

Now, if you think this is a bit of an exaggeration, just replace it with something else, like "Indonesian".

(laughs) Or you could say "French".

(Laughter) Now, you know that "Switzerland" works, but at a huge cost.

(Laughter) I'll give you a quick rundown of the actual process of creating a poster.

I do a lot of work at visual arts schools, where I teach, and the principal of this school, an outstanding person named Cyrus Rose, would often hand me textbooks and say, "Do something with this."

And he did.

And this was the text: "The same rules would apply to words and fashion/Too new and too old are equally good/Don't be the first to try the new/And don't be the last to set aside the old."

I couldn't do anything about it.

And I really struggled with this.

And the first thing I did was when I didn't have any other ideas, I thought I'd write it down, make some words bigger, and put some design on the back. And, as is often the case, I expected to stumble upon something.

So I tackled it again -- gotta keep moving -- and I wrote some words on colored paper and stuck it to the ugly board.

It's Alexander Pope's work, so I was hoping something like "words rule the great new old first last last pope" would come out of it. But I kind of messed it up and then thought I'd repeat it somehow for readability.

So it went nowhere.

Sometimes, during a persistent issue, I write down what I know about it.

But there you can see the beginning of the idea. Because I see the word "new" emerging from the word "old".

That kind of thing happens.

There is a relationship between the old and the new. The new comes out of the context of the old.

I made some variations of it, but it still didn't quite fit together graphically.

I had another version of this which was interesting in that I could build it in my head from the clues.

W was clearly W and N was clearly N, even though it was very fragmented and didn't contain much information.

Then I took the words 'new' and 'old' and was now retreating to the point of no return.

(Laughter) At this point, I was really hopeless.

So I did something really embarrassing by combining two paintings that I did for different purposes.

It says "dream" at the top.

And I was trying to do something, and I said, 'Well, change the copy.

Let me tell you about my dreams, coming to SVA is like a dream come true. ”

But to my credit, I didn't submit this sketch because I was so embarrassed to do it.

And finally arrived at the following solution.

It doesn't look very interesting, but it's different from many other posters.

First, it deviates from the notion of what posters should be, which need not be explained, but should be immediately understood and seen.

I remember hearing people in graphic arts say, "I have to explain, but it doesn't work."

Then one day he woke up and said, "Isn't that true?"

(Laughs) The explanation on the bottom left says:

It says, "Comment: This poem is impossible.

Cyrus usually has a great touch with his choice of quotes.

This doesn't produce an image at all. ”

I'm exposing myself to the audience now, right?

That's something I would never want to do professionally.

"Maybe words alone can create an image without anything else happening.

What is the point of this poem?

If you want to be serious, don't follow trends.

Is it trendy to make posters like this?

I think we can further simplify this idea by suggesting that the new emerges through the old in this way. ”

And then I'll show you a little picture--see, remember that old one I threw away?

Well, I found a way to use it.

So there's a small alternative out there, and I say "not bad," while criticizing myself, but "more didactic than visual.

Perhaps the point is that the old and the new are locked in a dialectical embrace, a kind of dance that defines each other. ”

And then ask yourself: "Am I thinking simple?"

Is this something simple that seems obvious, or something that seems deep?

There is a big difference.

This can be embarrassing.

In fact, I find that fear of embarrassment drives me as much as ambition.

Do you think this kind of thing can really attract students to your school? ”

(Laughter) Well, I think there are two fresh points here. Two fresh points.

One is a kind of willingness to expose yourself to a critical audience and not imply that you are confident in what you are doing.

And you know, we need a front.

In other words, you have to be confident. If you don't believe in your work, who else will believe it?

So it's one thing to introduce the concept of doubt into graphics.

It can be a big contribution.

The other is actually offering two solutions for the price of one. If you buy the big one and don't like it, how about the small one?

(Laughter) That's also a relatively new idea.

Here is a series of experiments that I ask questions about. Should the poster be square?

Now, this is a bit of a delusion.

The poster is not folded.

Unfolded, it is a photo, cut diagonally.

The top left corner has the same cheesy trick.

And this is a very strange poster. I use isometric perspective in my computer, so I can't stand still in space.

Sometimes the back looks wider than the front and then it shifts.

The longer you sit here, the more you'll float off the page and into the audience.

But I don't have time.

(Laughter) And then there's an experiment -- I'll tell you a little bit about the nature of perspective. The outline is determined by the peculiarities of perspective, but the shape of the bottle, which is the same as the outline, is seen from the front.

And another piece from the Art Directors Club is "Anna Reese", which casts a long shadow.

This is also a poster from the Visual Arts Department.

We had 10 artists invited to participate, and it was one of the most competitive, and we didn't want to embarrass ourselves, so we worked hard.

The idea, which was a great idea, was to distribute 10 posters all over the city's subways, and see a different poster every time you took the subway, all of which had a different idea of ​​what art was.

But I was completely caught up in the idea of ​​"what is art?" and was trying to figure out what art was.

But then I gave up and said, "Well, any art will do."

And the moment I said that, I saw the word "hat" hidden in the word "whatever" and came to the inevitable conclusion.

But again, this is on my list of didactic posters.

My intention is to have a literary appendix explaining the poster in case you don't understand.

(Laughter) It says, "Note to the reader: I wanted to use the modern visual cliché Magritte's Everyday Person to express the idea that art is mystery, continuity, and history.

I also believe that in the age of computer manipulation, Surrealism has become banal and has lost its former glory.

The phrase 'art can be anything' describes the current inclusiveness surrounding art making, something like the notion that 'it's not what you do, it's how you do it'.

Magritte's shadow falls on the central part of the poster, a poetic event that occurs when the shadow man separates the word "hat" hidden within the word "something". The four hats shown on the poster suggest how art is defined. It is the thing itself, the value of the thing, the shadow of the thing, the form of the thing.

Anything is fine. "

(Applause.) Okay.

(Applause.) And the one I didn't submit, which I still love, wanted to use the same phrase.

A few years ago there was a wonderful experiment with letterforms by Bruno Munari. In other words, try to see if you can read the characters no matter how far you read.

And that thought stuck in my head.

But I took the removed part and put it on the bottom.

And of course they are ruins and labeled.

But what really happens is to read that "art is what is left over."

thank you.

(applause)

Pablo Neruda published his first book of poetry at the age of 19.

He won the Nobel Prize for Literature, rescued 2,000 more refugees, spent three years in political exile, and ran for president of Chile.

A romanticist and revolutionary, Neruda was one of the most famous poets of the 20th century, but also one of the most accessible and controversial.

Originally written in Spanish, his poetry often uses straight words and everyday experiences to create lasting impact.

Neruda was born Ricardo Eliezer Neftali Reyes Basoalto in 1904 in a small town in Chile.

His father did not want him to become a poet, so he began writing novels at the age of 16 under the pseudonym "Pablo Neruda". The poems in his early collection, 20 Poems of Love and Songs of Despair, were tender and insightful, highlighting the subtleties of love and enchantment.

For example, in "Poem VI" he writes: "Your memory is of light, smoke, and quiet ponds!/Beyond your eyes, the twilight was burning."

Many of the 225 short poems in his collection of poems, All the Odes, are dedicated to the seemingly insignificant little items around us, from shoelaces to watermelons.

Onions have more beautiful / dazzling feathers than birds, but tuna in the market are bullets from the deep / Projectiles swimming in the sea, I saw you dead.

Despite this early literary success, Neruda struggled financially and held a series of diplomatic posts in places such as Burma, Indonesia, Singapore and Spain.

In 1936, while Neruda was working at the consulate in Madrid, civil war broke out and the government was overthrown by a fascist military dictatorship.

Neruda organized the evacuation of refugees from Spain to Chile, saving 2,000 lives.

Neruda has compiled 20 years of her experiences abroad into a three-volume poetry collection entitled Habitation on Earth.

Many of these poems were experimental and surreal, blending epic landscapes, supernatural themes, and longing with debates about the poet's responsibility to speak out against political conflict and injustice.

In "I will explain a few things" he recounts haunting details about the destruction of the Spanish Civil War.

Throughout the rest of his life, Neruda continued to adhere to revolutionary ideals.

His politics kept him in exile for several years before he was able to return to Chile in 1952.

While in exile, he published the influential Canto General.

The book attempts to retell the entire history of Latin America through poetry, touching on everything from its flora and fauna to politics and warfare, but above all, it pays tribute to the common people behind the feats of that civilization.

Neruda continued to travel, but after returning from exile spent the rest of his life in Chile.

In 1970, the 66-year-old Neruda ran for Chilean president, then fell to Salvador Allende and became his close aide.

However, in 1973, Allende was overthrown in a military coup by General Augusto Pinochet.

Neruda died in hospital a few weeks later.

He died shortly after the coup, leading to rumors that he died of grief or that he had been assassinated, but the hospital recorded the cause of death as cancer.

Today, Neruda's lines are read at protests and marches around the world.

Much like his life, Neruda's poetry bridged romance and revolution by highlighting everyday moments worth fighting for.

In the mid-16th century, a talented young anatomist named Andreas Vesalius made a shocking discovery that the world's most famous human anatomy textbook was wrong.

Not only were they unable to explain many details of the human body, but they were also unable to explain the organs of apes and other mammals.

Vesalius knew he was right, but to announce these mistakes would mean challenging the most famous physician in the history of medicine, Galen of Pergamum.

But who was this towering figure?

And why would doctors working more than 1,300 years later admire and fear him so much?

Born in 129 AD, Galen left home as a teenager to seek medical wisdom in the Mediterranean.

He returned home as a talented surgeon with a passion for anatomy and a flair for showmanship.

He gleefully entered an open anatomy contest and wanted his fellow doctors to participate.

In one demonstration, a nerve was tied and a pig lost its voice.

In another photo, he dissected a monkey's internal organs and asked a colleague to fix it.

When they couldn't, he did.

These grizzly feats earned him a position as the city's Gladiator Surgeon.

Eventually, he left the arena and became the personal physician to four Roman emperors.

While colleagues debated symptoms and their origins, Galen obsessively studied anatomy.

He believed that each organ had a specific function.

Since the Roman government almost forbade working with human corpses, Galen dissected countless animals instead.

Despite these limitations, his exhaustive research yielded some surprisingly accurate conclusions.

One of Galen's most important contributions was the insight that the brain, not the heart, controlled the body.

He confirmed this theory by opening the skull of a live cow.

By applying pressure to different parts of the brain, they were able to link different areas to specific functions.

Other experiments allowed him to distinguish between sensory and motor nerves, establish that urine was produced in the kidneys, and deduce that breathing was controlled by muscles and nerves.

However, these barbaric experiments also created a terrible misunderstanding.

Galen had no idea that blood was constantly circulating throughout the body.

Instead, he thought, the liver was constantly producing an infinite amount of blood that would be completely depleted during its one-way transfer to the organ.

Galen is also credited with solidifying the general theory of the tetrahumoral theory.

Introduced centuries ago by Hippocrates, this erroneous hypothesis believed that most medical problems resulted from an imbalance in four bodily fluids called humours.

To correct the balance of these fluids, doctors employed dangerous remedies such as phlebotomy and evacuation.

Due to his poor understanding of the circulatory system, Gehlen was a strong advocate of these treatments, despite their sometimes fatal consequences.

Unfortunately, Galen's ego led him to believe that all his discoveries were of the utmost importance.

He wrote treatises on everything from anatomy to nutrition to bedside manners and meticulously cataloged his writings to ensure their preservation.

For the next 13 centuries, Galen's prolific collection dominated all other schools of medical thought.

His text became the standard work to teach new generations of physicians, who wrote new essays praising Galen's ideas.

Even physicians who actually dissected human cadavers would inexplicably repeat Galen's mistake, despite seeing clear evidence to the contrary.

On the other hand, the few practitioners who boldly expressed opposing views were either ignored or ridiculed.

For 1,300 years, Galen's legacy remained untouched until the Renaissance anatomist Vesalius made his accusations against Galen.

As a prominent scientist and lecturer, his authority influenced many young doctors of his time.

But even then, it took another 100 years for an accurate description of blood flow to emerge, and another 200 years for the tetrahumor theory to fade.

Hopefully, today we can reap the benefits of his experimentation without attributing equal credence to Galen's less accurate ideas.

But perhaps equally valuable is a reminder that science is an ever-evolving process, and that evidence should always take precedence over egos.

Introducing Odontochelys semitestacea.

This tiny creature spends its days splashing in the swamps of the late Triassic period, along with many other reptiles.

Beneath the surface lies the greatest defense against attack. It is the hard shell of the abdomen.

Odontochelys is an early ancestor of turtles.

The half-shelled body illustrates an important point about modern turtles. There are actually two carapaces that develop completely separately while the turtle is still a fetus.

Both are extensions of the animal skeleton, and together they consist of almost 60 bones.

Like other embryos, turtle embryos are composed of undifferentiated cells that, through gene activity and cell-to-cell communication, become specific cell types and then organs and tissues.

Initially, turtle embryos look very similar to other reptile, bird, and mammal embryos, except for a cell bulge called the carapace bulge.

Ridges extend around the body between the neck and hips to form a disc.

This leads to the formation of the upper part of the turtle's shell, called the carapace, possibly by attracting the cells that become the ribs.

The ribs move outward toward the carapace crest rather than curve downward to form the normal ribcage.

They then secrete signaling proteins that convert surrounding cells into osteogenic cells.

These 50 bones grow until they fuse and are connected with sutures.

Rings of bone secure the edges of the shell.

The outer layer of skin cells produces scales known as scales that cover the carapace.

The development of the lower half of the shell, the flank, is driven by neural crest cells, which generate various cell types such as neurons, cartilage, and bone.

A thick shield of these cells spreads across the abdomen and gathers in areas that generate nine plate-like bones.

Ultimately these are connected to the carapace by sutures.

Turtle shells have obvious advantages in protecting them from predators, but their hard shells also present some challenges.

As the turtle grows, the sutures between the carapace and ventral bones widen.

Most mammals and reptiles rely on a flexible ribcage that expands to allow breathing, but turtles instead use abdominal muscles attached to their shells, one for inhaling and one for exhaling.

So how did the shell evolve?

Although there are still gaps in the fossil record, the first step seems to have been thickening of the ribs.

The oldest known ancestor of turtles, a creature called Eunotosaurus africanus, lived 260 million years ago and bore little resemblance to modern turtles, but it had broad, flat ribs that anchored powerful forearm muscles.

Eunotosaurus was a burrowing creature that is thought to have dug its own dwellings in what is now southern Africa.

Odontochelys semitestacea represents another late stage in sea turtle evolution, with thick Eunotosaurus-like ribs, plus a protective abdominal plate.

The first fossil evidence of complete carapace features of a modern turtle is about 210 million years old and belongs to a species called Proganochelys quenstedti, which has fused ribs.

Proganochelys was able to move between water and land.

Unlike modern turtles, it could not fit its head into its shell, but had defensive spines on its neck.

Modern turtle shells are almost as diverse as the turtles themselves.

Sea turtles have flatter, lighter shells for streamlined glide through the water.

Land-dwelling turtles, on the other hand, have domed carapaces that slide off the predator's jaws to help turn their bodies up if they fall on their backs.

The shells of leatherback turtles and soft-shelled turtles lack the bony rings around the edges of the shell and the sturdy deck covering them, making it easier to squeeze into tight spaces.

I have been an urban police officer for nearly 25 years.

That's crazy, right?

During that time, I have served at every rank, from police officer to chief of police.

A few years ago, I made a startling realization.

Beginning in 2014, I began monitoring recruits cycling through police academies in New Jersey and found that women failed 65-80 percent of the time on various aspects of the physical fitness test.

Due to a policy change, you learn that new hires must pass a fitness exam within 10 short training sessions.

This affected women the most.

This change gave recruits approximately three weeks to pass the physical fitness test at the five-month academy.

But this didn't make sense to me.

Police agencies and police recruits invested heavily in enrolling recruits in academies.

Police recruits passed lengthy background checks, passed medical and psychological tests, and quit their jobs.

And many spent over $2,000 on fees and equipment to get kicked out within the first three weeks.

The dire situation in New Jersey prompted me to investigate the position of women in police officers across the country.

Fewer than 13 percent of police officers were found to be women.

It's a number that hasn't changed much in the last 20 years.

And in 2013, the last time data was collected, they made up just 3% of police chiefs.

We know we can improve these rates.

Other countries such as Canada, Australia and the UK have almost doubled the number of female police officers.

And New Zealand is making steady progress towards its goal of adopting gender equality by 2021.

Other countries are also actively working to increase the number of women in the police force, knowing the vast body of research evidence spanning more than 50 years detailing the benefits of women in the police force.

The study found that female police officers were less likely to use violence or be accused of excessive violence.

We know that female police officers are less likely to be named in lawsuits and public complaints.

We know that the mere presence of female police officers reduces the use of force by other police officers.

We also find that female police officers are generally as successful in quelling violent or aggressive behavior, even though they are subjected to as much, and sometimes more, violence than male police officers.

So while women have a huge advantage in policing, we are losing them to arbitrary fitness standards.

The problem is that there are approximately 18,000 law enforcement agencies in the United States, and 18,000 agencies whose fitness standards vary widely.

We know that the majority of academies rely on masculine ideals of the police force that are working to reduce the number of women in the police force.

This type of academy places an overemphasis on physical fitness, with little attention paid to subjects such as community security, problem solving, and interpersonal communication skills.

The result is training that does not reflect police reality.

Physical agility is only part of a police job.

Much of a police officer's day is spent mediating interpersonal disputes.

That's the reality of police.

These are my babies.

And by changing tests that yield different results, we can reduce disparities in policing.

A federal court said that men and women are simply not physiologically alike for the purposes of fitness programs.

And it's based on science.

Agencies deeply respected by law enforcement, including the FBI, the U.S. Marshals Service, the Drug Enforcement Administration, and even the U.S. military, rigorously test fitness programs to ensure they measure fitness without gender-neutral results.

why is that?

Because hiring is expensive.

They want to recruit and retain qualified candidates.

Do you know what else the study found?

Well-trained women are just as competent as men in overall fitness, but more importantly in police methods.

Law enforcement is clearly facing a recruitment crisis.

But if you really want to increase the number of applicants, you can.

By training well-qualified candidates to pass the validated, work-related physiological fitness tests required by Title 7 of the Civil Rights Act, we can easily recruit more women and enjoy all the benefits of our research.

We can increase the number of women and reduce the gender gap simply by changing the tests that produce different results.

We have all the tools.

We have research, we have science, we have law.

Folks, this should be a pretty easy fix.

thank you.

(applause)

So, in the winter of 2012, I visited my grandmother's house in South India. By the way, that's where mosquitoes have a special fondness for American-born blood.

(laughs) I'm not kidding.

When I went there, I received an unexpected gift.

It was this antique instrument, more than a century old, hand-carved from rare wood, inlaid with pearls, and fitted with dozens of metal strings.

It's a family heirloom, a link between my past, the country my parents were born in, and the future, the unknown places I'll take.

I didn't really realize it when I received it, but it later became a powerful metaphor for my work.

We all know the saying, "There's never been a better time."

But today, it can sometimes feel like the only time is now.

The immediate and the temporary seem to dominate our lives, our economies and our politics.

It's easy to get bogged down in how many steps you took today or the latest tweets from celebrities.

Companies tend to be so obsessed with making short-term profits that they neglect the benefits of future inventions.

And it is all too easy for governments to sit back and watch fisheries and farmlands dry up instead of being conserved to feed future generations.

At this rate, I feel that it will be difficult for our generation to be remembered as good ancestors.

Come to think of it, our species has evolved to think ahead, chart the stars, dream of the afterlife, and sow seeds for later harvests.

Some scientists call this superpower we have "mental time travel." This superpower is involved in nearly everything we call human civilization, from agriculture to Magna Carta to the Internet, all of which are first conjured up in the human mind.

But let's get real. Looking around us today, we seem to be underutilizing this supernatural power. That's where the question arises. "Why not?"

What matters is how our communities, businesses and organizations are designed.

They are designed to undermine our foresight.

I'd like to talk about three big mistakes we think we're making.

The first mistake is what we measure.

When you look at a company's quarterly earnings or short-term stock price, it's often not a good measure of whether the company will grow market share or be inventive in the long run.

Being glued to the test scores kids bring home from school isn't necessarily good for their learning or curiosity in the long run.

We haven't measured what will really matter in the future.

The second mistake we make that undermines our foresight is what we get paid for.

When we praise a political or business leader for the disaster she just cleaned up or for the announcement she just made, we are not motivating that leader to invest in preventing those disasters in the first place, or to protect communities from flooding, or to fight inequality, or to defer future payments by investing in research and education.

The third mistake that undermines our foresight is our inability to imagine.

Now, when we think about the future, whether we use horoscopes or algorithms, we tend to focus on accurately predicting what will happen next.

But we spend much less time imagining all the possibilities the future holds.

When the Ebola epidemic broke out in West Africa in 2014, public health officials around the world had early warning signs and predictive tools of how the epidemic would spread.

People with many resources and good forecasts often fail to imagine how dangerous a deadly hurricane can be if they are not prepared.

Now, any of these mistakes I described, as dire as they may sound, are not inevitable.

In fact they are all avoidable.

To make better decisions about the future, you need tools that help you look ahead, tools that help you think ahead.

Think of them like the telescopes that old ship captains used to probe the horizon.

These tools are not for looking far away or across oceans, but for looking beyond time into the future.

I'd like to share with you some of the tools I've found in my research that I think can help with foresight.

The first tool I would like to share with you, I believe, is a long game that pays off right now.

This is Wes Jackson, the farmer I spent some time with in Kansas.

And Jackson knows that the way most crops are grown around the world today is robbing the earth of the fertile topsoil it needs to nourish future generations.

Working with a group of scientists, he bred perennial crops that rooted firmly in the farm's fertile topsoil, preventing erosion and protecting future crops.

But they also knew that to get farmers to grow these crops in the short term, they would need to increase their annual yields and find companies willing to use them to make grain and beer. Then farmers can benefit today by doing good tomorrow.

And this is a proven strategy.

In fact, it was used by George Washington Carver in the post-Civil War American South in the early 20th century.

Many of you have probably heard about Carver's 300 uses for peanuts and the products and recipes he devised that made peanuts so popular.

But not everyone knows why Carver did that.

He was trying to help poor tenant farmers in Alabama whose cotton yields were declining, and he knew that planting peanuts in their fields would replenish the soil and improve cotton yields in a few years.

But he also knew that in the short term it would have to benefit them.

Now let's talk about another tool for foresight.

I think this is something that helps us imagine the future by keeping the memories of the past alive.

So I went to Fukushima, Japan, six years after the 2011 Tohoku earthquake and tsunami-related nuclear power plant accident.

While there, I learned about the Onagawa nuclear power plant, which was even closer to the epicenter of that quake than the infamous Fukushima Daiichi plant we all know.

In Onagawa, people in the city actually evacuated to the nuclear power plant as an evacuation destination.

It was very safe.

escaped the tsunami.

It was the foresight of one engineer, Yanosuke Hirai, who made it a reality.

In the 1960s, he struggled to build power plants at higher elevations further back from the coast and with higher seawalls.

He knew the story of a shrine in his hometown that was flooded by a tsunami in 869.

His knowledge of history has allowed him to imagine things that others cannot.

OK, another foresight tool.

I think this is what makes a shared heirloom.

Lobster fishermen on the Pacific coast of Mexico taught me this.

They have been here for almost a century to protect the lobster harvest, treating it as a shared resource and passing it on to the children and grandchildren who collect it.

They measure their catch carefully so as not to take breeding lobsters out of the sea.

There are over 30 fisheries across North America that do something vaguely similar.

They create a long-term stake in the fishing industry known as catch share, which motivates fishermen not only to take whatever they can from the ocean today, but also to ensure the long-term viability of the ocean.

Well, there are many more foresight tools that I would like to share with you. They come from all sorts of places: investment firms looking beyond short-term stock prices, states that freed elections from the short-term interests of campaign funders.

And if we want to rethink what we measure, change rewards, and have the courage to imagine what's to come, we need to leverage as many of these tools as possible.

As you can imagine, all this is not easy.

Some of these tools we can have in our own lives, some we need to do in business and communities, and some we need to do as a society.

The future will be worth this effort.

My own inspiration for continuing this endeavor is the instrument I shared with you.

It's called a Dilruba, and it was custom made for my great-grandfather.

He was a prominent music and art critic in early 20th century India.

My great-grandfather had the foresight to protect this instrument back in the days when my great-grandmother used to pawn everything he owned, but that's another story.

He protected it by giving it to the next generation, which is to my grandmother, who gave it to me.

The first time I heard the sound of this instrument, it haunted me.

It felt like listening to a wanderer in the Himalayan fog.

I felt like I was hearing voices from the past.

(music) (music ends) It's my friend Simran Singh playing diluba.

When you play it, it sounds like a dead cat somewhere, but you're welcome.

(Laughter) I have this instrument in my house now, but it's not actually mine.

It's my role to lead it in time and it means more to me than just owning it for today.

This instrument positions me as both a descendant and an ancestor.

It makes you feel part of a larger story than your own.

And this, I believe, is the most powerful way for us to regain our foresight. It is to think of ourselves as the good progenitors we long for, the progenitors not only of our own children but of all mankind.

Whatever your heirloom, big or small, protect it and know that its music can resonate for generations.

thank you.

(applause)

Today is actually a very special day for me because it's my birthday.

(Applause) Thank you very much to everyone who participated.

(Laughter) But every time you throw a party, there's someone there to ruin it. right?

(Laughter) And I'm a physicist, but this time I brought in another physicist for that.

His name is Albert Einstein, or Albert. He said that those who have not made significant contributions to science by the age of 30 will never do so.

(Laughter) Now, you don't have to check on Wikipedia that I'm over 30.

(Laughter.) So, in effect, what he's telling me and us is that when it comes to my science, I'm a complete novice.

Luckily, I've been lucky in my career.

Around the age of 28, I became very interested in networks, and a few years later I was able to publish several important papers reporting the discovery of scale-free networks, actually giving birth to a new field called network science today.

And if you're really interested, now you can get a PhD in Network Science in Budapest or Boston and study it all over the world.

A few years later, when I first moved to Harvard on a sabbatical, I became interested in a different kind of network. It was about how our own internal networks, genes, proteins and metabolites, are linked together and how they lead to disease.

And that interest has caused a huge explosion in the medical community, including Harvard's Network Medicine Department. At Harvard University, more than 300 researchers use this perspective to treat patients and develop new treatments.

And then, a few years ago, I decided to take this network thinking and the expertise we had with networks and use it to understand another area: success.

And why?

We used to think that, to some extent, our success was determined by the network we belonged to. Our network can move us forward or backward.

And we were interested in whether we could actually quantify how these things happen using our knowledge, big data and expertise in developing networks.

This is the result.

What you see here is a network of interconnected galleries within the museum.

And, through this map that we made last year, if you tell us the first five exhibits in an artist's career, we can predict the artist's success very accurately.

Now, when I think about success, I realize that success isn't just about networks. It has many other dimensions.

And obviously one of the things you need to be successful is performance.

So let's define the difference between performance and success.

Well, performance is what you do. How fast you run, what kind of pictures you draw, what kind of papers you publish.

However, our actual definition of success is what the community perceives from what you do and your performance – how it values ​​and rewards you for it.

In other words, your performance is about yourself, but your success is about us all.

This was a very important change for us. Because the moment we defined success as the collective measure that our community provides us with, it became measurable. Because if it's within the community, there are multiple data points about it.

So we go to school, we exercise, we practice. Because we believe that performance leads to success.

But when I started doing some research, I found that performance and success are two very different things when you look at the math of the problem.

Let me explain.

So what you're looking at here is Usain Bolt, the fastest man on the planet.

And, of course, he wins most of the contests he has entered.

And we have chronometers to measure his speed, so we know he's the fastest on earth.

Now, what's interesting about him is that when he wins, he doesn't outperform his competitors significantly.

He is running no more than 1 percent faster than the person who loses the race.

And not only can he not run just 1% faster than the second person, he can't run 10 times faster than me. And I'm not a good runner. Believe me on that point.

(Laughter) And every time we can measure performance, we find something very interesting. In other words, performance is limited.

What that means is that there is no great variability in human performance.

The range of change is so narrow that a chronometer is required to measure the difference.

It's not that you can't tell the best from the good, but it's very difficult to tell the best.

And the problem is that most of us work in fields without chronometers to measure our performance.

Well, performance has limits. Performance wise there is not much difference between us.

What about success?

Now let's move on to other topics, such as books.

One measure of a writer's success is how many people read their work.

So when the previous book came out in 2009, I was talking to an editor in Europe and was curious. Who are the competitors?

And had some great ones.

That week – (laughs) Dan Brown released “The Lost Symbol” and Nicholas Sparks released “The Last Song.”

And just by looking at the list, you can see that there is very little difference between those books and mine in terms of performance.

right?

So perhaps if Nicholas Sparks' team tried a little harder, he could easily become number one. Because it's almost a coincidence who came out on top.

So I said, let's look at the numbers. I'm in charge of data, right?

So let's take a look at Nicholas Sparks sales.

And it turns out that Nicholas Sparks sold over 100,000 copies on its opening weekend. This is an astonishing number.

In fact, selling 10,000 copies a week is enough to top the New York Times bestseller list, so he's surpassed the number one requirement tenfold.

Still he wasn't number one.

why?

Because there was Dan Brown, who sold 1.2 million copies that weekend.

(Laughter) And the reason I like this number is because it shows that success really knows no bounds, and success is a collective measure, so that not only does the best get slightly more than the next best, but they can benefit by an order of magnitude more.

We don't get it through performance, we give it to them.

So, one of the things we've noticed is that there are limits to performance, what we do, but there are limits to collective success. This makes you wonder why such a small difference in performance can lead to such a large difference in success.

And I recently published a book about that very question.

And they didn't give me enough time to go through it all. So I go back to the "Okay, did you succeed?" question. When should it appear?

So let's get back to the party spoilers and ask ourselves: Why did Einstein make this silly statement that you can't really be creative until you're 30?

Because he looked around him and saw the wonderful physicists who gave birth to quantum mechanics and modern physics. And they were all in their twenties and early thirties when they created them.

And it's not just him.

It's not just observational bias. Because if we look at people we admire in the past and look at the age at which they made their greatest contribution, be it in music, science or engineering, there is actually a whole field of genius research documenting the fact that most of them tend to do so in their 20s, 30s, or at most early 40s.

But there is a problem with this genius study.

Well, first of all, it gives us the impression that creativity = youth, and that's painful, isn't it?

(Laughter) And then there's observational bias. Because it sees only geniuses and not ordinary scientists. Nor do we look at all of us and ask, "Is it true that we lose our creativity as we age?"

So that's exactly what we were trying to do, and this is important to actually have a reference.

So let's take a look at a mediocre scientist like me, and my career.

Here are all the papers I have published since my first paper in 1989. At that time, I was still in Romania until the middle of this year.

And vertically, you can see the impact of the paper, the number of citations, and how many other papers were written that cited the paper.

Looking at this, you can see that my career has broadly divided into three distinct phases.

I had to work a lot in the first ten years, but I didn't get much out of it.

No one seems to care what I do, right?

Little impact.

(Laughter) I was doing materials science at the time, and then I discovered the network myself and started publishing on the network.

And that led from one high-impact paper to another.

And it felt really good. That was that phase of my career.

(Laughter.) So the question is, what's going on now?

And I don't know, because not enough time has passed yet to really know how much impact those papers will have. It takes time to acquire.

Well, looking at the data, genius researcher Einstein seems right and I'm at that stage in my career.

(Laughter) So we said, "Okay, let's figure out how this actually happens scientifically first."

And in order to have no selection bias and only focus on geniuses, we ended up reconstructing the careers of all scientists from 1900 to today, and finding out for every scientist what their personal best was, whether they won a Nobel Prize or not, or even their personal best no one knows what they did.

That's what you see on this slide.

Each line is a career, and a light blue dot at the top of that career indicates that person's personal best.

And the question is, when did they actually make their biggest discovery?

To quantify it, look at what the odds are of making the biggest discovery one year, two years, three years, or ten years into your career.

We are not looking at your real age.

What we are focusing on is the so-called “educational background”.

Your academic age begins when you publish your first paper.

I'm sure some of you still have babies.

(Laughter) So let's look at your odds of publishing the most influential paper.

And what you see is certainly genius research is right.

Most scientists tend to publish their most influential papers in the first 10-15 years of their careers, but then falter.

It dwindles down so quickly that, just in my 30th year of career, I have less than a 1% chance of publishing a paper that will have more impact than the one I've published so far.

According to this data, I am at that stage in my career.

However, there is a problem with that.

Control is not properly done.

In other words, what would the control look like for a scientist who contributes randomly to science?

Or what is scientist productivity?

When will they write their thesis?

So we measured productivity. Surprisingly, productivity—the likelihood of writing a paper in years 1, 10, and 20 of a career—is indistinguishable from the likelihood of impacting that portion of a career.

Long story short, after many statistical tests, there is only one explanation for this. So the way we work as scientists is that every paper we write, every project we do, has exactly the same chance of achieving personal best.

So discovery is like a lottery ticket.

And the more lottery tickets you buy, the higher your chances.

And it just so happens that most scientists buy most of their lottery tickets in the first 10-15 years of their careers, after which they become less productive.

They don't buy lottery tickets anymore.

So they look uncreative.

In fact, they stopped trying.

When we actually summarize the data, the conclusion is very simple. Success can come at any time.

It could be your first or last paper in your career.

It is completely random within the project space.

Productivity is changing.

Let me explain.

This is Frank Wilczek, who won the Nobel Prize in Physics for his first paper written as a graduate student.

(Laughter) Even more interesting is John Fenn, who was forced out of Yale University at age 70.

They closed his lab, and at that moment he moved to Virginia Commonwealth University and opened another lab, where he published a paper at the age of 72, for which he won the Nobel Prize in Chemistry 15 years later.

And you think, science is special, but what about other areas where you need to be creative?

So let's take another classic example: entrepreneurship.

Isn't Silicon Valley a land of young people?

In fact, if you look at this, you'll see that the biggest awards, the TechCrunch Awards, and all others are given to people with an average age in their late 20s and early 30s.

If you look at who the VCs are funding, some of the biggest VC firms are all in their early 30s.

Of course we know that. Silicon Valley has a ethos that youth equals success.

Not when looking at the data. Because it's not just about setting up a company. Starting a company is like being productive, striving, striving, striving. Not so if you look at which of these individuals have actually built their companies and successfully exited them.

And recently some of our colleagues have turned their attention to this very question.

And sure enough, people in their 20s and 30s started a huge number of companies, started a lot of companies, and most of them turned out to be bankrupt.

And looking at successful exits like the one seen in this particular plot, the older you are, the more likely you are to actually enter the stock market or sell your company and be successful.

In fact, it's so strong that in your 50s you are twice as likely to actually succeed as in your 30s.

(Applause.) After all, what are we actually seeing?

What we see is that creativity has no age.

You'll be more productive, right?

Ultimately, this means that if you keep trying (laughs), you can succeed again and again.

So my conclusion is very simple. I got off the stage and went back to my lab.

thank you.

(applause)

First, I would like you to remember when you were a child and played with building blocks.

I was really learning how to think and solve problems by understanding and manipulating spatial relationships while understanding how to reach out and grab, pick up and move.

Spatial reasoning has a lot to do with how we make sense of much of the world around us.

So, as a computer scientist, inspired by this usefulness of interacting with physical objects, along with my advisor Patti and collaborator Jeevan Kalanithi, as a computer scientist, I started to wonder what would happen if, instead of using a single mouse cursor, like a digital fingertip moving around on a flat desktop, we could reach out with both hands to physically grasp information and place it exactly as we wanted.

This question intrigued me so much that I decided to explore the answer by building Siftable.

In a nutshell, Siftable is an interactive computer about the size of a cookie.

They can be moved by hand, can sense each other, can sense motion, and have screens and wireless radios.

Most importantly, they are physical, so you can move them just like a block by reaching out and grabbing them.

And Siftable is an example of a new ecosystem of tools for manipulating digital information.

And as these tools become more physical, more aware of their movements, more aware of each other, and more aware of the nuances of how we move them, we can start exploring some new and fun interaction styles.

So let's start with some simple examples.

This Siftable is configured to display a video, and tilting it in one direction will rotate the video in that direction. If you tilt it backwards, it rolls backwards.

And these interactive portraits recognize each other.

So I'm interested in putting them side by side.

If you are surrounded, the other person will notice it and may panic a little.

It can also sense your own movement and tilt.

One of the interesting implications about interaction is that I'm starting to realize that everyday gestures can be used with data, like pouring color in the same way you pour liquid.

In this case, we have three Siftables configured as paint buckets that can be used to pour colors into the central bucket where they can be mixed.

If you overshoot, you can set it back a little.

There are also some great possibilities in education such as language, mathematics and logic games. We want these games to be able to try things out quickly and see the results quickly.

This is me -- (applause) This is the Fibonacci sequence I'm creating in a simple equation program.

Here's a word game that's like a combination of Scrabble and Boggle.

Basically, each round you get a letter randomly assigned to each Siftable, which is then checked against a dictionary when trying to make a word.

Then after about 30 seconds it will be shuffled and you can try new sets of characters and new possibilities.

(Applause.) Thank you.

(Applause.) These are the kids who came to the Media Lab for field trips. I managed to get them to try out the Media Lab and shoot a video.

they really liked it.

And one of the interesting things about this kind of application is that you don't have to give the user a lot of instructions.

All you have to say is "Make a word" and they know exactly what to do.

So a few more people tried it.

That's our youngest beta tester, bottom right.

After all, all he wanted to do was stack Siftables.

So to him they were just blocks.

Well, this is an interactive cartoon application.

And we wanted to build a learning tool for language learners.

This is actually Felix.

And you can bring a new character into the scene by simply lifting the Siftable that character is on from the table.

Here he is bringing the sun.

Video: The sun is coming up.

David Merrill: Now he has a tractor on site.

Video: Orange Tractor.

well done! yes!

DM: So the characters can interact with each other by shaking the Siftables and putting them next to each other. -- Video: Wow!

DM: Inventing his own story.

Video: Hello!

DM: It's an open-ended story and he can decide how it unfolds.

Video: Run away, cat.

DM: So the final example I'm going to show you today is a music sequencing and live performance tool we recently built. In this tool, Siftables act as sounds for lead, bass, drums, etc.

There are 4 different variations of each and you can choose which one you want to use.

You can then insert these sounds into sequences and assemble them into the patterns you want.

And inject it by simply bumping up the Sound Siftable against the Sequence Siftable.

There are effects you can control live, such as reverbs and filters.

Attach to a specific sound and tilt to adjust.

Then there are global effects such as tempo and volume that are applied to the entire sequence.

So let's see.

Video: (music) DM: First, insert leads into two sequences Siftable, place them in a series, extend and add some more leads.

Now let's add a baseline.

Video: (music) DM: Now put in the percussion.

Video: (music) DM: Next we'll attach the filters to the drums so we can control the effects live.

Video: (music) DM: You can speed up the whole sequence by tilting the tempo either way.

Video: (music) DM: Now put a filter on the base for a little more expressiveness.

Video: (music) DM: Sequences can be rearranged during playback.

So you don't have to plan ahead, but you can improvise longer or shorter along the way.

And finally, we can use the Volume Siftable tilted left to fade out the entire sequence.

(Applause.) Thank you.

As you can see, my passion is creating new human-computer interfaces that better fit the way our brains and bodies work.

And today I had time to show you one point in this new design space and some of the possibilities we're working to pull out of the lab.

So the thought I want to leave you with is that we are on the cusp of a new generation of tools for interacting with digital media. These tools will bring information into our world exactly the way we want it.

thank you very much.

I look forward to speaking with you.

(applause)

My name is Minamikaze.

"Nan" means "Man" in Chinese.

"Fu" means "pillar".

My family wanted a boy who would grow up to be the breadwinner of the family.

And when I turned out to be a girl, they named me Minamikaze anyway.

(Laughter) I was born in 1985, six years before China announced its one-child policy.

Shortly after I was born, a local official came and ordered my mother to be sterilized.

My grandfather wanted his grandson to carry on the family name, so he stood up to the officials.

The parents were finally allowed to have a second child, but had to wait five years and pay a hefty fine.

My brother and I grew up in an only-child household.

I remember being very embarrassed because I had a younger brother.

Our family felt like we did something wrong by having two children.

At the time, I never wondered where this shame and guilt came from.

A year and a half ago, I had my first child.

It was the best thing that happened in my life.

Becoming a mother gave me a whole new perspective on my own childhood and brought back memories of my childhood in China.

For the past 30 years, my entire family has had to apply for government permission to have children.

And I wondered what it was like for people living under the one-child policy.

So I decided to make a documentary about it.

One of the people I interviewed was a midwife who delivered all the babies born in my village, including mine.

She was 84 when I interviewed her.

I asked her, "Do you remember how many babies you've had throughout your career?"

She didn't have a delivery number.

She said she had performed 60,000 forced abortions and sterilizations.

Sometimes late-term fetuses survive abortions and kill the babies after birth, she said.

She remembered her hands shaking as she worked.

Her story shocked me.

When I started making this film, I expected it to be a simple story of perpetrator and victim.

Those who implemented the policy and those who live with the consequences.

But what I saw was not.

When I finished interviewing the midwife, I noticed that part of her house was decorated with elaborate handmade flags.

And each flag has a picture of a baby on it.

These were flags sent by family members who helped her treat her infertility problems.

She explained that she was tired of abortions and sterilizations and that the only job she could do now was help her family have babies.

She said she was filled with guilt for implementing the one-child policy and hoped she could undo her past behavior by helping her family have babies.

It became clear to me that she too was a victim of this policy.

She heard every voice that her actions were right and necessary for China's survival.

And she did what she thought was right for her country.

I know how strong that message is.

When I grew up it was everywhere around me.

It was printed on matches, playing cards, textbooks, and posters.

Propaganda glorifying the one-child policy was all around us.

[Anyone who refuses to be sterilized will be arrested] and threatened for non-compliance.

That message has run so deep into our hearts that I grew up feeling embarrassed to have a younger brother.

With each person I have photographed, I have seen how their minds and hearts can be influenced by propaganda, and how their willingness to make sacrifices for the greater good can be skewed into something very dark and tragic.

China is not the only country where this is happening.

There is no country on earth without propaganda.

And in a society that is supposed to be more open and free than China, it can be even harder to recognize what propaganda looks like.

It hides in plain sight in news reports, TV commercials, political campaigns, and social media feeds.

It works to change our thoughts without our knowledge.

No society is vulnerable to accepting propaganda as truth, and no society in which propaganda replaces truth can be truly free.

thank you.

(applause)

"Sometimes fate is like a small sandstorm that keeps changing direction.

I change direction, but the sandstorm is chasing me.

You turn again, but the storm adjusts.

Play this over and over, like an eerie dance with death before dawn.

why?

This storm didn't come from far away... This storm is you. there's something in you This quote from the first chapter of Haruki Murakami's Kafka on the Shore describes the confusion of the teenage protagonist.

Desperate to escape an oppressive father and a family curse he feels doomed to repeat, he renames himself Kafka after his favorite author and runs away from home.

But the memories of his missing mother and the dreams that haunt his life upon waking prove to be even harder to break.

Published in Japanese in 2002 and translated into English three years later, Kafka on the Shore is an epic literary puzzle of time travel, hidden history and a magical underworld.

Readers will delight in discovering how haunting imagery, quirky characters, and eerie coincidences come together.

Kafka tells every two chapters, and the rest is centered around an old man named Satoru Nakata.

After waking up from a coma during World War II, Nakata lost his ability to read and write, but gained a mysterious feat of talking to cats.

Asked to follow a missing pet, he is thrown down a dangerous path parallel to Kafka.

Soon, the prophecy comes true, a portal to another dimension opens, and fish and leeches begin to rain from the sky.

But what is it that unites these two characters? Also, is it a power that either of them can control?

The clash of different worlds is a common theme in the works of Haruki Murakami.

His novels and short stories often create wonderful connections between personal experiences, supernatural possibilities and Japanese history.

Murakami was born in Kyoto in 1949 and grew up during the post-World War II US occupation of Japan.

As with his novels, the shadow of war cast a shadow over his life. "Kafka on the Shore" features bio-attacks, military ghosts, and shady plots.

Murakami's work blurs historical eras and draws on multiple cultural traditions.

References to Western society and Japanese customs intersect, ranging from literature, fashion, food, and ghost stories.

He also tends to refer to music, especially in "Kafka on the Shore."

Led Zeppelin and Prince accompany the fugitive Kafka as he wanders through a strange city.

Soon he takes refuge in a fine private library.

While he spends his days reading old books and thinking about strange paintings and the library's mysterious owner, he befriends a librarian who introduces him to classical music such as Schubert.

This musical sensibility makes Murakami's work more hypnotic.

He frequently bends the line between reality and the dream world, and is considered a master of everyday magic.

This is a key feature of Magic Realism.

In contrast to fantasy, magic in this kind of writing rarely offers a way to solve problems.

Rather, it just ends up complicating life.

In Kafka on the Shore, the characters face an endless stream of otherworldly distractions, from love-sick ghosts to flutes made from cat souls.

There are no easy answers to these challenges.

Rather, I am amazed at the resourcefulness of the human mind in dealing with the unexpected.

Kafka often seems to float in the midst of queerness, but at the heart of his mission is the kindness and honesty that keep him going.

Gradually he comes to terms with his inner turmoil.

After all, his experience is the same as that of the reader. The deeper you go, the more discoveries there are.

Last summer, I got a call from a woman named Ellie.

And when she heard about families being separated on the southern border, she wanted to know what she could do.

She told me the story of her grandfather and his father.

When they were children in Poland, their father, concerned for his son's safety, gave them a little money and told them to walk west, to keep walking west through Europe.

And they did.

They walked all the way west across Europe and boarded a ship to reach America.

Ellie said that when she heard stories of teens walking across Mexico, all she could think of was her grandfather and his younger brother.

For her, the story was exactly the same, she said.

The brothers were the Hassenfeld brothers, or "Hus" and "Brothers," the Hasbro toy company that brought us Mr. Potato Head, of course.

But that's not really why I'm telling this story.

I am telling this story because it made me wonder if I had the faith and courage to send my teenage children (I have three) on such a journey.

Knowing they're not safe where we are, can I watch them go away?

I started my career decades ago working with Central American asylum seekers on the southern border of the United States.

For the past 16 years, I have worked as a lawyer and advocate for HIAS, a Jewish organization fighting for the rights of refugees around the world.

And one of the things I've learned is that sometimes things that are said to make us safer and stronger are actually not.

And indeed, some of these policies have the opposite effect of their intentions, causing a great deal of unnecessary suffering in the meantime.

So why are people showing up on the southern border?

Most migrants and refugees arriving at our southern border come from three countries: Guatemala, Honduras and El Salvador.

These countries are consistently ranked among the most violent countries in the world.

It is very difficult to stay safe, let alone build a future for yourself and your family in these countries.

And violence against women and girls is widespread.

People have fled Central America for generations.

Generations of refugees have come to our shores, fleeing a civil war in the 1980s in which the United States was heavily involved.

This is nothing new.

What is new is the recent surge in people coming forward to seek asylum, with families, children and families showing up at checkpoints.

Now that this has been in the news lately, I want you to remember a few things while looking at these images.

One, this is not a historically high level of interception at the southern border, people are actually showing up at checkpoints.

The second is that people are showing up in their clothes. Some of them are literally flip flops.

And third, we are the most powerful nation in the world.

This is not the time to panic.

Considering the security of the destination country, it's easy to think in absolute terms whether it's legal or illegal.

But those wrestling with these questions and making decisions about their families are thinking about a whole different question. "How can I keep my daughter safe?"

How can I protect my son?

And if you want absolutes, it's perfectly legal to seek asylum.

It is a fundamental right under our own law and international law.

And actually -- (applause) it comes from the 1951 Refugee Convention. This was the world's response to the Holocaust, a way to declare to nations that they would never return to a country that hurt and killed people.

There are several ways for refugees to come to this country.

One is through the US Refugee Reception Program.

Through this program, the United States identifies and selects refugees abroad and brings them to the United States.

Last year, the United States resettled the fewest number of refugees since the program began in 1980.

And this year there will probably be less.

And now, including the post-World War II period, we have the largest number of refugees in the world in recorded history.

Another way refugees come to the country is to seek asylum.

Asylum seekers are people who report to the border and say they will be persecuted if deported to their home country.

An asylum seeker is simply someone who is proceeding in the United States to prove that they meet the refugee definition.

And seeking asylum has never been so difficult.

Border guards are telling people when people show up at the border that the country is full and they can't apply.

This is an unprecedented illegal act.

Under the new program, Orwellianly titled the Immigration Protection Protocol, refugees are told they must wait in Mexico until their cases clear U.S. courts, which can take months or years.

During that time, they are not safe and cannot consult a lawyer.

Our country, our government, has detained over 3,000 children from their parents' arms as a deterrent to asylum applications.

Many were young children, at least one of whom was a six-year-old blind girl.

And this is still going on.

We spend billions of dollars detaining innocent people in virtual prisons.

And family separation has become a feature of our immigration system.

It's so different from a shining city on a hill or a beacon of hope or any other way we talk about ourselves and our values.

Migration has always been with us and always will be.

The reasons people flee -- persecution, war, violence, climate change, and the fact that mobile phones can tell us what life is like elsewhere -- these pressures are only increasing.

But given the realities of the world, there are ways to make policies that reflect our values ​​and actually make sense.

The first thing we need to do is undo the harmful rhetoric that has been the basis of the public debate on this issue for too long.

(Applause.) I'm neither an immigrant nor a refugee myself, but I take these attacks personally because my grandparents were.

I hadn't seen my great-grandmother Rose for seven years because she tried to take the kids from Poland to New York.

She separated from her grandfather when he was seven and did not see him again until he was fourteen.

On the other side of the family, my grandmother, Aliza, left Poland in the 1930s for what was then a British mandate to Palestine, never to see her family and friends again.

Global cooperation in response to global migration and displacement would go a long way toward making migration a crisis rather than a crisis, one that we as an international community can deal with.

Humanitarian assistance is also important.

The amount of assistance we provide to Central American countries sending refugees and migrants is a fraction of the amount we spend on enforcement and detention.

And we can absolutely have a functioning asylum system.

For a fraction of the cost of building the wall, we could hire more judges, provide asylum seekers with lawyers, and work on a humane asylum system.

(Applause.) And more refugees can be resettled.

To give a sense of the decline of the refugee program, three years ago the US resettled 15,000 Syrian refugees in response to the biggest refugee crisis on the planet.

A year later, that number was 3,000.

And last year that number was 62.

62.

Despite harsh rhetoric and efforts to stop immigration and keep refugees out of the country, opinion polls show that support for refugees and immigrants in the country is at an all-time high.

Organizations like HIAS, where I work, and other humanitarian and faith-based organizations make it easy to take a stand when there's a law worth opposing, a law worth upholding, or a policy that needs scrutiny.

You can do anything with your phone, and if you want to do more, you can do it.

If you see kids in a jail on the border, it's a prison, but I'm telling you, you'll never be the same.

What I loved about my phone call with Ellie was that deep down she knew that her grandparents' story was no different than it is today, and she wanted to do something about it.

The one thing I would like to leave you with, besides the backstory of Mr. Potato Head, is, of course, a good one, but that nations show their strength not through force or fear, but through compassion and realism.

(Applause.) These stories of the Hassenfelds and my relatives and yours still happen today. they are all the same.

A country is strong when it says to refugees, "It's okay, we're here, we're safe," instead of "Get out."

thank you.

(Applause.) Thank you.

(applause)

In July 1969, three Americans went into space.

Now, they famously reached the surface of the moon and made a giant leap for mankind.

Buzz Aldrin, Neil Armstrong, they walked the surface and planted this flag.

It is rightly celebrated in America as a moment of triumph.

I think this was a great achievement.

But they didn't just leave this flag.

They also left a nameplate.

This plaque is a beautiful object, and I would like to say a few words about it.

First, you may notice that there are two globes representing the entire globe.

And then there are these beautiful words: "We have come in peace for all mankind."

Now, this is just a nice poetic word at first glance, but it's also the perfect typeface for this moment.

It seems industrial, and it seems to be engineered.

It's also the best name you can come up with for anything on the moon. That's Futura.

Now I want to talk about fonts and why this typeface is perfect for this moment.

But it's actually more than just a ritual.

Well, when you guys came here today, you actually had to think about fonts.

You may not realize it, but you are subconsciously typography experts.

Typography is the study of how fonts exist in our world, fonts are the visual language of the words we use.

But here's what's interesting about this:

Some of you may think that you are probably not a font nerd like me, but it's okay if you aren't. Because I might spend hours every day picking the perfect typeface for the perfect project, or I might spend thousands of dollars every year getting a typeface with the right features.

But in reality, you spend hours each day evaluating fonts.

If you don't believe me, think about how you got here.

Each of you had to decide which signals to trust and which to ignore, from the signals and even your cell phone.

You were evaluating fonts.

Or, when buying a new product, you may need to consider whether the item is expensive or cheap, hard to come by or easy to find.

And the funny thing is, this may not seem like anything special, but the moment you see something out of place, you know it right away.

(Laughs) What I love about typography and why I love fonts and why I love Futura is that for me the subject matter is everywhere.

Every road I walk, every book I pick up, everything I read is filled with what I love.

Now, when you understand what's going on in history and typography, you can actually get a history of everything that's in front of you.

And this is the typeface called Futura.

As discussed earlier, this is modernism in miniature.

This is how modernism permeated the country and became perhaps the most popular or messy typeface of the 20th century.

"Less is more", yes, it's a modernist maxim.

And the same thing happened with the visual arts.

Focus on essentials, basic shapes and geometry.

So Futura really has this at its core.

You may notice that shapes unique to Futura include circles, squares, and triangles.

Some shapes, such as O, D, and C, are all circle-based, while others have triangular pointed vertices.

Some look like they were made with a ruler or compass.

They are geometric and feel mathematical and precise.

In fact, the whole system is a direct reflection of how typefaces are designed.

Something new that doesn't look like it was made in the same way as other typefaces.

These are lightweight, medium weight and bold weight.

All family members have different things to praise about it.

This was a conscious break from the past, one that seemed machine-made rather than hand-made.

This is what I mean when I say it's not handmade.

We probably think of this when we create something with a brush or pen.

There are dark areas and thin areas.

More traditional typefaces, such as Garamond, have remnants of this old system, and you can see that the A tapers slightly at the top and thickens towards the bottom. This is because someone is trying to make it look like it was created by hand.

But Futura, by contrast, is designed in such a way that no one touches it at all, so it looks like it was made by a machine in the Machine Age, the Industrial Age.

Actually, here's a trick used by designer Paul Renner, who built it in 1927.

If you look at the connection between the circle and the vertical axis, you can see a slight taper.

This is one of the hundreds of ways the typeface was designed to look geometrically perfect, even if it's not mathematically perfect.

This is what type designers do every day to make their typefaces work.

Well, in Europe and America there were other designers doing this at the same time.

These are some other excellent examples of Europe trying to create something new for a new era, a new moment.

These are other models from Germany that are in some ways very similar to the Futura, with higher or lower waists and different proportions.

So why did Futura conquer the world?

In this case, some of these names don't quite make sense if you can read the titles there: Erbar, Kabel Light, Berthold-Grotesk, Elegant-Grotesk.

These are not very familiar names, are they?

So comparing this to Futura shows that it was a very good choice by the marketing team.

What's so great about this name is that it's actually a name that evokes thoughts about hope and the future.

And this was not really a German word for the future, nor was it a German name. They really chose something that would resonate with a wider, wider audience, a universal audience.

And if you compare it to what was being done in America, these are American typefaces of the same period in the 1920s: bold, sassy, ​​brawny.

You might think this is exactly what the stock market looked like in the 1920s when everything went crazy.

Then I realized Futura was doing something revolutionary.

I would like to take a step back and talk about examples of typefaces used.

This is probably the magazine that everyone knows today, "Vanity Fair".

This is what the summer of 1929 looks like.

And in many respects there is nothing wrong with this design.

This is typical of the 1920's.

There is a picture of a key person, in this case, then-New York Governor Franklin Roosevelt.

Everything seems centered and everything looks symmetrical.

There is still some decoration left, so this still has remnants of the women depicted and may not be entirely modern.

But everything looks like a solid kid.

There are also drop caps to help you get into the text.

But things soon changed, and in October 1929 a Berlin-based designer came and redesigned the 'Vanity Fair'.

In Futura it looks like this:

In place of the governor came pictures of abstract and beautiful landscapes, in this case the sea.

Instead of drop caps, nothing.

It was then replaced by a central layout, making it asymmetrical.

And the more magazines you go to, the more radical it gets.

In this case, an even more dramatic asymmetry occurs.

In this case, the Pablo Picasso illustration has moved across the page, breaking the margins of two pages.

And there are even more radical ones.

Take a closer look at Futura and you might notice something.

It may not make sense at first, but the title and captions on this page do not have capital letters.

You might think it's not that radical, but I assure you that you won't find it easily by picking up a magazine or book or visiting a website.

This is still a radical idea.

And why is it radical?

When we think about what capital letters mean, whether it's our names or our titles, they mean something important.

Or just the company name or trademark.

In fact, in some ways, America is the home of capital letters.

We love capitalizing everything.

(Laughter) But think about how radical it would be to introduce a magazine with all the capital letters removed.

This perhaps has the same political ramifications that we have in today's society arguing over things like pronouns.

It was the 1920s, shortly after the communist revolution in Soviet Russia.

And to them, this really meant a socialist infiltration of America.

All lower case meant that this was egalitarianism, completely bringing everything down to one level playing field.

This is still some kind of radical idea.

Think about how often you use something to gain power or prestige.

So the way they do this was how Futura took advantage of this idea.

Now other designers were doing other things with Futura.

Others have brought in other modernist ideas, such as interesting new illustration styles and new collage-type illustrations.

Or even just a new book cover, European or not.

But here's where it gets interesting.

In the 1920s, if you wanted to use a new typeface, you couldn't just download it to your computer.

I actually needed a piece of lead.

So for Americans who wanted to take this and make anything that could be used in everyday typography, whether advertising or otherwise, part of their own system, metal type was really needed.

So what have we, good American capitalists, done?

We made all kinds of copies.

It had nothing to do with the name Futura, but it looked exactly like a Futura, whether it was a Spartan or a Tempo.

And in fact, by the start of World War II, American corporations were actually trying to boycott Nazi products.

But they said, "Please use our copy.

Use 20th century, use Spartan, use Vogue, use Tempo.

These are the same as Futura. ”

In fact, most people didn't even learn the new name and simply called it all Futura.

So America adopted this typeface, conquered it, and made it its own.

So by the end of World War II, Americans were using it for everything from catalogs, atlases, encyclopedias, charts, calendars, and even political materials.

And even the new extended football team logo.

And indeed, it was used in some of the most important advertisements of the 20th century.

So it was in this context that the US government chose Futura after World War II when it was choosing a typeface to use for new maps and new projects.

It wasn't a startling choice, it wasn't a radical choice, it had nothing to do with communism.

But in this case, it was used in some of the most important maps, so it was used in this map, the Air Force map of 1962, or the Vietnam map of 1966.

So when John Glenn first started the Mercury program, including orbiting Earth, it was not surprising that the nautical charts and maps he was using were Futura.

And indeed, by the time Mercury turned into Apollo, Mercury began to be used for more and more things.

In this case, it is starting to be used for safety planning or even in instrument panels and navigation aids.

Alternatively, you can show a diagram of how the whole system works.

But here's the surprise. It wasn't just used as a document to hand out to people.

It began to be used as an interface across systems to help astronauts learn how to use machines.

NASA wasn't just a big company making everything.

Hundreds of contractors, including Boeing, IBM, and McDonnell Douglas, were building different machines.

Now imagine if astronauts had to use different typefaces and different systems for each component of the space shuttle.

This would have been impossible to navigate and would have caused cognitive overload every time I needed to open a new system.

So in this case Futura was used in the interface to avoid complexity and make things clearer.

And it wasn't just used in buttons, it was used in labels, it was used in food, it was used in toolkits.

Used for knobs and levers to tell you what to do.

In fact, even in some of the places where complex things needed to be made simpler, the instructions were printed entirely in Futura so I knew what to do in that moment.

They didn't have to remember everything in their heads, they could see it and refer to it around the world.

In this case, Futura helped make an already very difficult and complex system a little more complicated.

In fact, the Futura would have been the first or last thing the astronauts saw as they entered and exited the spacecraft.

One of my favorite examples of how Futura worked is actually this camera.

It's a Hasselblad made by a Swedish company.

It's a very good camera, and you may have used it before, but it's highly regarded among photographers as a really great camera.

If you know anything about cameras, you may notice some changes to the camera.

In this case, there are stickers all over the film canister and other parts of the camera.

This allowed NASA to make some really cool stuff out of astronauts.

They are neither photographers nor art experts.

But thanks to the labels placed on Futura, I was sure I knew how to use this camera.

So, in this case, we confirmed the legitimacy of what Futura had acquired and used.

In this case, do not remove the film before exposure.

In this case, we wouldn't have gotten some of the great photos without this label.

When you see ornaments like this, ceremonial patches, or even lunar plates, you can see that Futura was more than just ceremonial, more than just a design choice.

In fact, this choice gave Futura authority, legitimacy, and power.

There is one last thing I would like to talk about.

And that is, Futura tells stories.

What I love about typefaces is that they all tell a story.

And in this case, the typeface tells a very powerful story of assimilation, of something being brought to America and becoming part of its culture.

And that's one of America's best things and one of its worst. It's about us taking things into our culture, spewing them out again, and claiming them as ours.

And in this case, Futura reflects exactly what happened with the technology that underpins the whole system.

Futura is an American take on a German typeface.

So was technology. Both the rockets and the scientists all came from Germany.

So, in a way, this German typeface on an American plaque is a perfect reflection of what happened in technology.

In this case, when we think about this story, we see that the typography on the moon represents legitimacy, represents authority, and this gave the astronauts the power to go to the moon.

thank you.

(applause)

My name is Amy Padoni, and I'm the editor of the obituaries desk at The New York Times.

Or some friends call me the Angel of Death.

(Laughter) In fact, people ask me, "Isn't it depressing to be working on obituaries and thinking about death all the time?"

But do you know what I say to them?

Mourning is not about death, it's about life, and it's interesting and relatable.

Often about things I didn't know before.

For example, a tribute to the inventor of the sock doll was recently published.

(Laughter) We all know what a sock doll is, but have you ever wondered who made it or what their lives were like?

Obit is a leading form of journalism.

It's an art form, so to speak.

It's an opportunity for writers to weave a person's life story into a beautiful narrative.

Since 1851, The New York Times has published thousands of obituaries.

Heads of state, celebrities, and even the person who came up with the Slinky name.

There is only one problem.

Only a few documents document the lives of women and people of color.

That's the driving force behind the project I created, Overlooked, which tells the story of a marginalized group who received no life.

It's a chance for the newspaper to rethink its 168-year existence and fill the void left behind for whatever reason.

It's a chance to right the wrongs of the past and refocus society's lens on who is considered important.

The idea came to me when I first joined Obituaries in 2017.

The Black Lives Matter movement was boiling, and the debate about gender inequality was just beginning to heat up again.

And at the same time, I wondered what I could do as a journalist, as a woman of color, to move this conversation forward.

People could come out from the shadows to tell the stories of the injustices they faced and feel their pain.

So I've noticed that I occasionally get emails from readers asking, "Why don't you try to include more women and people of color in your obituaries?"

And I thought, "Yes, what if?"

I was new to this team, so I asked my colleagues and they said: "Well, the people dying today are from a generation where women and people of color weren't invited to the table to make a difference.

Perhaps in a generation or two, more women and people of color will appear in obituaries. ”

The answer was not entirely satisfactory.

(Laughter.) What I wanted to know was, where are the women who died?

(Laughter.) So I started thinking about how we hear about the dead.

The best way is through reader submissions.

So I thought, ``What if I read international newspapers or look up social media?

It was just around this time...

When everything was swirling in my head, I found a website about Mary Outerbridge.

She is credited with introducing tennis to America in 1874.

And I thought, wow, one of America's biggest sports was introduced by a woman.

Anyone know that?

And did she receive a New York Times obituary?

Spoiler alert -- she didn't.

(Laughter) So I thought, who else would I miss?

And that's what inspired me to delve deeper into the archives.

There were some surprises.

Ida B. Wells, the pioneering journalist who started the anti-lynching movement.

Genius poet Sylvia Plath.

Ada Lovelace was a mathematician and now credited as the first computer programmer.

So I went back to the team and said, "What if we told their story now?"

It took time to get buy-in.

There was concern that the newspaper would have a bad impression because it was not communicated correctly the first time.

It was also a bit odd that it felt like we were looking back in time instead of just picking up today's news story.

But I said, "Guys, I think this is really worth it."

And once my team saw the value, everyone was hooked.

So, with the help of 12 writers and editors, we launched 15 Women's Stories to Watch on March 8, 2018.

I knew the work my team was doing was strong, but I didn't expect the reaction to be as strong.

I had hundreds of emails.

It was from people who said, "Thank you for finally giving women a voice."

It was from a reader who said, "I felt like I was being seen for the first time, and when I read this story, I cried on my way to work."

And they were from my colleagues, who “never thought a woman of color could achieve something like this at The New York Times.” We also received nearly 4,000 reader posts suggesting others we may have overlooked.

Some of them are my favorite stories in this project.

My favorite is Grandma Gatewood.

(Laughter) She survived 30 years of domestic violence by her husband.

One day he beat her so badly that he even broke the broomstick over her head so she threw flour in his face in response.

However, when the police arrived, they arrested her instead of him.

The mayor saw her in prison and took her to his home until she recovered.

One day, she read in National Geographic that no woman had ever hiked the entire Appalachian Trail alone.

And she said, "Okay? I'll do it."

Reporters caught an old woman hiking in the woods.

And at the finish line, they asked her, "How did you survive such a harsh place?"

But they didn't know what she had survived before that.

So "Overlooked" was a huge success.

It's now a TV show on Netflix.

(Laughter) (Applause) I can't wait to see this become a reality.

About 25 publishers contacted me with interest in publishing Overlooked.

All this clearly shows how timely and necessary this project is.

It's also a reminder of how newspapers document what happens in our world every day, and that we must make sure we don't leave important people behind.

That's why, even though looking back has been so rewarding, we're plagued with the persistent question: "What is the future of obituaries, and how can we diversify them?"

That was my original problem, right?

So I wanted to gather some information to answer this question.

I went to the Archives in the basement of the New York Times Building.

We call it the morgue.

(Laughter.) So I asked the archivist there for guidance.

He pointed me to a book called The New York Times Obituary Index.

So we gave it to the New York Genealogical Society to have it digitized.

And the programmer wrote a program that scanned all headlines for all sorts of gender-defining terms: "Mr.", "Mrs.", "Lady", "Sir."

And what we found was that between 1851 and 2017, only 15-20 percent of articles were about women.

So we then worked with programmers to build this tool called the Diversity Analysis Tool.

It's a very dry name, but bear with it because it's very helpful.

This is the percentage of women and men broken down by month.

OK, it may not seem like a big deal, but I used to calculate it like this:

(Laughter) So I asked this programmer to set a goal and program it. That goal was 30%.

From March 2018, when Overlooked was launched, to March 2019, I expected to achieve 30 percent of the articles on women.

This was a number we hadn't achieved in 168 years, but we're happy to have achieved it. Reached 31%.

(Applause.) That's great, but it's not enough.

We want to reach 35 percent next, and then 40 percent until we reach parity.

And I hope to partner with this programmer again to build a similar tool for measuring people of color within our reach.

That's what I wanted to do with "Overlooked," too, so I could include men of color. And finally we were able to do it with a special section for Black History Month. It told the stories of about a dozen black men and women.

Again, it was a really powerful experience.

Many of these people were slaves or were generations away from slavery.

Many of them had to make up about their pasts in order to get ahead.

And the pattern of their struggle was repeated over and over again.

For example, Elizabeth Jennings had to fight for her right to ride a segregated streetcar in New York City 100 years ago when Rosa Parks did exactly the same thing with a bus.

It was a reminder of how far we've come and how much still remains to be done.

"Overlooked" also includes other marginalized people.

Recently, news broke about the death of computer programmer Alan Turing.

Believe it or not, this brilliant man never heard of his passing, even though his work in deciphering German messages during World War II helped end the war.

Instead, he died a criminal because of his sexual orientation and was forced to endure chemical castration.

Great things like this obits project don't come easy.

In trying hard to convince people that this was worth getting off the ground, there were a lot of hit and miss events.

There was a moment when I faced a huge self-doubt.

I wondered if I was crazy or alone and that I should just give up.

Looking at the reaction to this project, I knew I was by no means alone.

There are many people who feel the same as I do.

Well, not many people think about obituaries.

However, when you actually try it, you will find that they are living proof of human beings.

It's your last chance to talk about someone's contribution to the world.

They were also an example of who society considered important.

100 years from now, someone may look into the past and find out what our time was like.

As a journalist, I've been fortunate to be able to use this form of storytelling to change the narrative.

It also allowed established institutions to question their status quo.

Little by little, I hope we can continue to do this work and keep the lens of society focused so that no one is overlooked.

thank you.

(applause)

First of all, thank you for your attention.

There's nothing better than being in a room full of people like this and having everyone's attention on me.

Getting attention is a powerful emotion.

I'm an actor, so I'm not really an expert at anything.

(Laughter) But I know what it feels like to be the center of attention. I've been lucky enough to get more than my fair share of attention in my life.

And I am grateful for that. Because, like I said, it's a powerful emotion.

But there is also another powerful feeling that I am lucky to have had so much experience as an actor.

Interestingly, it's the opposite feeling in a way, because it's not what you get for attention.

It comes from paying attention.

When I'm acting, my concentration is high and I focus on just one thing.

Like when you're on set, about to shoot, and your first AD yells, "Rolling!"

Then the sounds of "speed", "marker" and "set" are heard and the director calls out "action!"

I've heard that sequence so many times that it feels like it's become a Pavlovian spell for me.

"Rolling" "Speed" "Marker" "Set" "Action".

If something happens, there is nothing you can do about it.

my attention...

narrow.

And everything else in the world, anything that might have bothered me, or that might have caught my attention, has gone away and I am just there.

And that feeling, that's what I love, that's creativity for me.

That's the biggest reason why I'm so grateful to be an actor.

So there are these two powerful emotions.

Attention is gathering, attention is gathering.

Of course, in the last decade or so, new technology has given more and more people a powerful sense of attention.

For all creative expressions, not just acting.

It could be writing, photography, drawing, music, or anything else.

Distribution channels have been democratized, and that's a good thing.

But I think it can have unintended consequences for anyone on the planet with the urge to be creative, myself included. Because I am not immune to this effect either.

Our creativity is becoming more and more a means to an end, and the end is to get attention.

In my experience, the more I pursue that powerful emotion of attention, the happier I am, so I feel compelled to speak up.

But the more I pursue the strong feeling of wanting attention, the more unhappy I become.

(One applauds.) And—thank you.

(Laughter) (Applause) This goes back a long time for me.

For as long as I can remember, I think the first time I used my acting to get attention was at summer camp when I was eight years old.

By then I had been auditioning for about a year and was lucky enough to get small parts in TV shows and commercials, which I often bragged about at camp that summer.

And it worked at first.

Since I was in "Family Tides", the other children gave me special attention.

That's a picture of me on "Family Ties".

(Laughter.) Then the tide turned. I think I bragged too much.

And other kids started making fun of me.

I remember there was a girl I had a crush on, Rocky.

Her name was Rachel, nicknamed Rocky.

She was beautiful, she sang well, and I fell in love with her and stood there showing off.

Then she turned to me and called me an attention seeker.

That's what I deserve 100 percent.

But it still really hurts.

And since that summer, I've had a certain hesitation about getting attention for my acting.

Sometimes people would ask me, "Wait a minute, if you don't want the attention, why are you an actor?"

And I said, "Because it's not about acting, it's about art."

And they'll be like, "Okay, okay, dude."

(laughs) And then Twitter came along.

And like everyone else, I've become so obsessed with it that I've become a complete hypocrite.

Because at that point, I was absolutely using my acting to get attention.

I mean, did you think my awesome tweets got you this many followers?

In fact, I thought -- I was -- (laughter) "They don't like me just because they saw me in Batman. They like what I say, and I have a way of using words."

(Laughter) And, very quickly, it began to influence the creative process that I love.

It still is.

I try not to let that happen.

But you know, I was sitting there reading the script.

And instead of thinking, "How can I personally relate to this character?"

Or, "How will the audience relate to this story?"

It's like, "What would they say on Twitter about this movie?"

And, "How can I say something good and sarcastic enough to get a lot of retweets, but not too harsh? Because people love to be offended and I don't want to be cancelled."

These are the thoughts that come to mind while reading scripts while trying to become an artist.

I'm not here to say that technology is the enemy of creativity.

I do not think so.

I believe technology is just a tool.

It has the potential to nurture humanity's unprecedented creativity.

I also started an online community called HITRECORD where people all over the world collaborate on all kinds of creative projects, so I don't think social media, smartphones, or other technologies per se are the problem.

but ...

If we're going to talk about the dangers of creativity becoming a vehicle for attention, then we have to talk about the attention-driven business models of today's big social media companies, right?

(Applause.) This may be familiar territory to all of you, but it's a very important question here. For example, how do social media platforms like Instagram make money?

We do not sell photo sharing services. That part is free.

So what are they selling?

It's getting attention.

You're selling your attention to advertisers.

And while there's a lot of discussion going on right now about how much attention we're getting to things like Instagram, my question is, why is Instagram getting so much attention?

We understand it for them.

When someone posts on Instagram, it gets a certain amount of attention from their followers, whether they have a few followers or millions.

And the more attention you can get, the more attention Instagram can get.

Therefore, it is in Instagram's interest to get as much attention as possible.

And it trains you to want that attention, crave it, and feel stressed when you're not getting enough of it.

Instagram makes users addicted to the powerful feeling of being the center of attention.

And everyone jokes like, "Oh my god, I'm crazy about cell phones," but this is a real addiction.

There is a perfect science to it.

For those interested, I recommend the work of Jaron Lanier, Tristan Harris, and Nir Eyal.

But here's what I can say.

Being obsessed with being the center of attention is like being obsessed with anything else.

That's never enough.

At first, I think, "Wouldn't it be great if I had 1,000 followers?"

But you'll think, 'If I hit 10,000 followers,' 'If I hit 100 followers, if I hit 1 million, I'll feel great.

I mean, I have 4.2 million followers on Twitter, and that has never made me feel great.

I won't reveal how many people are on Instagram. Because I joined Instagram after the release of "Batman," so I'm really ashamed of how few there are.

(Laughter.) And when I search for other actors, I find that they outnumber me and I feel terrible about myself.

Because follower count makes everyone feel terrible about themselves.

That feeling of inadequacy drives you to post so you can get more attention, and the attention you get is what these companies sell, that's how they make their money.

So where you feel you've arrived and you're like, 'Oh, I'm fine now,' I can't get any attention.

And of course there are many actors who are more famous than I am and have more followers than I do, and I'm sure they would say the same thing.

Creativity will never be fulfilled if it is driven by a desire for attention.

But there is good news.

There is another powerful feeling.

There are other things you can do with your attention other than letting tech giants control and sell you.

This is the sentiment I spoke about and why I love acting. It means that you can focus your attention on just one thing.

In fact, it turns out that there is also a scientific basis for this.

Psychologists and neuroscientists study a phenomenon they call flow. This is what happens in the human brain when someone is paying attention to just one thing, such as something creative, and trying not to be distracted by other things.

And some say the more regularly they do this, the happier they are.

Now I am neither a psychologist nor a neuroscientist.

But for me it is very true.

It's not always easy, it's hard.

This kind of real attention takes practice, and everyone does it in their own way.

But if there's one thing I can share that I think helps me focus and really pay attention, it's this. I try not to see other creative people as competitors.

I'm trying to find collaborators.

For example, when I was acting in a scene and I started seeing other actors as competitors and I thought, 'Oh, they're going to get more attention than me, people will talk about their performance more than mine,' I lost focus.

And I would probably fall in love with that scene.

But when you look at the other actors as collaborators, it's almost easier to focus because you're just looking at them.

And I don't have to think about what I'm doing. I respond to what they do and they respond to what I do too and we are able to keep each other together.

But I don't want you to think that only the actors on set can collaborate in this way.

I can put myself in any creative situation.

It can be professional or just for fun.

You can also collaborate with people who are not in the same room.

In fact, some of my favorite things I've ever made have been with people I've never met physically.

By the way, to me, this is the beauty of the internet.

The internet can be a great place to find collaborators, if only you could stop competing for attention.

And collaborating with other people makes it so much easier to find that flow wherever you are, whether it's on set or online. Because we're all just focused on the one thing we're building together.

And I felt like I was part of something bigger than myself, and we all protect each other from other things that might catch our attention, and we can all just be there.

At least that's what works for me.

sometimes.

Sometimes it doesn't always work.

Sometimes I still get completely caught up in the addictive cycle of wanting attention.

I mean, even now, to be honest, I don't have the feeling inside of me like, "Hey guys, look, I'm giving a TED talk!"

(Laughter) There is, there is a certain part.

But I can honestly say that the whole creative process of writing and giving this talk has also been a huge opportunity for me to focus and really pay attention to what I care so much about.

So regardless of how much attention I got as a result, I'm glad I did it.

And thank you to everyone who gave me permission to do so.

Thank you, that's it. Focus your attention on others now.

thanks again.

(applause)

(music) (end of music) (applause) Thank you!

(Continued applause) Thank you.

Like my previous speaker, I consider myself a TED virgin.

It's my first time here too...

(Applause) I'm so glad that Mr. Anderson invited me.

I really appreciate the opportunity to play in front of all of you.

And the song I just played was by Josef Hoffmann.

It's called "Kaleidoscope".

Hoffmann was a Polish pianist and composer of the late 19th century and is widely considered one of the greatest pianists of all time.

I have another song I want to play.

19th century German composer Robert Schumann's "Abegg Variations".

The name "Abegg" is actually A-B-E-G-G and that's the main theme of the melody.

(playing the notes A, B, E, G, G) This comes from the surname of a female friend of Schumann's.

(Laughter.) But he wrote it to his wife.

(Laughter) So, actually, if you listen carefully, there should be five variations on this Abegg theme.

It was written around 1834, so it's old, but I hope you like it.

(music) (end of music) (applause) Now here's the part I don't like.

Now, Mr. Anderson told me the session was called "Sync and Flow," and I wondered, "What do I know that these geniuses don't?"

(laughs) So I don't know where to start, but let's talk about composing.

How should I compose?

I think Yamaha does a really good job of teaching us how to compose.

The first thing I do is create a bunch of little musical ideas that I can improvise here on the piano. And I choose one of them as my main theme, my main melody. Like the Abegg I heard earlier.

And once you've chosen your main theme, you'll need to decide: Of all styles of music, what style do you need?

And this year I composed a romantic style.

So I listened to Liszt, Tchaikovsky, and the great Romantic composers for inspiration.

Next, we will create the composition of the entire work together with the teacher.

They help plan the entire production.

And the hard part is cramming musical ideas. Because you have to think.

(laughter) And once the piece has a certain shape, excuse me, it's a solid shape. You really need to polish the piece, polish the details, and polish the performance of the composition as a whole.

Another thing I enjoy is drawing.

I draw because I like drawing Japanese anime art.

I think that's what's trending among teens now.

And then I realized that there are similarities between making music and making art. Because that's your character, your motivation or your little first idea for drawing. Because you have to decide who you want to draw or whether you want to draw an original character.

The next thing I want to decide is how to draw the character.

For example, are you going to use one page? Are you drawing on your computer?

Will it be used as a double-page spread like a manga?

I think it gives a more spectacular effect.

And I need to make the first sketch of my character. This is like the structure of your work, where you add pens and pencils and any other details you want. This is the work of polishing the drawing.

And the other thing that both of them have in common is their state of mind. Because I know I'm one of those teenagers who gets really distracted.

So if you're trying to do your homework and you don't feel like doing it, you'll be drawing and wasting your time.

And what happens is that sometimes I can't draw at all, or I can't compose at all, and then I feel like I'm thinking too much in my head.

I can't concentrate on what I need to do.

And if you use your time wisely, you can get something out of it, but it doesn't come naturally.

What happens is that when something magical happens or something natural happens to you, you can instantly create all this beautiful stuff. And that's what I consider "flow". Because then everything will be fine and you will be able to do anything.

I feel that I am at my best and that I can do whatever I want.

I'm not going to play my song today. I finished it, but it's too long.

Instead, I would like to do something called "improvisation".

Here are seven note cards, one for each sound of the musical alphabet.

And I want someone to come here and pick five, anyone come here and pick five - so I can turn it into some kind of melody and improvise.

oh. Volunteer done!

(Laughter) (Applause) Jennifer Lynn: Nice to meet you.

JL: Yes, five cards. Any 5 cards.

GH: Okay, one. JL: Okay.

GH: Oh, D and F -- how nostalgic.

(laughs) JL: One more thing. GH: Okay. "E" stands for "effort".

JL: Could you read them in the order you chose them?

GH: Okay -- C, G, B, A, E.

JL: Thank you!

GH: You're welcome. So what about these?

JL: No. thank you!

(Applause) Well, she chose C, G, B, A, E.

Let's try to put them in some sort of order.

(playing notes) Okay, that's good.

So, I would like to think about it a little and make something out of it.

(play five notes) (music) (music ends) (applause) The next song, or encore I'll play, is called "Bumble Boogie" by Jack Fina.

(applause) (music) (end of music) (applause)

In his inaugural address, Barack Obama called on each of us to do our best to get out of this current financial crisis.

But what was he suing for?

He happily followed in his predecessor's footsteps and didn't tell us to just go shopping.

Nor did he tell us, "Trust us. Trust your country."

Invest, invest, invest. ”

Instead, what he told us was to put the childishness aside.

And he appealed to virtue.

Virtue is an old word.

It seems a bit out of place in such a cutting edge environment.

And what does that even mean? Some of you may be wondering.

Let's start with an example.

This is the job description of the hospital cleaner scrolling up the screen.

And none of the items there are conspicuous.

Mopping floors, sweeping, emptying trash cans, restocking cabinets, and more, all the things you'd expect.

You might be a little surprised by the amount of stuff, but not by what it is.

But here's what I want you to notice about them. It's a very long list, but none of it involves other humans.

not one.

Janitor's work can be done in the mortuary as well as in a hospital.

Nonetheless, when several psychologists asked hospital cleaners what they thought their job was like, they ran into Mike and told him how Mr. Jones had gotten out of bed, exercised a bit, and walked slowly down the hallway to gain strength, so he stopped mopping the floors.

Charlene said she ignored her boss's advice and didn't vacuum the visitor's lounge because she had a family member who was there all day every day and happened to be taking a nap at this moment.

And then there was Luke, who twice washed the floor of the comatose young man's room. The man's father, who had been staying up all night for six months, was angry because he hadn't seen Luke do it first.

And actions like this by janitors, technicians, nurses and, if you're lucky, doctors can not only make people feel a little better, they can actually improve the quality of patient care and make hospitals run better.

Of course, not all managers are like this.

But they consider this kind of human interaction, accompanied by kindness, compassion, and empathy, to be an important part of their work.

Nevertheless, their job description does not contain a single word about other humans.

These janitors have a moral will to try to do what is right by others.

And beyond that, they have the moral skills to understand what it means to "do the right thing."

"Practical wisdom is the combination of moral will and moral skill," said Aristotle.

A wise man knows when and how to make exceptions to any rule, just as a janitor knew when to disregard his duties for other purposes.

Smart people know how to improvise like Luke did when the floor was rewashed.

Real-world problems are often vague, ill-defined, and constantly changing.

Smart people are like jazz musicians. Using the notes on the page, you dance around them, inventing combinations that suit the situation and the people in front of you.

A wise person knows how to use these moral skills for good ends.

Not to manipulate others, but to serve others.

And finally, and perhaps most importantly, smart people are made, not born.

Wisdom depends on experience, but not just experience.

It takes time to get to know the people you serve.

Permission is needed to be allowed to improvise, try new things, sometimes fail, and learn from failure.

And should be guided by a wise teacher.

When I ask the janitors who have acted like I described how hard it is to learn a job, they say it takes a lot of experience.

And that doesn't mean it takes a lot of experience to learn how to mop a floor or empty a trash can.

It takes a lot of experience to learn how to value people.

At TED, glitz is rampant.

It's scary.

The good news is that you don't have to be smart to be smart.

The bad news is that without wisdom, brilliance alone will not suffice.

It can get you and other people in trouble as much as anything else.

(Applause) Now, I want you to know this.

It's obvious, but let me tell you a little about it.

It's a story about lemonade.

A father and his 7-year-old son were watching a Detroit Tigers game at a ballpark.

My son asked for lemonade, so my dad went to the concession stand to buy it.

All they had was Mike's hard lemonade, 5 percent alcohol.

My dad is a scholar, so I didn't know Mike's Hard Lemonade contained alcohol.

So he took it home.

And the kid was drinking it, so a security guard found it and called the police, who called an ambulance and rushed him to the ballpark and took the kid to the hospital.

The emergency room confirmed there was no alcohol in the boy's blood.

And they were ready to let go of the child.

But not so fast.

The Wayne County Department of Child Welfare and Protection said no.

The child was then placed in an orphanage for three days.

At that point, can the child go home?

Well, the judge said yes, but only if the father left home and checked into a motel.

Two weeks later, I am happy to see the family reunited.

But welfare workers, ambulance workers, and judges all said the same thing: "We don't want to, but we have to follow the procedure."

How could something like this happen?

Scott Simon, who told the story on NPR, said, "Rules and procedures may be silly, but they take the guesswork out of it."

And, in all fairness, rules are often imposed because previous authorities have loosened up and put children back into abusive households.

fair enough.

When things go wrong, we naturally reach for two tools to fix the problem.

One of the tools we use is rules.

Better, more.

The second tool we reach for is incentives.

Better, more.

After all, what else is there?

This is also evident in our response to the current financial crisis.

Regulation, regulation, regulation.

Fix incentives, fix incentives, fix incentives...

The truth is that neither rules nor incentives are enough to get the job done.

How could we write a rule that would force the admin to do the same?

And pay them a bonus for being empathetic?

It's absurd from the looks of it.

And what happens is, as we increasingly look to rules, rules and incentives may make things better in the short term, but they create a downward spiral that makes things worse in the long run.

Excessive reliance on rules undermines moral skills and robs one of the opportunity to improvise and learn from improvisation.

And moral will is undermined by constant appeals to incentives that destroy our desire to do what is right.

And unintentionally, we are waging a battle against wisdom by appealing to rules and incentives.

Here are some examples. The first is the war over rules and moral skills.

The story of lemonade is one of them.

Second, perhaps you are more familiar with the nature of modern American education: the scripted, lockstep curriculum.

Below is an example from Chicago Kindergarten.

Enjoy reading literature and words that begin with "B". "Bath": Gather students on a rug and warn them of the dangers of boiling water.

Say the 75 items in this script and teach the 25-page picture book.

In every kindergarten class across Chicago, every teacher says the same words in the same way on the same day.

I know why these scripts exist.

We don't trust teachers' judgment enough to let them go.

A script like this is insurance against disaster.

And they prevent disaster.

But instead, they guarantee mediocrity.

(Applause.) Don't get me wrong. We need rules!

A jazz musician needs some notes. Most of the time you need some notes on the page.

God only knows, bankers need more rules.

But too many rules prevent a skilled jazz musician from improvising.

As a result, they lose their talent or, worse, stop playing altogether.

What about incentives?

They seem smarter.

If you have one reason to do something and I give you a second reason to do the same thing, it is logical that two reasons are better than one and you are more likely to do it.

right?

Well, not always.

Sometimes the two reasons for doing the same thing seem to compete rather than compliment each other, making people less likely to do it.

I'm running out of time, so I'll just give you an example.

About 15 years ago, Switzerland was trying to decide where to put its nuclear waste.

A referendum was to be held.

Some psychologists even visited and surveyed citizens who had very detailed information.

And they said, "Do you mind if we set up a nuclear waste repository in your area?"

A staggering 50 percent of the public said yes.

They knew it was dangerous.

They thought it would devalue their property.

But it had to go somewhere and they had a national responsibility.

Psychologists asked other people a slightly different question.

They said, "If we pay you six weeks' salary every year, do you think it's okay to have a nuclear waste dump in your area?"

There are two reasons. It's my responsibility and I get paid.

Instead of 50 percent saying yes, 25 percent said yes.

What happens the moment this incentive is introduced is that instead of asking, "What are my responsibilities?"

All we ask is, "What's in my interests?"

When incentives don't work, when a CEO ignores the long-term health of the company in pursuit of short-term profits that lead to huge bonuses, the reaction is always the same.

Earn Smarter Incentives.

Truth be told, there are no incentives to devise wisely enough.

Any incentive system can be subverted by malicious intent.

I need an incentive. People have to make a living.

However, over-reliance on incentives demoralizes professional activity in two ways.

It demoralizes those engaged in the activity, and the activity itself becomes immoral.

Before taking office, Barack Obama said, "We have to ask more than just 'Will it make money?'" And when a profession is demoralized, everyone in that profession becomes dependent on incentives, addicted, and not asking, "Is it right?"

We see this in medicine as well.

("It's not serious, but let's keep an eye on it to make sure it doesn't turn into a big lawsuit.") And we certainly see that in the business world.

(“Unfortunately, to stay competitive in today's market, we'll have to replace you with a three-ball.”) (“I sold my soul about a tenth of the way it is now.”) Clearly, this is not how people want to work.

So what can we do?

Some sources of hope: We should try to make work moral again.

One way to prevent that is to teach more ethics classes.

(Applause.) There's no better way to show people that you're not serious than to wrap everything you have to say about ethics in a little package with a ribbon and marginalize it as an ethics course.

What should I do instead?

1: Honor your moral example.

As you go to law school, realize there's a little voice whispering in your ear about Atticus Finch.

No 10-year-old goes to law school to do M&A.

People are inspired by moral heroes.

But with sophistication, we find that we come to the realization that we are not allowed to have moral heroes.

Well, admit them.

Be proud that you have them.

Celebrate them.

And demand that those who teach you also recognize and bless them.

That's one thing we can do.

I don't know how many people remember this, but another moral hero, 15 years ago, was Aaron Feuerstein, the head of Malden Mills in Massachusetts -- they built Polartec -- the factory burned down.

3,000 employees. He kept them all on the payroll.

why? If he had let them go, it would have been a disaster for them and for the community.

“Perhaps on paper we are worth less to Wall Street, but I can say we are worth more. We are doing great.”

Right here at TED, we heard some moral heroes.

Two in particular inspired me.

One is Ray Anderson, and he -- (applause) -- as you know, turned a piece of an evil empire into a zero-footprint, or near-zero-footprint business.

why? Because it was right.

And the bonus he discovered is that it will actually make you even more money.

His employees are inspired by the effort.

why? Because there is joy in doing the right thing.

Yesterday we heard Willie Smits talk about reforestation in Indonesia.

(Applause.) In many ways, this is a perfect example.

I needed the will to do the right thing.

God only knows that it required an enormous amount of technical skill.

It baffles me how much he and his companions needed to know to plan this.

But most important to make it work, and he emphasized this, it was necessary to know the people in the community.

This fails unless the people you work with are behind you.

And since different people in different communities organize their lives differently, there is no formula that tells you how to stand up for those behind you.

So here at TED and elsewhere, we have a lot to celebrate.

And you don't have to be a megahero.

There are ordinary heroes.

Ordinary heroes like janitor are also worth celebrating.

As practitioners, each of us should strive to become ordinary heroes, if not extraordinary heroes.

As leaders of organizations, we should strive to create an environment that encourages and fosters both moral skills and moral will.

Even the smartest and best-intentioned people give up when they have to go against the flow of their organization.

If you run an organization, you need to make sure none of your jobs include job descriptions like janitor.

Because, truth be told, any work that involves interacting with other people is moral work.

And all moral work depends on practical wisdom.

And, perhaps most importantly, as teachers we should strive to be ordinary heroes, moral exemplars to those we guide.

And there are some things that you as a teacher have to remember.

One is that we are always teaching.

Someone is always watching.

The camera is always on.

Bill Gates spoke about the importance of education, especially the model "knowledge is power" provided by KIPP.

And he talked a lot about the amazing work KIPP is doing to get inner-city kids on the road to college.

I would like to highlight the KIPP effort that Bill didn't mention.

It has come to the realization that the most important thing children should learn is character.

They need to learn to respect themselves.

They need to learn to respect their school friends.

They need to learn to respect their teachers.

And most importantly, we need to learn to respect learning.

That's the main purpose.

Then the rest is mostly downhill along the coast.

and teachers. The way these things are taught to children is for teachers and all other staff to embody them every minute of every day.

Obama appealed for virtue.

And I think he was right.

And the virtue we need most of all, I think, is practical wisdom. Because it allows us to exercise other virtues—honesty, kindness, courage, etc.—in the right way at the right time.

He also appealed for hope.

It is again.

I think there is reason for hope.

I think people want to be allowed to have virtue.

In many ways, that's what TED is all about.

I want to do the right things in the right ways for the right reasons.

This kind of wisdom is within the reach of each of us if we only pay attention.

We pay attention to what we do, how we do it, and perhaps most importantly, the structure of the organizations in which we work so that we and others can develop wisdom rather than have it suppressed.

thank you very much.

thank you.

(Applause) Chris Anderson: Just go here and stand out.

Barry Schwartz: Thank you.

(applause)

So I'm a little embarrassed to admit.

At 17, as a creationist, I decided to go to college and study evolution in order to destroy it.

(laughs) I failed.

I failed so spectacularly that I am now an evolutionary biologist.

(Applause.) I'm a paleoanthropologist and a National Geographic explorer who specializes in cave fossil hunting in unstable and hostile disputed areas.

And we all know that if I were a guy instead of a girl, it would be a pick up line, not a job description.

(Laughs) Well, here's the main subject. I have no death wish.

I am not an adrenaline junkie.

I just looked at the map.

Not much front-line exploration science takes place in politically unstable regions.

Here is a map of all the places where the UK Foreign Office has declared the Red Zone or Orange Zone to be included, or issued any threat warnings.

Now, I would venture to say that it would be a tragedy if we weren't doing cutting-edge discovery science across most of the planet.

So science has a geography problem.

Also, as a paleoanthropologist, folks, this is basically a map of some of the most important places in humanity's journey.

You will almost certainly find fascinating fossils here.

But are we looking for them?

So, as an undergraduate, I was repeatedly told that humans, whether they were humans, Homo sapiens, or early species, left Africa via Mount Sinai in Egypt.

I'm British, as you can tell from my accent, but I'm actually of Arab descent and I always say I look very, very Arab.

You know, I can be really passionate.

It's like, "You're amazing! I love you!"

But I'm really British at heart, so everyone gets annoyed.

(laughs) It's true.

And as a matter of fact, my family is Arab from Yemen and I knew that crossing the Bab El Mandeb Strait wouldn't be too difficult.

And I kept asking myself this really simple question. If the ancestors of New World monkeys were somehow able to cross the Atlantic, why couldn't humans cross that small stretch of water?

The problem, however, is that Yemen has been far too understudied and almost unexplored territory compared to, say, Europe.

But the potential for discovery, combined with its location, was very exciting and raised so many questions.

When did you first start using Bab El Mandeb?

But also what species of humans other than us ended up in Yemen?

Can we discover species that are not yet known to science?

And it turns out I wasn't the only one to see the potential in Yemen.

There were actually several other scholars.

But sadly, due to political instability, they left, so I moved.

And I was looking for a cave. Because the cave is the original primary real estate.

But if you're looking for fossils in that kind of heat, caves are always the best option for fossil preservation.

But then things got really sad in Yemen, and a few days before I left for Yemen, the civil war escalated into a regional conflict, the capital's airport was blown up, and Yemen became a no-fly zone.

Well, my parents made the decision before I was born that I was born British.

It had nothing to do with the best decision of my life.

and now ...

Now the lucky ones in my family are running away, others are being bombed, sending you WhatsApp messages that make you hate your very existence.

This war has been going on for four years.

It has been going on for over four years and has created a humanitarian crisis.

There is hunger, and it is man-made hunger.

The United Nations warns that this is a man-made famine, not a natural famine, but a completely man-made famine that could be the worst hunger in the world in 100 years.

This war has made it clearer than ever to me that no place and no people deserve to be left behind.

So I joined other teams and was forming new collaborations in other precarious places.

But Yemen was so personal to me that I desperately wanted to go back.

So I kept thinking of projects that I could do in Yemen to highlight what was going on in Yemen.

Because, let's be honest, most of Yemen is too dangerous for western teams.

But then I was told that Socotra, an island in Yemen, would be safe once I got there.

In fact, it turned out that several local and international scholars are still working there.

I was so excited to see Socotra Island so close to Africa.

However, it is not known when humans reached the island.

But Socotra Island, for those who know it, well, let's just say you probably know it for an entirely different reason.

You probably know it as the Galapagos of the Indian Ocean, as it's one of the most biodiverse places on earth.

But we were also informed that this incredibly delicate environment and the people who live in it are under threat because they are at the forefront of both politics and climate change in the Middle East.

And gradually I realized that Socotra Island is my Yemeni project.

So I wanted to put together a huge multidisciplinary team.

We wanted to cross the archipelago by foot, camels and dhows to do a health check of this place.

This has only been attempted once in the past, and that was in 1999.

But the problem is that it's not easy to do that.

So we desperately needed a recce. For those unfamiliar with British English, a recce is like a reconnaissance expedition.

And I often say, a really big road trip without recce is like a first date without Facebook's stalker.

(Laughter) It's doable, but is it wise?

(Laughter) There are too many laughs in this room that I know.

Anyway, so our recce team was thankfully unaccustomed to the unsteady place. To be honest, it was kind of important because we were going somewhere between Yemen and Somalia. And after millions of favors, including the Lieutenant Governor, we finally set off, albeit on a wooden cement cargo ship that sailed through the pirate waters of the Indian Ocean using this place as a toilet.

(Laughter) Guys, can you see this?

Did you know that everyone has their own worst toilet story?

Well, I have never swam with dolphins before.

I went straight to poop on them.

(Laughter.) And I also realized that the cockroach infestation was so intense that at one point I went below deck and the floor was all black and moving, which was really less stressful in pirate water.

(audience groans) Yes, and at night there were three high stools to sleep on, but that was the only one. Let's say you have four team members. Problem is, if you have an elevated platform to sleep on, you'll only have to fight a few roaches all night. On the other hand, if you do get the floor, good luck.

So I was the only girl in the team, and in the whole ship, so I didn't sleep on the floor and ran away.

And on the fourth or fifth night, Martin Edström looked at me and said: "Ella, Ella, I really believe in equality."

(Laughter.) So we were sailing on a cement freighter for three days, and gradually we started to see land.

And after three years of failing, I finally got to see Yemen.

And there is no emotion on earth like the beginning of an expedition.

Jump out of the jeep or look up out of the boat and you'll see that there is this possibility, small but still present, trying to find something that might add or change our knowledge of who we are and where we come from.

Such sentiments do not exist on Earth, and are felt by so many scientists, but rarely in politically unstable places.

Because Western scientists are discouraged or outright banned from working in unstable places.

But the problem is that scientists specialize in jungles.

Scientists are conducting research deep inside the cave.

Scientists mount their bodies on rockets and fly into outer space.

But apparently working in an unstable place is considered too risky.

it's completely optional.

Is there anyone in this room who grew up with adventure stories?

And most of our heroes were actually scientists and scholars.

Science was about venturing into the unknown.

Even with the risks, it was a true global exploration.

So when did it become acceptable to make scientific progress difficult in unstable places?

I'm not saying that all scientists should start working in unstable places.

But the point here is for those who do research, understand security protocols and are trained, don't stop people who want it.

Furthermore, just because a part of a country is a war zone does not mean the whole country is a war zone.

I'm not saying that you should go to areas where there is war.

But Iraqi Kurdistan is very different from Fallujah.

And indeed, months after I was unable to enter Yemen, another team recruited me.

So, Professor Graham Barker's team was actually operating in Kurdistan, Iraq, and they were digging Shanidal Cave.

Well, Shanidar Cave had a Neanderthal man known as Shanidar 1 on display decades ago.

Well, with the BBC/PBS TV series, we actually brought Shanidar 1 to life. I want you to meet Ned the Neanderthal.

This is the coolest thing about Ned.

Ned, you met this guy before you got hurt.

You see, it turns out Ned was severely disabled.

In fact, he was so disabled that he could not have survived without the help of other Neanderthals.

This was proof, at least for Neanderthals at this point, that Neanderthals were just like us, sometimes caring for people who couldn't care for themselves.

Ned is an Iraqi Neanderthal.

So what else am I missing?

What are the amazing scientific discoveries we haven't made because we haven't investigated them?

By the way, these places deserve stories of hope, and science and exploration can be a part of it.

In fact, it can visibly help development, and I would argue that these discoveries are a great source of local pride.

And that brings us to the second reason science has a geography problem.

See, we don't empower local academics, do we?

Similarly, my particular field of paleoanthropology studies the origins of humans, but I do not forget that there are very few diverse scientists.

And the fact is that there are a lot of students and academics in these places who are eager to collaborate, and the fact is that they have fewer security issues than we do.

I think we always forget that for them it's not a hostile environment. It's home for them.

Research conducted in unstable locations with local collaborators can lead to surprising discoveries, and that's what we hope for in Socotra.

They call Socotra Island the most alien-looking place on earth, and I, Leon McCarron, Martin Edstrom, and Reese Thwaites-Jones, could understand why.

I mean, look at this place.

These places are neither hell pits nor waste, but the frontiers of future science and exploration.

Ninety percent of the island's reptiles and 37 percent of its plant species reside here, nowhere else on Earth. Among them are the seeds of the Dragon's Blood Tree, which actually shed this red resin.

We have others, too.

Some Socotra people still live in caves. That's really interesting. Because if caves are the prime real estate of this century, it probably means they are thousands of years old.

But we need data, fossils and stone tools to prove it. So our research team, working with other scientists, anthropologists, national and international storytellers, and locals like Ahmed Alalukbi, is desperate to shed light on this place before it's too late.

And now we have to get back to that really big expedition somehow. Because science, science has geography problems.

You guys were a really nice audience.

thank you.

(applause)

The room called economy has a big elephant.

So let's talk about it.

I would like to tell you about the current state of the economy.

That's what I have behind myself.

(Laughter) But, of course, what we have to remember is this.

And what you have to think about is what happens next when you're dancing in flames.

What I'm going to do in the next 17 1/2 minutes is first talk about fire, where we are in the economy, and then I'm going to take three trends that have happened at TED in the last 25 years and three trends that will happen at this conference and wrap them up.

And we want you to get a feel for what the ultimate reboot is like.

The three trends are the ability to manipulate cells, the ability to manipulate tissues, and robots.

And somehow, it would all make sense.

Anyway, let's start with the economy.

There are still some really big problems.

One is leverage.

And the problem with leverage is that it makes the US financial system look like this.

(Laughter) So, a normal commercial bank has 9x to 10x leverage.

This means that for every $1 you deposit, you will be loaned approximately $9 or $10.

A regular investment bank is an investment bank, not a deposit bank. There are 15-20 times.

It turned out that B of A in September was 32 times.

And your friendly Citibank was 47 times.

husband.

This means that every bad loan goes bad 47 times.

And, of course, that's why you guys are making such generous and wonderful donations to these kind people.

Given this, you must be wondering what banks have in store now.

(laughs) It's not pretty.

Meanwhile, governments are acting like Santa Claus.

We all love Santa Claus, don't we?

But the problem with Santa Claus is that when you look at what these people have done and the obligatory spending of those who have promised, in 1967 it turns out that 38 percent were obligatory spending on so-called "rights."

And in 2007 it was 68%.

And it wasn't supposed to reach 100% until about 2030.

Except we were too busy donating a trillion here and a trillion there, so we moved the date forward to around 2017.

And we thought we could get rid of our children's debts, but what happens?

We will start paying them.

And the problem with this issue is that now that the bill is due, it turns out that Santa isn't so cute over the summer.

right?

(Laughter) Here's some advice from one of America's biggest investors.

This person runs a China investment company.

He is a major buyer of U.S. Treasuries.

He gave an interview in December.

This is his first piece of advice.

And this is his second piece of advice.

By the way, the Chinese premier reiterated this at the Davos meeting last Sunday.

This is getting so serious that if we don't pay attention to the deficit, we will end up losing dollars.

And all bets will be void.

Let me show you what it looks like.

I think it's safe to say I'm the only millionaire in this room.

This is the actual invoice.

And that's $10 trillion.

The only problem with this bill is that it really isn't worth much.

It was $8 last week, $4 this week, and $1 next week.

And if you don't support currency, the same thing happens to currency.

So the next time someone as cute as this shows up on your doorstep, and this creature is sometimes called Chrysler, sometimes called Ford, sometimes... whatever you want, you just have to say no.

And we must start banishing the word called "rights."

And the reason it has to be done in the short term is just because we're short on cash.

If you look at the federal budget, it looks like this:

Leave the orange slices to me.

Everything else is obligatory.

Removing the bridge to Alaska from the overall plan makes no difference.

So what we need to start thinking about is capping medical costs. Because it's simply a monster that eats up your entire budget.

We have to start thinking about encouraging retirement with a little more delay.

If you are between the ages of 60 and 65, you will retire on time.

Your 401(k) just succeeded.

If you are 50 to 60 years old, I want you to work for 2 more years.

If you're under 50, I want you to work for 4 more years.

The reason it's reasonable is because when your grandparents got Social Security, they were supposed to take it at age 65 and check out at age 68.

68 is young today.

Military spending must also be reduced by about 3 percent annually.

Other mandatory spending must also be limited.

I have to stop borrowing. Because otherwise the interest will eat up the whole pie.

And in the end, we have no choice but to have a small government.

And if we don't start changing this trend line, we will lose the dollar and end up like Iceland.

I see what you are thinking.

This will happen when hell freezes over.

But let me remind you that it snowed in Las Vegas this December.

(Laughter) If you don't address this issue, here's what happens.

In other words, Japan was hit by a financial real estate crisis in the late 80s.

And its 225 largest companies are worth a quarter of what they were 18 years ago.

I can't fix this now, but what do you think the Dow 3,500 will be in 2026?

It's the result of not addressing this issue.

And unless you want this person to be the CFO of the United States, not just Florida, we might as well address this issue.

it is short term. That's the flame part.

That's the financial crisis.

Now, right behind the financial crisis, there is a second, larger wave that we need to talk about.

That wave is much bigger, much more powerful, and of course it's the wave of technology.

And what's really important in this space is that we need to cut and grow at the same time.

Notably, investment in start-ups accounts for 0.02% of US GDP and approximately 17.8% of US output.

Such groups in this room will create the future of the US economy.

And that is what we must continue to grow.

You don't have to keep stretching these bridges indefinitely.

So let's bring romance novelists into the conversation.

And here these three trends come together.

From there, the ability to manipulate microbes, the ability to manipulate tissues, the ability to manipulate robots begins to lead to a reboot.

And let's recap some of what we've seen so far.

Craig Venter showed up last year to show off the first fully programmable cell that acts like hardware that can be inserted with DNA and booted into another species.

In parallel, people at MIT are building a standard registry for biological parts.

So think of this as a radio shed for biology.

You can go out and get proteins, RNA, DNA, and more.

And start making things.

In 2006 they got together high school and college students to start making these little weird creatures.

It just happened to be alive instead of a circuit board.

This is one of the first they built.

In other words, cells have this cycle.

First, don't grow.

After that they grow exponentially.

Then it stops growing.

Graduate students wanted a way to know what stage they were in.

So they genetically engineered these cells to smell like wintergreen when growing in logarithmic growth.

And when it stops growing, it starts to smell like bananas.

And it was very easy to see when an experiment was working, when it wasn't working, and what phase it was in.

Two years later, this has become a little more complicated.

21 countries gathered. dozens of teams.

they started competing.

A team at Rice University began processing the substance in red wine that turns red wine into beer.

So take resveratrol and put it in beer.

Of course, one of the judges staggered by and said, "Wow! It's a cancer-fighting beer! God exists."

(laughs) The Taiwanese team was a little more ambitious.

They tried to genetically engineer bacteria to function like kidneys.

Four years ago I showed you this photo.

And Cliff Tubin was able to grow a chicken with an extra feather, so people cheered, "Ah!"

And that was pretty cool back then.

But now we're moving from bacterioengineering to tissue engineering, and let me show you what happened during that period.

Two years ago you saw this creature.

Nearly extinct limb-regenerating axolotls from Xochimilco, Mexico.

You can freeze half of your heart. it plays.

You can freeze half of your brain. it plays.

It's like leaving Congress.

(Laughter) But now you can clone mouse molars in Petri dishes, so you don't have to regenerate the animal itself.

And of course, if mouse molars can be grown in Petri dishes, so can human molars.

Isn't this amazing?

In other words, they were born with no teeth.

You give all your teeth to the Tooth Fairy.

The teeth will grow back.

But if you lose one of your second teeth, it won't regrow unless you're a lawyer.

(Laughter) But, of course, most of us know how teeth erupt, so we can take an adult stem tooth, place it in a biodegradable mold, let the tooth regrow, and simply implant it.

And you can do that with other things too.

There, a Spanish woman dying of tuberculosis, who had a donor trachea, took all the cells out of the trachea and spray-painted the cartilage with stem cells.

She regenerated her own trachea and was transplanted 72 hours later.

She is now running around with her children.

This is done in Tony Atala's lab in Wake Forest, where he regrows the ears of wounded soldiers, as well as their bladders.

So, right now, there are nine women walking the streets of Boston with recurrent bladders. This is much more fun than walking around with a bunch of plastic bags for the rest of your life.

This is kind of boring, right?

So you know where this story is going.

But it does make it more interesting.

Last year, the group removed all the cells from the heart, leaving only the cartilage.

They then sprayed the hearts of the mice with stem cells.

These stem cells self-organized and the heart started beating.

life happens.

This may be one of the ultimate treatises.

This was done in Japan and the United States and announced at the same time last year to reboot skin cells into stem cells.

That means you can take what's here and turn it into just about anything in your body.

And this is becoming commonplace and is moving very quickly and in a series of locations.

Third trend: Robots.

Those of us of a certain age grew up expecting to have the "Jetsons" robot Rosie at home by now.

And all we have is the Roomba.

(Laughter) We also thought about having this robot warn us of danger.

didn't happen.

And these are robots designed for a flat world, right?

So Rosie ran around on skates and the other on a flat string.

It's no good without a flat world. So the robots we design today are a little different.

This is "Big Dog" by Boston Dynamics.

This is as close as possible to a physical Turing test.

OK, so let me remind you, a Turing test is when you have a wall and you're talking to someone on the other side of the wall and you don't know if it's a human or an animal. That's when computers reach human intelligence.

This is not an intelligent Turing rest, but it is as close as possible to a physical Turing test.

And this object is moving very fast, and by the way, it can carry around 350 pounds of weight.

This is not the only interesting robot.

There's even a fly-sized fly made by Robert Wood at Harvard University.

Stickybots are made at Stanford University.

When you put all these things together and put cells, tissue engineering and mechanics together, very strange questions start to arise.

At the last Olympics, this gentleman, who held several world records in Special Olympics, tried to run in the regular Olympics.

The only problem with Oscar Pistorius is that he was born without bones in his lower legs.

He arrived within about a second of qualifying.

He filed a lawsuit for permission to run, won, but failed to qualify in time.

There is no doubt that Oscar, or one of Oscar's successors, will make time at the next Olympics.

And in the next couple of Olympics, they would be unbeatable.

And as we summarize these trends and consider what it means for the severely deaf to embrace those who can now hear, remember the evolution of hearing aids.

So your grandparents had very large cones. Then your parents had a strange box that meowed at strange times during dinner. And now we have little buds that no one sees.

And now, cochlear implants have been implanted in people's heads, allowing the deaf to hear.

Well, they don't sound like you or me.

But it will be after 10 or 15 generations of machines. And it's the machine generation, not the human generation.

And after they can hear as well as you and me, in about a couple of years you'll be able to hear how bats sing, how whales talk, how dogs talk, and other kinds of scales.

They will be able to focus on hearing, turn it up or down, and do a range of things we can't do.

And the same thing is happening in your eyes.

This is a German group that is beginning to design eyes that allow blind people to perceive light and darkness.

Very primitive.

And they will be able to see the shape.

And they'll see color, they'll see more clearly, and one day they'll look just like you and me.

And in a few years, we will be able to see in the ultraviolet, see in the infrared, focus our eyes, and microfocus.

They will do what you and I cannot do.

All of these things add up, and it's especially important for those of us who worry about the current blaze to keep an eye on the future.

And of course, next week is Darwin's 200th birthday, so the future looks back 200 years.

This year marks the 150th anniversary of the publication of On the Origin of Species.

And, of course, Darwin argued that evolution is a natural state.

It is the natural state of all living things, including hominids.

In fact, there are 22 species of hominids that have existed, evolved, wandered in different places, or went extinct.

Human evolution is common.

That's why when you look at the hominid fossil record, Erectus, Heidelbergensis, Floresiensis, Neanderthals, and Homo sapiens all overlap.

A common situation is that there are duplicate versions of Hominidae instead of just one.

Then, while considering its meaning, I will briefly explain the history of the universe.

The universe was created 13.7 billion years ago, after which you created all the stars, all the planets, all the galaxies, all the Milky Way.

And then about 4.5 billion years ago we created the Earth, about 4 billion years ago life began, about 006 million years ago humans emerged, and about 001.5 million years ago our version of humanity emerged.

free!

Perhaps the reason for the creation of the universe, all galaxies, all planets, all energies, all dark energy and all other things is to create what is in this room.

maybe not.

That may seem a little arrogant.

(Laughter.) So if that's not what the universe is for, what happens next?

(Laughter) I think what we're going to see is going to be seeing different species of hominids.

I think we are going from Homo sapiens to Homo Evoltis.

And I don't think this is 1000 years from now.

I think most of us will take one look at it and our grandchildren will start living it.

And Homo evoltis integrates these three tendencies into Hominidae, directly and deliberately controlling the evolution of its own, hers, and other species.

And of course it will be the ultimate reboot.

thank you very much.

(applause)

Chris Anderson: So let's take a look at that amazing speech we filmed a few weeks ago.

(music) José Antonio Abreu: Dear friends, ladies and gentlemen, I am very pleased to receive the TED Award today on behalf of all the distinguished Venezuelan music teachers, artists and educators who have selflessly and faithfully worked with me for 35 years in the creation, growth and development of the national system of youth and children's orchestras and choirs in Venezuela.

Ever since I was little, I always wanted to be a musician, and thankfully, it happened.

My teachers, family and community gave me all the support I needed to become a musician.

I have always dreamed that all the children in Venezuela would have the same opportunities as I did.

From that desire and my heart came the idea of ​​making music a deep global reality for my country.

From the first rehearsal, I could see a bright future.

Because rehearsals meant a big challenge for me.

I received a donation of 50 music stands for use by 100 boys at that rehearsal.

When I arrived at rehearsal and there were only 11 children, I thought, "Should we close the program or increase these kids?"

I decided to take up the challenge and that night I promised my 11 children that we would make our orchestra one of the best in the world.

Two months ago, when a prominent British critic published an article in the London Times about who would win the Orchestral World Cup, I remembered my promise.

He named the world's four greatest orchestras, fifth was the Venezuelan Youth Symphony Orchestra.

Today, we can say that Latin American art is no longer the exclusive property of the elite, but has become a social right - a right for all people.

Children: There are no class distinctions here, no white or black, no money.

Simply, if you have the talent, the calling and the will to be here, you can participate. You share with us and make music.

JA: During the recent tour of the Venezuelan Simón Bolivar Youth Orchestra in the United States and Europe, I saw how our music moved young audiences to the core of their souls, how children and adolescents ran onto the stage to receive jackets from the musicians, how standing ovations that sometimes lasted 30 minutes seemed to last forever, and how after the concert was over the public took to the streets to greet our youth in triumph.

This meant not only an artistic triumph, but, as seen in Venezuela, a deep emotional empathy between the nations of the world's cutting edge nations and the musical youth of Latin America, giving these audiences a message of music, vitality, energy, enthusiasm and strength.

In essence, orchestras and choirs are much more than mere artistic structures.

They are examples of social life and also schools. Because singing and playing together means intimately coexisting in pursuit of perfection and excellence, following strict disciplines of organization and coordination in pursuit of harmonious interdependence of voices and instruments.

In doing so, they are able to build a spirit of unity and fraternity, develop self-esteem, and foster the ethical and aesthetic values ​​associated with music in all its senses.

This is why music is so important in awakening sensibility, forming values, and training young people to teach other children.

Child: After being here for so long, music is life itself.

nothing else.

music is life

JA: The teenagers and children of El Sistema each have their own story, and they are all important and very important to me.

I would like to mention the case of Edixon Lewis.

He was a boy from the parish of Caracas who was avidly taking double bass lessons in the Junior Orchestra of San Agustín.

Through his hard work and the support of his mother, family and community, he became a leading member of the double bass division of the Berliner Philharmoniker.

There is another famous case - Gustavo Dudamel.

He started out as a juvenile member of a children's orchestra in his hometown of Barquisimeto.

There he developed as a violinist and as a conductor.

He became the conductor of a junior orchestra in Venezuela and now conducts some of the best orchestras in the world.

He is the music director of the Los Angeles Philharmonic and is still the general leader of the Venezuelan Junior Orchestra.

He is the conductor of the Gothenburg Symphony Orchestra and an unbeatable role model for young musicians in Latin America and around the world.

El Sistema's organization is based on a new and flexible operating style, tailored to each community and region, and currently serves 300,000 lower and middle-class children across Venezuela.

It is a program of social salvation and deep cultural change designed for the entire Venezuelan society, with no distinctions and a focus on vulnerable and endangered social groups.

The influence of El Sistema is felt in three basic circles: the personal/social circle, the family circle and the community.

Within their personal/social circles, children in orchestras and choirs develop intellectually and emotionally.

Music is the source of human dimension development, thereby uplifting the spirit and leading the human being to the full development of his personality.

The emotional and intellectual benefits are therefore enormous. Leadership, the principles of education and training, a sense of commitment, a sense of responsibility, generosity and devotion to others, and the acquisition of individual contributions to achieving greater collective goals.

All this leads to the development of self-esteem and self-confidence.

Mother Teresa of Calcutta always insisted on words that impressed me. The most miserable and tragic thing about poverty is not the lack of bread and the roof, but the feeling of being a nobody, a feeling of being nobody, a lack of identity, a lack of public recognition.

That is why a child's development in an orchestra or choir gives him a noble identity and serves as a role model for his family and community.

It inspires responsibility, perseverance and punctuality in him and makes him a better student in school as it helps a lot in school.

In the family, the support of parents is unconditional.

Children are role models for their parents and this is very important for poor children.

When children find themselves important to their families, they start looking for new ways to improve themselves and have better hopes for themselves and their communities.

Also, he wants social and economic improvement for his family.

All of this creates a constructive and rising social dynamic.

As already mentioned, the majority of our children belong to the most vulnerable segments of the Venezuelan population.

It encourages us to embrace new dreams, new goals and progress in the many opportunities that music offers.

Finally, in the circle of community, the orchestra proves to be a cultural creative space, a source of exchange and new meanings.

Spontaneous music has eliminated it as a luxury and made it an asset to society.

The child plays the violin at home while the father does the carpentry work.

That is why little girls play the clarinet at home while their mothers do household chores.

The idea is that families take pride and joy in participating in the activities of their children's orchestras and choirs.

The vast spiritual world that music creates is within the music itself, ultimately overcoming material poverty.

The moment a child is taught to play an instrument, he or she is no longer poor.

He becomes a kid on his way to a professional level and later a full citizen.

Needless to say, music is the greatest defense against prostitution, violence, bad habits, and anything demeaning in a child's life.

A few years ago, historian Arnold Toynbee said the world was in great spiritual crisis.

It's not an economic or social crisis, it's a spiritual crisis.

To face such a crisis, I believe that only art and religion can give adequate answers to humanity, its deepest aspirations, and the historical demands of our time.

Education, the synthesis of wisdom and knowledge, is a means of striving for a more perfect, more aware, nobler and more just society.

With passion and enthusiasm, we deeply admire TED's excellence in humanism, its range of principles, and its open and generous promotion of young values.

We hope that TED can contribute in a comprehensive and fundamental way to building this new era in music education. In this new age, the social, communal, spiritual and just ends of children and adolescents become beacons and goals of a broader social mission.

No longer does society serve art, much less the monopoly of the elite, but instead art serves society, it serves the weakest, it serves children, it serves the sick, it serves the weak, and it serves all those who seek justice through the spirit of improving human condition and dignity.

(music) (applause) CA: We're going live to Caracas.

We will be broadcasting live to Caracas to hear Maestro Abreu's TED Award wishes.

JA: This is my TED Award wish. We would appreciate your help in creating and documenting a special training program for 50 talented young musicians who are passionate about their art and social justice and are dedicated to promoting El Sistema in the United States and beyond.

thank you very much.

(applause)

Fifteenth-century Europeans believed they had found a miracle cure, a cure for epilepsy, bleeding, bruising, nausea, and nearly every other ailment.

This brown powder can be mixed into drinks, made into an ointment, or eaten plain.

It was known as Mumia and was made by crushing mummified human flesh.

The term "cannibal" dates back to the time of Christopher Columbus. In fact, it's even possible that Columbus himself coined the term.

After landing on Guadalupe, Columbus' first report to the Queen of Spain described the indigenous peoples as friendly and peaceful, but touched upon rumors that a group known as the Caribs carried out violent raids and cooked and ate prisoners.

In response, Queen Isabella granted permission to capture and enslave the cannibals.

When the gold Columbus sought did not come from the island, he began labeling those who resisted looting and kidnapping as Caribbean.

Somewhere along the way, the word 'Caribbean' became 'crabbe' and then 'cannibal'.

First used by colonists to dehumanize natives, it has since been applied to all cannibals.

So while the term stems from an account that isn't based on solid evidence, cannibalism has a real and much more complicated history.

It takes many forms, but sometimes, like Mumia, no recognizable part of the human body is involved.

There are many reasons for cannibalism.

Across cultures and ages, there is evidence of cannibalism for survival, in which people who survived starvation, sieges, or ill-fated expeditions had no choice but to eat the bodies of the dead or starve themselves.

However, it is also very common culturally to normalize some form of cannibalism under normal circumstances.

With fallacies like Columbus, it's difficult to say exactly how common cultural cannibalism is, but there are still some accepted examples within cultures practicing cannibalism.

Consider medicinal cannibalism in Columbus-era Europe.

From the 15th century onwards, the demand for Mumia increased.

Initially, mummies stolen from Egypt sparked the Mumia boom, but the demand soon became too great to sustain Egyptian mummies alone, and opportunists stole bodies from European cemeteries and turned them into Mumia.

The use of Mumia continued for hundreds of years.

Since the turn of the 20th century, it has been included in the Merck Index, a popular medical encyclopedia.

And ground mummies weren't the only remedies made from human flesh that were common across Europe.

Liquid or powdered blood was used to treat epilepsy, and human liver, gallstones, oil distilled from the human brain, and crushed heart were common medical preparations.

In China, records of socially accepted cannibalism date back almost 2,000 years.

One particularly common form of cannibalism seems to have been filial cannibalism, in which adult sons and daughters offered their parents part of their flesh.

This was usually offered as a last resort to cure an ill parent and was not fatal to the offspring. It usually contained thigh meat, or rarely finger meat.

Cannibal funerals are another culturally accepted form of cannibalism.

Perhaps the best-known example is that of the Fore people of New Guinea.

Throughout the mid-20th century, members of the community made their funeral preferences known in advance when possible, sometimes requiring families to come together to burn the body after death.

Sadly, while these ceremonies honored the deceased, they also spread a deadly disease known as kuru throughout the community.

Between fictionalized narratives, verifiable practices, and the huge gaps that still exist in our knowledge, there is not a single history of cannibalism.

But we do know that for thousands of years people have eaten each other, volunteered to be eaten, and accused others of eating them.

At the 2017 Maryland Country Fair, the prize pigs didn't look all that great.

A farmer reported a febrile pig with sore eyes and a runny nose.

But while trade fair officials were concerned about the pigs, the Maryland Department of Health was concerned about a group of sick trade show attendees.

Some petted the pigs, others were just near the barn. But soon 40 of these participants will be diagnosed with swine flu.

Often sick animals do not infect humans.

However, when they do occur, these cross-species transmission, or movement of the viral host, can lead to deadly epidemics.

So how does one species infect another, and why is host jumping so dangerous?

Viruses are a class of organic parasites that infect nearly all life forms.

To survive and reproduce, they must go through three stages: contact with a susceptible host, infection and replication, and infection of other individuals.

As an example, let's look at human influenza.

First, the influenza virus encounters a new host and invades its respiratory tract.

This shouldn't be too difficult, but to survive in this new body, the virus must successfully infect before it can be seized and degraded by the immune response.

To accomplish this task, viruses have evolved specific interactions with host species.

Human influenza viruses are coated with proteins adapted to bind to corresponding receptors on human respiratory cells.

Once inside the cell, the virus makes additional adaptations to hijack the host cell's reproductive machinery and replicate its own genetic material.

The virus only needs to suppress or evade the host's immune system long enough to replicate to a sufficient level and infect more cells.

At this point, the flu can be transmitted to the next victim via transmission of infected bodily fluids.

But this simple sneeze can also expose pets, plants, and even your lunch to the virus.

Viruses constantly encounter new species and try to infect them.

This often fails.

In most cases, the genetic differences between the two hosts are too great.

For a virus adapted to infect humans, lettuce cells would be a foreign and hostile landscape.

However, there are a surprising number of viruses circulating in the environment, all of which may encounter new hosts.

Viruses also multiply rapidly by the millions, so random mutations can occur rapidly.

Most mutations have no effect or even prove to be harmful. However, a small fraction may make the pathogen more susceptible to new strains.

The odds of hitting this devastating genetic raffle increase over time or when a new strain is closely related to the virus's normal host.

A virus adapted to another mammal could infect humans with a few lucky mutations.

And a virus adapted to one of our closest genetic relatives, the chimpanzee, may need little change.

Successful host jumping requires more than time and genetic similarity.

Some viruses have the ability to easily infect new host cells, but cannot evade an immune response.

Sending to a new host can be difficult.

For example, they can make the host's blood contagious, but not their saliva.

However, once the host jump reaches the infection stage, the virus becomes even more dangerous.

The pathogen is now pregnant within two hosts, doubling the chances of mutating into a more successful virus.

And every time a new host emerges, the likelihood of a full-blown epidemic increases.

Virologists are always looking for mutations that could make viruses such as influenza more transmissible.

But predicting the next potential epidemic is a big challenge.

Viruses are very diverse and we are just beginning to understand them.

Researchers are vigorously studying the biology of these pathogens.

And by monitoring populations and quickly identifying new outbreaks, vaccines and containment protocols can be developed to stop these deadly diseases.

It was the largest contiguous land empire in history, stretching from Korea to Ukraine, Siberia to southern China, and was built on an open plain.

In the 12th century AD, before the formation of the Mongol Empire, the steppes of East Asia were dotted with Mongolian and Turkic nomads led by khans.

People had sheep, cows, yaks and camels.

They lived in felt tents and shuttled between summer and winter campsites.

Nomadic women held significant authority in controlling these migrations, many herds, and trade.

Men, on the other hand, specialized in cavalry warfare.

These nomadic groups often fought each other.

That changed under Temujin, who was born into a Mongol aristocratic family.

Despite growing up in poverty after his father died at a young age, he quickly rose to power by forming strategic alliances with other leaders.

Unlike those khans, Temujin promoted his soldiers based on merit and evenly distributed the spoils among them.

His greatest act was to disperse the conquered nomads among his soldiers, so that they could not unite against him.

These innovations made him unstoppable, and by 1206 he united the people of his felt-walled tent and became Genghis Khan.

The Mongols were shamanists and believed that nature spirits and their ancestors lived in the world around them.

The sky god Tengeri drew an arch throughout.

Genghis Khan believed that Tengeri wanted to conquer the whole world in his name.

This seemed within reach if the nomads of the Mongolian plains united.

Anyone who resisted the Mongols had resisted Tengeri's will and had to die for this disobedience.

Under Genghis Khan, the Mongols first conquered northern China and eastern Muslim countries.

After his death in 1227, the mission of God passed to his family, the Golden Bloodline.

In the 1230s, Genghis Khan's sons and daughters conquered Turks and Russian princes in Central Asia, and in 1241 destroyed two European armies.

In the 1250s, the Mongols occupied Islamic territory as far as Baghdad, and in the east their dominance reached southern China by 1279.

Life within the Mongol empire was much more than war, plunder and destruction.

Once the Mongols conquered territory, they left their domestic politics alone and used local magistrates to rule them.

The Mongols allowed all religions to prosper as long as their leaders prayed for them.

They routinely captured artisans, scholars, and technicians, but appreciated what those professionals could do, and forced them to settle across Asia to continue their work.

The empire's most prized product was brocade, with silk sourced from China, gold from Tibet, and weavers from Baghdad.

Gold brocade clothed Mongol rulers, covered their horses, and covered their tents.

The Mongols especially appreciated gunpowder engineers from China.

Once much of Eurasia was politically unified, trade along the Silk Road flourished, aided by an extensive system of equestrians and transit stations.

At sea, the trade continued to be strong, especially in blue and white porcelain, a combination of Mongolian-Chinese white pottery and Mongolian-Iranian blue dye.

But this didn't last long either.

Rather than automatically succeeding to the Great Khan's eldest son, brothers, uncles, and cousins ​​were allowed to vie for leadership, and senior widows were allowed to be regents for their sons.

By the 1260s, Genghis Khan's grandchildren were in full-blown civil war over inheritance, fragmenting their territory into four separate empires.

In China, Kublai Khan's Yuan dynasty is remembered as the golden age of science and culture.

In Iran, the Ilkhanate embarked on the development of new monumental architecture and Persian miniature painting.

In Central Asia, the Chagatai Khanate produced leaders like Timur and his descendant Babur, who founded the Mughal Empire in India.

And in Eastern Europe, the Golden Horde ruled for years until the trading post Muscovy grew into a major world power.

Despite their short-lived empire, the Mongols left behind a legacy of world domination that is unmatched even today.

So this is the first time I'm publicly speaking about the personal side of this story.

Yogi Berra, a world-famous baseball player, said, "When you come to a fork in the road, keep going."

For more than a century, researchers have studied the immune system as a way to fight cancer, but cancer vaccines have unfortunately been a disappointment.

They are only effective against cancers caused by viruses, such as cervical cancer and liver cancer.

So cancer researchers have basically given up on the idea of ​​harnessing the immune system to fight cancer.

And either way, the immune system didn't evolve to fight cancer. Evolved to fight pathogens that enter from outside.

Therefore, its role is to kill bacteria and viruses.

And the reason the immune system has problems with most cancers is because they don't invade. It evolves from its own cells.

So either the immune system does not recognize cancer as a problem, or the immune system attacks normal cells as well as cancer, causing autoimmune diseases such as colitis and multiple sclerosis.

So how do you get around it?

Our answer turned out to be a synthetic immune system designed to recognize and kill cancer cells.

That's right, I said synthetic immune system.

We do that with genetic engineering and synthetic biology.

We did that with naturally occurring parts of the immune system called B cells and T cells.

These were our building blocks.

T cells have evolved to kill virus-infected cells, and B cells are cells that secrete and bind antibodies to kill bacteria.

So what if we combined these two capabilities in a way designed to be reusable to fight cancer?

We realized that it was possible to insert genes for antibodies from B cells into T cells.

So how do you do that?

We used the HIV virus as a Trojan horse to evade the T-cell immune system.

The result was the Chimera, a fire-breathing fantasy creature in Greek mythology with the head of a lion, the body of a goat, and the tail of a serpent.

So we decided to call the paradoxical thing we created using a B-cell antibody, a T-cell carrier, and an HIV Trojan horse a "chimeric antigen receptor T-cell," or CAR T-cell.

The virus also inserts genetic information to activate T cells and program them into killing mode.

So when CAR T cells are injected into cancer patients, what happens when those CAR T cells find and bind tumor targets?

They act like killer T cells that are overcharged with steroids.

They initiate this collision defense building system within their bodies, literally dividing and multiplying millions of times, where they attack and kill tumors.

All of this means that CAR T cells are medicine's first living drug.

CAR T cells break that stereotype.

Unlike regular drugs that you take, the drugs have to do their job, be metabolized, and then taken again, but CAR T cells stay alive and working for years.

For more than eight years, we have retained CAR T cells in cancer patients.

And these designer cancer T cells, CAR T cells, have a calculated half-life of over 17 years.

Therefore, one injection will give you the effect. They will continue to patrol for the rest of your life.

This is the beginning of a new paradigm in medicine.

Now, there was one big challenge with these T cell infusions.

Unless you happen to be an identical twin, the only source of functioning T cells in your patient's body is your own T cells.

So for most of us, we are out of luck.

So what we did was create CAR T cells.

We had to learn how to expand the patient's own T cells.

And we developed a robust platform for this in the 1990s.

And in 1997, we first tested CAR T cells in patients with advanced HIV-AIDS.

They found that these CAR T cells survived in patients for more than 10 years.

And while it improved their immune system and reduced the virus, it didn't cure them.

So we went back to the lab and spent the next decade refining the design of CAR T cells.

By 2010, he had started treating patients with leukemia.

And our team treated three patients with progressive chronic lymphocytic leukemia in 2012.

It is an incurable form of leukemia that afflicts approximately 20,000 adults in the United States each year.

The first patient we treated was a retired Marine and prison officer.

He had only a few weeks to live, and in fact had already paid for his funeral.

When the cells were injected, he developed a high fever within days.

He developed multiple organ failure, was transferred to the ICU, and fell into a coma.

We thought he was going to die, but in fact he was given his final rites.

But then another fork in the road happened.

So, about 28 days after the CAR T-cell injection, he woke up and when his doctors finally checked, the cancer was gone.

The big chunks that were there melted away.

Bone marrow biopsies showed no evidence of leukemia, but of the first three patients we treated that year, two of the three have now been in durable remission for eight years and one has had a partial remission.

CAR T cells attacked the leukemia in these patients, lysing 2.9 to 7.7 pounds of tumor in each patient.

Their bodies became veritable bioreactors for CAR T cells, generating millions of them in bone marrow, blood, and tumor masses.

They found that these CAR T cells were capable of punching well above their weight class, in a boxing analogy.

Just one CAR T cell can kill 1,000 tumor cells.

That's right, it's a ratio of 1 to 1,000.

CAR T cells and their daughter progeny cells divide repeatedly in the body until the last tumor cell is gone.

There is no such precedent in cancer medicine.

The first two patients in complete remission remain leukemia-free and are believed to have been cured.

These were people who had run out of options, and by all the traditional methods they had, they were like modern-day Lazarus cases.

All I can say is "thanks for the fork in the road".

Our next step was to obtain approval to treat acute leukemia, the most common childhood cancer.

The first patient we enrolled in this trial was Emily Whitehead, who was 6 years old at the time.

She had undergone a series of chemotherapy and radiation treatments over several years, but her leukemia was constantly recurring.

I've actually been back three times.

Emily was seriously ill when we first met her.

Her official diagnosis was progressive, incurable leukemia.

The cancer had invaded her bone marrow, liver and spleen.

And when we injected her with CAR T cells in the spring of April 2012, her symptoms did not improve for several days.

Her condition got worse, actually worse.

She entered the ICU in 2012, as did our prison guards in 2010. This was the most terrifying fork in the road of this entire story.

By the third day, she was in a coma and was on life support due to kidney failure, lung failure, and coma.

Her fever reached as high as 106 degrees Fahrenheit for three days.

And I didn't know what was causing the fever.

We performed all standard blood tests for infectious diseases and found no contagious cause for her fever.

But we discovered something very unusual in her blood that had never been seen before in medicine.

She had elevated levels of a protein called interleukin-6 (IL-6) in her blood.

In fact, it was over 1000 times higher than normal levels.

And here another fork in the road appeared.

By pure coincidence, one of my daughters has childhood arthritis.

As a result, as a cancer doctor, I was following an experimental treatment for arthritis in case my daughter needed it.

And coincidentally, months before Emily was hospitalized, a new treatment had been approved by the FDA to treat elevated interleukin-6 levels.

It was also approved for my daughter's arthritis.

It is called tocilizumab.

And in fact, it had just been added to Emily's hospital pharmacy for arthritis.

So when I found out that Emily had very high levels of IL-6, I called the ICU doctor and said, "Why don't you treat her with this arthritis drug?"

I was told I was a cowboy for suggesting such a thing.

And because her fever and low blood pressure were unresponsive to other treatments, her doctor immediately asked the Institutional Review Board for permission, and her parents, and of course everyone, said yes.

And they tried it, and the results were amazing.

Within hours of treatment with tocilizumab, Emily's symptoms began to improve rapidly.

Twenty-three days after treatment, she was declared cancer-free.

And now she's 12 and still in remission.

(Applause.) So we now call this violent response of high fever and coma that follows CAR T cells Cytokine Release Syndrome, or CRS.

We found it to occur in nearly all patients who responded to treatment.

But that doesn't happen to non-responding patients.

Paradoxically, therefore, when patients receive CAR T-cell therapy, they expect a high post-treatment fever, which feels like the “worst flu of their lives.”

They expect this response because they know this is part of a winding road to regain health.

Unfortunately, not all patients recover.

Patients who do not develop CRS are often uncured patients.

Therefore, there is now a strong link between CRS and the immune system's ability to eradicate leukemia.

That's why when the FDA approved CAR T cells for leukemia last summer, it also co-approved the use of tocilizumab to block the effects of IL-6 and associated CRS in these patients.

It was a highly unusual event in medical history.

Emily's doctors have now completed a further trial, reporting that 27 of the 30 patients (the 30 initially treated, or 90%) had a complete remission within a month after CAR T-cell therapy.

A 90% complete remission rate for patients with advanced cancer is unprecedented in more than 50 years of cancer research.

In fact, companies often declare successful cancer trials when 15% of patients achieve a complete response rate.

A remarkable study was published in the New England Journal of Medicine in 2013.

An international study later confirmed the results.

And that led to FDA approval for childhood and young adult leukemia in August 2017.

Therefore, as the first approved cell and gene therapy, CAR T-cell therapy is also being tested in adults with refractory lymphoma.

About 20,000 people in the United States suffer from this disease each year.

The results were equally impressive and have persisted to this day.

And six months ago, the FDA approved CAR T cells to treat this advanced lymphoma.

So there are now many laboratories, doctors and scientists around the world testing CAR T cells for various diseases, and understandably we are all excited about the rapid pace of progress.

We are so grateful to see formerly terminally ill patients, like Emily, return to healthy lives.

We are excited that long-term remission may actually be curative.

At the same time, economic costs are also a concern.

Generating CAR T cells for each patient can cost up to $150,000.

Add in the costs of treating CRS and other complications, and the cost can reach $1 million per patient.

But let's not forget that the cost of failure is even greater.

Current non-curative therapies for cancer are also expensive, and patients die.

So, of course, I hope research is done now to make this more efficient and more affordable for all patients.

Fortunately, this is a new and evolving field, and like many other new treatments and services, prices will go down as the industry learns to do things more efficiently.

Considering the various forks leading up to CAR-T cell therapy, there is one thing that I think is very important.

It reminds us that discoveries of this magnitude do not happen overnight.

CAR T-cell therapy has come to us after a 30-year journey full of setbacks and surprises.

In a world of instant gratification and 24/7 on-demand results, scientists need tenacity, vision and perseverance to get through it all.

They understand that a fork in the road is not necessarily a dilemma or a detour. Sometimes the fork in the road is the way home, even if you didn't realize it at the time.

thank you very much.

(applause)

It was a normal Tuesday in Superconductor until a bug in the system caused a minor situation.

Your team is now trapped in 11 separate pocket dimensions.

Luckily, the experimental teleporting robot is still complete, and if we can figure out how to overcome its design quirks, we might be able to bring everyone home.

The Engineer explains that through interdimensional radio, the robot can teleport to another world you're trapped in, but it's completely random.

The robot has two levers and one big button.

When it appears, simply switch one position of the lever from A to B or vice versa and the robot will record your dimensional position and randomly teleport you to another dimension in 11 dimensions.

If it reappears, you'll need to pull a lever before teleporting away.

When someone pushes the button, the robot takes everyone who pulled the lever home.

Those who did not will be lost in the Multiverse forever.

The challenge is to make sure everyone pulls the lever before someone presses the button.

Currently, they are able to talk to each other via interdimensional radio and come to terms with plans, but all attempts to communicate are thwarted when robotic teleportation technology arrives.

You can't attach messages to the robot or write notes on its super-strong alloy body.

The only way to convey information is by changing the position of one lever or pressing a button.

What kind of plan will make sure everyone gets home?

Pause the video now if you want to figure it out for yourself.

Answer with 3 Answer with 2 Answer with 1 It would be nice to be able to set different combinations of levers to indicate who the robot has already visited.

But there are only two levers.

This gives us 4 combinations, which is too few to communicate about 11 people, especially when one needs to be flipped in order for the robot to move forward.

There must be another way.

A key insight is that no one needs to know when all pocket dimensions have been visited.

If one person pre-accepts responsibility for pressing the button, only that person needs to know who the robot has visited.

In fact, you don't even need to know exactly who visited or how many.

You'll be responsible for pushing buttons at the right time and giving everyone else what's next.

The plan is simple. Use the left lever to count visits. The right lever is useless, so it's okay to move it up and down.

Each of the other members pulls the left lever from position A to position B only once.

If the robot is already shown with the left lever down, or if someone has lowered the left lever at some point in the past, then the right lever should be moved.

Meanwhile, you are the only one who resets the left lever from position B to position A.

This allows the robot to count the number of people visited.

Everyone has to lower the left lever just once, and only you can put it back.

So when the robot visits the 10th time with the left lever down, we know it should have visited all the other 10 times.

That means it's safe to press a button and teleport everyone home.

It may take a while. The robot probably needs to teleport about 355 times. But it's better than leaving no one behind.

Teammates return to the Home Dimension one at a time.

The mission was a resounding success.

Well... most of the time.

Nur Inayat Khan was in the midst of a desperate escape.

Imprisoned for her activities as an Allied spy, she returned to Paris under the stars with the help of Driver and two other prisoners.

When she started running, her thoughts flew into the vortex of events that had brought her here... Born in Moscow in 1914 to an Indian Muslim father and an American mother, Nour grew up in a very peaceful home.

Her parents were Sufi pacifists who believed in the power of music and compassion.

They moved to Paris, where Noor studied child psychology and published children's books.

But with the outbreak of World War II, all that changed.

In May 1940, as German forces prepared to take Paris, Noor and her brother faced a difficult choice.

As pacifists, they believed that all conflicts should be resolved non-violently.

But in the face of devastation across Europe, they decided that standing by was no option.

Traveling to England, Noor volunteered for the Women's Auxiliary Air Force and trained as a radio operator.

Unaware that she was being watched by a secret organization, she immersed herself in radio manipulation and Morse code.

The British Special Operations Executive was set up to sabotage the Germans in Nazi-occupied countries.

A trained radio operator who knows Paris well and speaks fluent French, Nour was an attractive newcomer.

In an interview, she was warned that radio operations are some of the most dangerous jobs in the intelligence field.

The operators had to bring a conspicuous transmitter into enemy territory, and if she was caught, the Secret Service could not protect her.

Nour readily accepted her assignment.

Noor was determined to stick to pacifist principles as much as possible, but he had to learn the art of espionage.

She learned how to contact intelligence networks, pick locks, resist interrogation, and fire a gun.

In June 1943, she landed in Angers, south of Paris, and left for Paris with a forged passport, a pistol, and some French francs.

However, her network has been compromised.

Within a week of being deployed, all of his fellow agents were arrested and Nour was summoned to his home.

She persuaded her superiors to let her stay, which meant doing the work of six radio operators alone.

Over the following months, she tracked and transported supplies to the French Resistance, sent reports of Nazi activity to London, and arranged the safe movement of Allied soldiers.

This effort was essential to building the French resistance and Allied intelligence networks and ultimately ending the war.

She often avoided questions, relying solely on her quick wit and charisma.

When the Gestapo searched her on the train, she casually showed her "projector" around. When officers spotted her hanging the antenna, she talked about her passion for listening to music on the radio and lured the officers into helping her install the cable.

During her four-month tenure, she never lost her keen wit and stealth.

But her charm aroused mortal jealousy.

In October 1943, a colleague's sister who fell in love with an agent who loved Nour sold her address to the Gestapo.

Noor refused to divulge any information, instead focusing on her escape.

Sneaking a screwdriver from the guards, they were able to loosen the skylight and get out into the night.

But just as the POWs began to flee for their lives, an air raid alarm alerted them.

Noor was caught again and sent to a German prison.

Then to Dachau Concentration Camp.

Despite being tortured, deprived and isolated, Nour gave nothing.

It is believed that she shouted "Free!" just before being executed. Since his heroic sacrifice, Noor has been hailed as a hero who fought secret battles behind enemy lines and paved the way to freedom without losing his life.

Twenty years ago, our family introduced a system called “Friday Democratic Assembly”.

Every Friday at 7pm, my family met for an official meeting to discuss current family issues.

These meetings were facilitated by one of my parents and had a note taker.

This meeting had two rules.

First, we are allowed to speak openly and freely.

We children were allowed to criticize our parents without being seen as disrespectful or disrespectful.

The second rule was the Chatham House Rule, which meant that whatever was said at the meeting remained at the meeting.

(Laughter) The topics discussed at these meetings varied from week to week.

One week we discussed what kind of food we wanted to eat, what time our children should go to bed, and how we could improve as a family. Meanwhile, another meeting discussed most of what happened at school and how to resolve conflicts between siblings—real quarrels.

At the end of each meeting, decisions and agreements are reached that last at least until the next meeting.

So you could say I was raised to be a politician.

By age six or seven, I had mastered politics.

I was negotiating, making compromises, and building alliances with other political actors.

(Laughter.) And I once even tried to jeopardize the political process.

(laughter) These meetings are considered very peaceful, civil and democratic, don't you think?

However, this was not always the case.

Things got very heated at times because of this open and free space for conversation, discussion and criticism.

One meeting turned out really badly for me.

I was about 10 years old at the time, and I did really bad things in school, which I'm not going to talk about today (laughter), but my brother decided to bring it up in a conference.

I couldn't defend myself, so I decided to withdraw from the meeting and boycott the entire system.

I literally wrote an official letter and gave it to my father to announce my boycott.

(Laughter) I thought that if I stopped attending these meetings, the system would collapse (Laughter), but my family continued to have meetings, and they often made decisions I didn't like.

However, since I was not present at the meeting, I could not contest these decisions and therefore had no right to object to them.

Ironically, when I was about thirteen, after a long boycott, I ended up attending these gatherings again.

Because there was an issue that was only affecting me and the other family members were not discussing it.

The problem was that after every dinner I was always the only one asked to wash the dishes, and the brothers never had to do anything.

I felt this was unfair, unfair and discriminatory and wanted to discuss it at the conference.

You know, the idea that it's a woman's or girl's role to do housework is a long-held rule in many societies, so a platform was needed for me, 13, to challenge it.

During the gathering, the brothers argued that none of the other boys we knew had washed the dishes, so why should our family be any different?

But my parents agreed with me and decided that my siblings should help me.

However, it could not be enforced and the problem persisted.

Seeing no solution to the problem, I decided to attend another meeting and propose a new system that would be fair to everyone.

So I suggested that each family member should wash their own dishes instead of washing the dishes that the whole family uses alone.

And, as a sign of goodwill, he said he would wash the pot too.

In this way my brothers can no longer claim that it is not their responsibility as boys or men to wash the dishes or clean up after the family. Because the system I proposed was that the whole family would clean after themselves and take care of themselves.

Everyone agreed with my suggestion, and for years it became our dishwashing system.

What I just told you is a family story, but it's a purely political story.

Every part of politics involves decision-making, and ideally the decision-making process should involve people of different backgrounds, interests, opinions, genders, beliefs, races, ethnicities, ages, etc.

And they should all be given an equal chance to contribute to the decision-making process and influence decisions that directly or indirectly affect their lives.

So when I hear young people say, "I'm too young to be in politics, I can't even have a political opinion," I find it hard to understand.

Likewise, when I hear some women say, “Politics is a dirty world and I don’t want to get involved,” it worries me that in many parts of the world, ideas about politics and political engagement are so polarized that the general public feels that in order to participate in politics, they need to be outspoken activists.

I would like to ask these young people, women, and ordinary people, can you really afford not to be interested in or participate in politics?

Politics is not just an activity.

It is awareness, keeping ourselves informed and concerned with the facts.

Vote if possible.

Politics are the tools we use to build ourselves as a collective and a society.

Politics rules every aspect of life, and not participating literally means letting others decide what you can eat, what you can wear, whether you can get health care, whether you can get a free education, how much you pay in taxes, when you can retire, how much your pension is, and so on.

Others decide whether your race and ethnicity are enough to consider you a criminal, or whether your religion and nationality are enough to put you on a terrorist list.

And if you still think of yourself as a strong, independent person who is immune to politics, think again.

I speak to you as a young woman from Libya in the midst of a civil war.

After more than 40 years of authoritarian rule, political participation by women and young people is neither possible nor encouraged here.

Most of the political dialogue held in the past few years, even those convened by foreign powers, were attended only by middle-aged men.

But in places like Libya where political institutions have collapsed and seemingly functioning, including international institutions, today's political decision-making system was established not by the people and for the people, but by the few and for the few.

And these few, who have historically been almost exclusively male, have created laws, policies, and mechanisms for political participation based on the opinions, beliefs, worldviews, dreams, and aspirations of this group of people, while others have been shut out.

After all, we've all heard some version of this sentence: "What do women, much less brown youths, understand about politics?"

When you're young, and in many parts of the world you're a woman, you often hear experienced politicians say, "But you don't have enough political experience."

When I hear that, I wonder what kind of experience they are talking about.

Experience with a corrupt political system?

Or is it about making war?

Or are we talking about the experience of prioritizing economic interests over environmental interests?

Because if this is political experience, then so be it. (Applause.) We women and young people have no political experience.

Now, politicians may not be the only ones to blame, as the general public and many young people are also apolitical.

And even those who are interested do not know how to participate.

This has to change. Here is my suggestion.

We need to teach people about decision-making and how to participate in it from an early age.

Every family is its own mini-political system, usually not democratic. Because while parents make decisions that affect the whole family, children have little to say.

Similarly, politicians make decisions that affect the country as a whole, but the public has little say.

We need to change this, and to achieve this change systematically, we need to teach people that politics, nations and world affairs are as important to them as personal and family matters.

So if you want to achieve this my suggestion and advice is to try the family democratic conference system.

By doing so, children are empowered to exercise their own agency and decision-making from an early age.

Politics is about having conversations that lead to decisions, including difficult conversations.

And to have a conversation, you have to participate. It's not like I used to sign off as a kid, then have to learn the lesson the hard way and then go back.

If you involve children in family conversations, they will grow up and know how to participate in political conversations.

And most importantly, help others get involved.

thank you.

(applause)

On October 17, 2009, Maldivian President Mohammed Nasheed did something unusual.

He held a cabinet meeting underwater.

He literally took his ministers on a scuba dive, so to speak, and warned the world that his homeland could sink if global warming was not brought under control.

I don't know if his message got through to the world, but he definitely caught mine.

I saw a political stunt.

You know, I'm a politician, so I notice these things.

To be honest, Maldives is far from where I'm from and my country is Bhutan. So I kept awake about the impending fate of the Maldives.

Just two months later, I witnessed another political stunt.

This time, the prime minister of Nepal, he held a cabinet meeting on Mount Everest.

He took his entire cabinet to Everest base camp and warned the world that the Himalayan glaciers were melting.

Well, did that worry me?

I'm sure it did.

I live in the Himalayas.

But would I lose sleep after hearing his message?

no.

I was not going to allow my beauty sleep to be disturbed by political stunts.

(Laughter) Well, let's fast forward 10 years.

I saw this report in February of this year.

The report basically concludes that one-third of the Hindu Kush Himalaya's ice could melt by the end of this century.

But only if global warming can be kept to 1.5 degrees Celsius below pre-industrial levels.

Otherwise, if we can't do that, the glacier will melt much faster.

1.5 degrees Celsius. "No way," I thought.

Even the ambitious goal of the Paris Agreement was to limit global warming to 2 degrees Celsius.

1.5 degrees Celsius is what we call the best case scenario.

"This is not true," I thought.

The Hindu Kush Himalayan region is the world's third largest reservoir of ice after the Arctic and Antarctic.

That is why we are also called the "Third Pole".

There is a lot of ice in this area.

And yes, glaciers are melting.

we know that

I have been to people in my own country.

I've seen it too, yes it's melting.

they are vulnerable.

"But they can't be so vulnerable," I remember thinking.

But what if so?

What if our glaciers melt much faster than expected?

What if our glaciers were much more fragile than previously thought?

And what if the resulting glacial lakes, the lakes that form when glaciers melt, burst under the additional weight of water?

And what if these floods cascaded into other glacial lakes, causing even bigger explosions?

Then there will be unprecedented flash floods in my country.

It will ruin my country.

It will wreak havoc on my country.

It can literally destroy our land, our livelihoods, our way of life.

So that report grabbed my attention in a way a political stunt couldn't.

The plan was put together by the Nepal-based International Center for Integrated Mountain Development (ICIMOD).

Scientists and experts have studied our glaciers for decades, but the reports kept me up at night, agonizing over the bad news and what it meant for my country and people.

So after a few sleepless nights, I went to Nepal to visit ICIMOD.

I found a very talented and dedicated team of scientists there. they told me

Part 1: The Hindu Kush Himalayan Glacier has been melting for some time.

Take that glacier, for example.

It's on top of Mount Everest.

As you can see, this once huge glacier has already lost most of its ice.

Number two: Glacier melting is now even faster. So fast, in fact, that just 1.5 degrees of global warming could melt a third of our glaciers.

If global warming increases by 2 degrees Celsius, half of the glaciers will disappear.

And if current trends continue, two-thirds of glaciers will disappear completely.

Part 3: Global warming will cause more rain and less snow on our mountains...

And unlike snowfall, rain only melts ice and compromises the health of glaciers.

Fourth: Pollution in the area is increasing the amount of black carbon deposited on glaciers.

Black carbon is like soot.

Black carbon only absorbs heat and accelerates the melting of glaciers.

In short, our glaciers are melting rapidly, and global warming is making them melt even faster.

But what does this mean?

That means directly affecting the 240 million people living in the Hindu Kush Himalayan region in Afghanistan, Pakistan, India, China, Nepal, Bangladesh, Myanmar and my own beloved country of Bhutan.

As glaciers melt, rain increases and snow decreases, significant changes occur in the behavior of water.

More extreme events will occur, including heavier rains, flash floods, landslides, and glacial lake outburst floods.

All of this will cause unimaginable destruction in areas already home to the poorest people on the planet.

But it's not just people in neighboring areas who are affected.

People living downstream will also be hit hard.

Ten of the major rivers originate in the Hindu Kush Himalayas.

These rivers provide critical water for agriculture and drinking water to more than 1.6 billion people living downstream.

That's 1 in 5 humans.

This is why the Hindu Kush Himalayas are also called the "Water Tower of Asia".

However, when the glaciers melt or the monsoons intensify, these rivers will obviously flood, resulting in great floods when water is not needed and drought all too often when water is desperately needed.

In short, Asia's water towers would collapse, catastrophic for one-fifth of humanity.

Should the rest of the world care?

For example, should I care?

When I heard that the Maldives could disappear underwater, I didn't care.

That's the crux of the problem, isn't it?

we don't care

We don't care until we are personally affected.

I mean, we know. We know climate change is real.

We know we are facing rapid and dramatic change.

We know it's fast approaching.

But most of us act as if everything is normal.

Therefore, all of us must be vigilant. If we can't care about the people affected by melting glaciers, we should at least care about ourselves.

Because the Hindu Kush Himalayas, the whole region is like the heartbeat of the earth.

If this area gets sick, eventually the whole planet will suffer.

And now, with glaciers melting rapidly, the region is not just sick, it needs help.

And how will it affect the rest of the world?

One obvious scenario is the potential destabilization caused by tens of millions of climate refugees. They are forced to migrate because they have no or little water, or because their livelihoods have been destroyed by melting glaciers.

Another scenario we cannot discount is the potential for conflict over water and political destabilization in a region that hosts the three nuclear powers of China, India and Pakistan.

We believe the situation in our region is serious enough to justify the creation of new intergovernmental institutions.

So, as a native of that part of the world, I am here today to propose the establishment of the Third Polar Council, a high-level intergovernmental body with sole responsibility for protecting the world's third largest ice reservoir.

The Third Polar Council will be composed of equal membership, with all eight countries located in the region as members, and may also include representative bodies and other countries with vested interests in the region as non-voting members.

But the key idea is to bring all the parties together and work together.

Working together to monitor glacier health. Working together to develop and implement policies that protect glaciers and, in turn, the billions of people who depend on them.

To think globally and act locally, we must work together...

It does not work.

We tried it in Bhutan.

We have made great sacrifices to act on the ground...

Local, individualized initiatives will continue to be important, but they alone will not be enough to combat the onslaught of climate change.

To combat climate change, we must work together.

We must think globally and act locally.

Our entire region must come together, work together, fight climate change and make our voices heard together.

And that includes India and China.

They have to step up their game.

They must take the initiative in battle to protect our glaciers.

To do so, these two mighty giants must reduce their own greenhouse gases, control pollution and lead the battle.

Lead the global fight against climate change.

And it's all done with a new sense of urgency.

Only then – and maybe, maybe – will our region and other glacier-dependent regions have a chance of averting catastrophe.

Time is running out.

We must act together now.

Otherwise, the next time the Nepali Cabinet meets on Everest, that spectacular backdrop...

It may look quite different.

And if that happens, sea level rise could well drown the Maldives if our glaciers melt.

And although they can hold cabinet meetings underwater and send SOS to the world, their nations can only survive if the islands continue to exist.

The Maldives is still far, far away.

Their island is far from where I live.

But now I'm paying close attention to what's going on there.

thank you very much.

(applause)

Do you feel trapped in a broken economic model?

A model that destroys the living world and threatens the lives of our descendants?

A model that makes a handful of people unimaginably rich while excluding billions?

Does it classify us into winners and losers, and blame the losers for our misfortunes?

Welcome to neoliberalism. This is the zombieism that seems to never die, even if it is totally untrustworthy.

Now, you might have imagined that the 2008 financial crisis led to the collapse of neoliberalism.

Ultimately, the policy exposed its core characteristics of deregulating business and finance, destroying public protection, and throwing us into extreme competition with one another, but it was, well, just a little flawed.

And intellectually, it collapsed.

But still, it rules our lives.

why?

Well, I think the answer is that we haven't yet created a new story to replace it.

Stories are how we navigate the world.

These allow us to interpret its complex and contradictory signals.

When we want to understand something, the sense we seek is not scientific sense, but narrative fidelity.

Does what we hear reflect the behavior we expect of humans and the world?

hanging together?

Is the story moving in the direction it should go?

Now, we are creatures of stories, made up of a series of facts and figures, but no matter how important facts and figures are, you know, I am an empiricist, I believe in facts and figures, but those facts and figures have no power to replace a compelling narrative.

Only stories can replace stories.

You can't take someone's story without giving them a new story.

And we are not interested in the narrative in general, but in the specific narrative structure.

There are many basic plots that we use over and over again, but in the world of politics, there is one basic plot that has proven to be very strong, and I call it the "restoration story."

It looks like this:

Anarchy plagues this land, with powerful and nefarious forces working against the interests of humanity.

But the protagonist will rise up against this anarchy, fight against powerful forces, overthrow them in spite of all odds, and restore harmony to the land.

You've heard this story before.

It's a biblical story.

It's the story of "Harry Potter".

It is the story of "Lord of the Rings".

It's "The Chronicles of Narnia".

But it's also the story that accompanies nearly every political and religious transformation going back thousands of years.

In fact, it can even be argued that political and religious change cannot occur without a powerful new narrative of revival.

It is very important.

After laissez-faire economics caused the Great Depression, John Maynard Keynes sat down to write a new economics and what he did was tell the story of recovery, and it went something like this:

Anarchy attacks the earth!

(laughter) It's because of the powerful and nefarious forces of the economic elite who control the wealth of the world.

But the hero of this story, the Realized State, supported by working- and middle-class people, will challenge that anarchy, combat those powers by redistributing wealth, generate income and jobs by spending public money on public goods, and restore harmony to the land.

Like all good revival stories, this one resonated across the political spectrum.

Democrats and Republicans, Labor and Conservatives, Left and Right, by and large all have become Keynesians.

And when Keynesianism fell into trouble in the 1970s, neoliberals like Friedrich Hayek and Milton Friedman brought up a new revival narrative that went something like this:

You can never predict what will happen.

(laughter) Anarchy plagues this land!

Caused by powerful and evil forces in mighty nations whose collectivist tendencies crush freedom, individualism and opportunity.

But the protagonist of the story, an entrepreneur, will battle those powerful forces, unwind the nation, and restore harmony to the land by creating wealth and opportunity.

And the story resonated beyond the political realm.

Republicans and Democrats, Conservatives and Labor, they have all become neoliberals, broadly speaking.

Opposite stories with the same narrative structure.

Then, in 2008, the neoliberal narrative collapsed, with its opponents coming forward.

none.

No new restoration stories!

The best they could offer was watered-down neoliberalism or microwaved Keynesianism.

That's why we're stuck.

Without that new story, we're stuck with an old failed story that keeps failing.

Despair is the state that we fall into when our imagination fails.

Without a story to explain the present and explain the future, hope is lost.

A failure of politics is essentially a failure of imagination.

Nothing changes without a restoration story telling us where to go, but with such a restoration story, almost everything can change.

The stories we have to tell are those that reach the widest possible audience across political divides.

It should resonate with deep needs and aspirations.

It should be simple, straightforward, and grounded in reality.

Okay, I'll admit that all of this sounds like a bit of a tall order.

But I believe the West is actually waiting for stories like this to be told.

Over the past few years, interesting discoveries have gathered in several different sciences, including psychology, anthropology, neuroscience, and evolutionary biology. And they all tell us the most amazing thing is that mankind has an enormous capacity for altruistic action.

Sure, we all have a little bit of selfishness and greed within us, but for most people, those aren't our core values.

And it turns out that we are also the best collaborators.

We have survived the African savannah by our remarkable ability to provide mutual assistance, albeit weaker and slower than predators and most prey. And that urge to cooperate is hardwired into our minds by natural selection.

These are the central and important facts about humanity: amazing altruism and cooperation.

But something is horribly wrong.

Anarchy plagues the land.

(Laughter) Our good natures have been thwarted by several forces, but I think the most powerful of these is the prevailing modern political discourse that we should live in extreme individualism and competition with each other.

It makes us fight each other, fear and mistrust each other.

It atomizes society.

It weakens the social bonds that make our lives worth living.

And in that vacuum grows forces of violence and intolerance.

We are an altruist society but ruled by psychopaths.

(Applause) But it doesn't have to be this way.

It really isn't. Because we have an amazing capacity for unity and belonging, and by invoking that capacity we can reclaim the amazing elements of our humanity: altruism and cooperation.

With atomization, we can build a rich civic life with a rich participatory culture.

Even if we are caught between the market and the nation, we can build an economy that respects both people and the planet.

And we can create this economics around that great neglected realm, the commons.

The Commons is neither a market, nor a state, nor a capitalist, nor a communist, but it is made up of three main elements: A specific community that manages that resource. and rules and negotiations that the community develops to govern it.

Think community broadband or community energy cooperatives, or common land for growing fruits and vegetables, called plantations in the UK.

Commons cannot be sold or transferred and their profits are shared equally among the members of the community.

We can restore politics where we have been neglected and exploited.

We can take back democracy from those who took it away.

We can use new rules and methods of elections to ensure that financial power never wins over democratic power again.

(Applause.) Representative democracy should be reinforced by participatory democracy so that we can refine our political choices, and that choice should be exercised at the local level wherever possible.

What can be decided locally should not be decided nationally.

And I call all this the politics of belonging.

Now, I think this could appeal to a fairly wide range of people. The reason is that belonging and community are among the few values ​​shared by both the Left and the Right.

And while what they mean may differ slightly, at least we start with a common language.

In fact, much politics can be seen as a quest for a sense of belonging.

Even fascists want community, but it's a terrifyingly homogenous community where everyone looks the same, wears the same uniform and chants the same slogans.

What we need to build is a community based on a bridging network, not a connecting network.

Currently, associative networks connect homogeneous groups of people, whereas bridging networks connect different groups of people.

And it is my belief that if we can build sufficiently rich and vibrant bridging communities, we will be able to resist the temptation of people to slip into the safety of like-knit communities to protect themselves from others.

In summary, our new story looks like this:

Anarchy attacks the land!

(Laughter.) It's caused by a powerful evil force of people who say there's no such thing as society, and that their main purpose in life is to fight over trash cans like stray dogs.

But we, the protagonists of this story, revolt against this anarchy.

We will fight these nefarious forces by building prosperous, attractive, inclusive and tolerant communities, and in so doing restore harmony to the land.

(Applause.) Now, whether you feel this is the right story or not, I hope you agree that we need this story.

We need a new story of restoration that can lead us out of our current turmoil, tell us why we are in turmoil, and show us how to get out of that turmoil.

And that story, if we tell it right, will touch people's minds across the political spectrum.

Our mission is to tell stories that light the way to a better world.

thank you.

(applause)

In 415 A.D. in the city of Alexandria, the bishop and governor were quarreling.

It began with a disagreement over the actions of the monk's militia and ended with a witchcraft accusation against one of the city's most powerful figures.

Hypatia of Alexandria was an advisor to the eminent mathematician, philosopher, and city leader.

In the centuries since she lived, the details of her life have been the subject of much controversy and have assumed almost mythical status.

However, although no writings by Hypatia herself survive, the accounts of her work and life by her contemporaries and students describe the qualities that made her famous as a scholar, beloved as a teacher, and ultimately her downfall.

Hypatia was born around 355 in Alexandria, then part of the Egyptian province of the Byzantine Empire and an intellectual center.

Her father Theon was a prominent Greek mathematician and astronomer. her mother is unknown.

Hypatia was probably an only child, and Theon educated her himself.

By adulthood, she surpassed her father in both mathematics and philosophy, becoming the city's foremost figure, and taking over the post of president of the Platonic school, akin to modern universities.

She improved scientific instruments, wrote mathematics textbooks, and developed more efficient methods of long-distance arithmetic.

But perhaps her most important contribution to intellectual life at Alexandria was through her teachings.

The philosophy Hypatia taught draws from the legacy of Plato and Aristotle, as well as the mystical philosopher Plotinus and the mathematician Pythagoras.

These influences coalesced to form a school of thought called Neoplatonism.

For the Neoplatonists, mathematics had a spiritual dimension and was divided into four branches: arithmetic, geometry, astronomy, and music.

These subjects were studied not merely for curiosity or practicality, but to prove the belief that numbers are the sacred language of the universe.

Neoplatonists saw rational cosmic forces at work in algebraic formulas, repeating patterns of geometric shapes, planetary orbits, and the harmonious spacing of musical tones.

Students delved deep into this ordered world of mathematics in order to achieve a higher oneness with this power known as "The One". Although Hypatia was considered pagan (a term used to describe the traditional pre-Christian Roman faith), she did not worship any particular deity and her ideas could be applied in parallel with multiple religious perspectives.

Jewish, Christian, and pagan students came from across the empire to study with her.

The nonpartisan environment that Hypatia fostered was one in which all students felt comfortable, and was particularly noteworthy given the religious and political turmoil that was tearing the city of Alexandria apart at the time.

Christianity recently became the state religion of the empire.

The local Archbishop Kirill steadily gained political power, commanding a zealous militia of Christian monks to destroy pagan temples and harass the Jewish population.

In doing so, he violated the secular authority of the moderate Christian Roman governor Orestes, leading to a bitter public feud between the two.

She was regarded as wise and impartial, and the governor Orestes consulted Hypatia, who advised her to act justly and with restraint.

However, when a group of Cyril monks instigated a riot and seriously injured Orestes in the process, Orestes had its leader killed by torture.

Cyril and his followers denounced Hypatia, accusing Orestes of practicing sorcery against Christianity.

In March 415, while Hypatia was traveling through the city, the bishop's friar militia dragged her out of her carriage, brutally murdered her, and dismembered her.

Hypatia's death marked a turning point in Alexandria's politics.

Following her murder, other philosophers of the Greek and Roman tradition fled, and the city's role as a center of learning declined.

In a very real sense, the spirit of inquiry, openness and fairness she had cultivated disappeared with her.

Just a mile from here is Pammle House in Edinburgh's Old Town.

Panmoor House was the home of world-famous Scottish economist Adam Smith.

In his seminal book The Wealth of Nations, Adam Smith argued, among other things, that gold and silver reserves are not the only measure of a nation's wealth.

It was the totality of national production and commerce.

I believe this was one of the first descriptions of what we know today as Gross Domestic Product, or GDP.

Of course, in the years since, GDP, a measure of production and commerce, has become more and more important, and today – and I don't think this was Adam Smith's intention – it is considered the most important measure of the success of a nation as a whole.

And my point today is that it's time for that to change.

As you know, it's important that we as a country choose what we measure.

It's really important because it moves the political focus and promotes public activism.

And in that context, I think the limitations of GDP as a measure of national success are all too obvious.

As you know, GDP measures the output of all our work, but it says nothing about the nature of that work or whether it is worthwhile or fulfilling.

For example, we value illicit drug use but not unpaid medical treatment.

We value short-term activity that boosts the economy, even if that activity does a great deal of damage to the sustainability of the planet in the long run.

And when we look back at the political and economic upheaval and rising inequality of the last decade, and look at the challenges of the climate emergency, increasing automation, and an aging population, I think the argument for a broader definition of what it means to succeed as a nation and as a society is compelling and increasingly so.

And it's clear why Scotland took the lead in 2018, spearheading the creation of a new network called the Wellbeing Economy Government Group, bringing together the countries of Scotland, Iceland and New Zealand as founding members.

Although we are focused on the public good, we are sometimes called the SIN countries.

And the aim of this group is to challenge issues focused on narrow measures of GDP.

Economic growth is certainly important, it is important, but it is not the only important thing.

And GDP growth should not be pursued at any cost.

In fact, that group argues that the goal, the objective, of economic policy should be collective well-being, not just how wealthy the population is, but how happy and healthy the group is.

I will discuss the implications for policy later.

But I think it has a deeper resonance, especially in the world we live in today.

You know, when we focus on happiness, we start conversations that raise deep, fundamental questions.

What is really important in our life?

What do we value in the community in which we live?

What kind of country and society do we really want to become?

And I believe that by engaging people with these questions and finding answers to them, we have a much better chance of addressing the political alienation and dissatisfaction that pervades many developed countries today.

Policy-wise, our work on Scotland began in 2007 when we published what we called the National Performance Framework and looked at a range of metrics by which we could measure ourselves.

And those indicators are as diverse as income inequality, child well-being, access to green space and access to housing.

None of these are reflected in GDP statistics, but they are fundamental to a healthy and happy society.

(Applause.) And that broad approach is central to our economic strategy, where we place as much emphasis on tackling inequality as on economic competitiveness.

This promotes a commitment to fair work and ensures that work is fulfilling and well-compensated.

It is behind our decision to establish a Just Transition Commission to guide the path to a carbon zero economy.

Past economic transformations have shown us that if we are not careful, there will be more losers than winners.

And as we face the challenges of climate change and automation, we must never make those mistakes again.

I think the work we are doing here in Scotland is important, but we have a lot to learn from other countries.

Earlier, I mentioned Iceland and New Zealand, the partner countries of the Wellbeing Network.

It's worth noting that all three of these countries are now led by women. I'll leave it up to you to decide if this is appropriate.

(Applause.) They're doing a great job, too.

New Zealand announced its first welfare budget in 2019 with mental health at its core. Iceland leads the way when it comes to equal pay, child care and fatherhood, not the policies that immediately spring to mind when it comes to creating a prosperous economy, but the foundations of a healthy economy and a happy society.

I started with Adam Smith and Wealth of Nations.

In Adam Smith's earlier book, The Theory of Moral Sentiments, which I think is equally important, he puts forward the view that the value of government is measured in proportion to the extent to which it makes its people happy.

I believe this is a good founding principle for any group of nations focused on promoting welfare.

No one, not even in Adam Smith's native Scotland, has all the answers.

But in today's world of increasing division and inequality, dissatisfaction and marginalization, it is more important than ever for us to ask those questions, find answers, and promote a vision of a society that centers well-being, not just wealth.

(Applause) You are now in the beautiful, sunny capital...

(laughter) The country that led the world with the Enlightenment, the country that led the world into the industrial age, and the country that is now leading the world into the low-carbon age.

I want and am determined that Scotland will help change the focus of nations and governments around the world to put welfare at the heart of everything they do.

I think we owe it to this generation.

I certainly believe that we owe it to the next generation and everyone who comes after us.

And if we are led from this enlightened country to do so, I think we can build a better, healthier, fairer, happier society here at home.

And in Scotland we are doing our part to build a fairer and happier world.

thank you very much.

(applause)

Recently, the management of an American supermarket chain decided that they needed to make their business more efficient.

As such, they embraced digital transformation with enthusiasm.

Gone are the teams that oversaw meat, vegetables, and bakery, and in came algorithmic task allocators.

Now instead of people working together, each employee shows up, shows up, is assigned a task, does it, and then comes back.

This was a scientific management with enhanced standardization and assignment of work.

It was very efficient.

Well, it's not perfect. Because task assigners couldn't predict when a customer would drop a box of eggs, or when a crazed kid would knock over a display, or when the local high school decided everyone needed to bring in coconuts the next day.

(Laughter) Efficiency works really well when you can predict exactly what you'll need.

But when something unusual or unexpected happens: children, customers, coconuts, etc., efficiency is no longer on your side.

The unexpected is becoming the norm, so the ability to deal with the unexpected has become a very important issue.

This is why experts and forecasters are reluctant to forecast beyond 400 days.

why?

Because much of the world has gone from complex to complex in the last 20-30 years. So, yes, there are patterns, but they don't repeat themselves regularly.

This means that very small changes can have a disproportionate impact.

And the system keeps changing so fast, it means that expertise alone isn't always enough.

What this means is that there is a huge amount of unpredictability in the world today.

This is why the Bank of England says 'yes, there will be another crash', but we don't know why or when.

We know climate change is real, but we can't predict where wildfires will break out or which factories will be flooded.

That's why companies are blinded when plastic straws, bags and bottles of water go from necessities to waste overnight, and why it's baffling when social conventions turn stars into outcasts and colleagues into outcasts. In other words, it is an indelible uncertainty.

In an environment that largely ignores predictions, efficiency is not only useless, it especially undermines and erodes our ability to adapt and respond.

So if efficiency is no longer our guide, how should we deal with the future?

What kind of thinking really helps us?

What talents must we protect?

I used to think a lot about time management, but now I think I have to start thinking just in case, for events that are certain in general but remain vague in specific.

One example of this is the Coalition for Epidemic Preparedness (CEPI).

We know there will be more epidemics in the future, but we don't know when, where, or what.

That's why I can't plan.

But you can prepare.

As such, CEPI is developing multiple vaccines for multiple diseases, knowing that it cannot predict which vaccines will work or which diseases will occur.

Therefore, some of those vaccines are never used.

it is inefficient.

But it's robust because it means it offers more options and doesn't rely on a single technical solution.

Our ability to respond to epidemics is also highly dependent on people who know and trust each other.

But building these relationships takes time, and that time is always short when an epidemic strikes.

As such, CEPI builds relationships, friendships and alliances knowing that some of them may never be used.

It may be inefficient and time-consuming, but it is robust.

We can also see prudent thinking in financial services.

Banks once held far less capital than they need today. Because holding so little capital and using capital too efficiently made banks so vulnerable in the first place.

Now, holding more capital is as inefficient as it looks.

But it is robust as it protects the financial system from the unexpected.

Countries serious about climate change know they need to adopt not just one but multiple solutions, multiple forms of renewable energy.

The most advanced countries have been working for years to change their water and food supplies and health care systems. Because we know that by the time we can make a firm prediction, it's likely too late for that information.

We can take the same approach to trade wars, and many countries do.

They know they can't predict which markets will suddenly become volatile, so they strive to be friends with everyone rather than relying on a single giant counterparty.

Negotiating all these deals will take time and money, but they are robust because they can better protect the economy as a whole from shocks.

This is especially a strategy adopted by small nations who know they don't have the market power to make decisions, so it's better to have lots of friends.

But if you're still trapped in an organization trapped in the efficiency myth, how do you begin to change it?

Experiment with some.

In the Netherlands, home care nursing used to operate much like a supermarket. Working hours were standardized and dictated by the minute. It was 9 minutes on Monday, 7 minutes on Wednesday, and 8 minutes on Friday.

Nurses hated it.

So one of them, Jos de Block, proposed an experiment.

Each patient is different and we don't know exactly what they need. So why not leave it up to the nurse to decide?

Sound reckless?

(Laughter) (Applause) In his experiments, Joss found that patients felt better in half the time and at 30% less cost.

When I asked Joss what surprised him about his experiment, he smiled a little and said, "Well, I didn't think it would be this easy to find such a big improvement, because it's not the kind of thing you can know or anticipate sitting at your desk or staring at your computer screen."

As such, this form of nursing is now widespread throughout the Netherlands and around the world.

But in any new country it always starts with an experiment. Because each location is slightly and unexpectedly different.

Of course, not all experiments go well.

Joss tried a similar approach with the fire service, but found it didn't work because the fire service was too centralized.

Failed experiments seem inefficient, but they are often the only way we can understand how the real world works.

So now he's trying to be a teacher.

Such experiments require creativity, and not a little courage.

In England -- I meant to say in England, in England -- (laughter) (applause) In England, one of the rugby powerhouses, or one of the rugby powerhouses, is the Saracens.

The managers and coaches there found that all the physical training and data-driven conditioning they were doing had become the norm. In fact, every team does exactly the same thing.

So they risked their experiments.

They took the whole team on ski trips and toured social projects in Chicago, even during game season.

This is expensive and time consuming, and it can be a bit dangerous to bring a large group of rugby players to the ski resort.

(Laughter) But what they discovered was that the players came back with a new bond of loyalty and unity.

And now, when they're on the pitch under incredible pressure, they're demonstrating what the manager calls 'calmness': an unflinching, unwavering devotion to each other.

Opponents are in awe of this, but are still too obsessed with efficiency to attempt it.

Verve, a technology company in London, measures everything its CEO moves and finds nothing that impacts the company's productivity.

So she devised an experiment she called "Love Week." It's about employees spending an entire week looking for really clever, useful, and imaginative things they do, shouting them out loud, and celebrating them.

It takes a lot of time and effort. Many would say it's distracting.

But it really makes the business more dynamic and increases the productivity of the company as a whole.

Preparation, connection building, imagination, experimentation, courage - these are great sources of resilience and strength in unpredictable times.

They are inefficient, but they give us infinite capacity to adapt, change and invent.

And the less we know about the future, the more we will need a vast source of human, messy, and unpredictable skills.

But as we become more reliant on technology, we're taking away those skill assets.

Every time we use technology to help us make decisions and choices, interpret someone's feelings, or guide conversations, we are outsourcing what we can and can't do ourselves to machines, and it's an expensive trade-off.

The more we let machines think, the less we can think for ourselves.

The More -- (Applause) The more doctors spend looking at digital medical records, the less time they spend examining patients.

The more you use parenting apps, the less you understand your children.

The more time we spend with people we are predicted to like and programmed to like, the less we are able to connect with people who are different from ourselves.

And the less compassion we need, the less compassion we have.

What all these technologies are trying to do is force a standardized model of predictable reality to fit into a world of infinite wonder.

What will be left behind?

Everything that cannot be measured is everything that matters.

(Applause.) Our increased reliance on technology risks weakening our skills and making us even more vulnerable to the deep and growing complexity of the real world.

As I was thinking about the extreme stress and turmoil we have to face now, I went to meet and talk to several chief executives whose businesses were experiencing existential crises and were on the brink of collapse.

These were frank and heartbreaking conversations.

Many men cried just thinking about it.

So I asked them: "What put you in this situation?"

And they all gave the exact same answer.

"It wasn't data or technology," they said.

“It was my friends and colleagues that pushed me forward.”

“It was almost the opposite of the gig economy,” added one.

But then I went to see a group of young, up-and-coming executives and asked, "Who are your friends at work?"

And they just looked dazed.

"there is no time."

"They are too busy."

"Not efficient."

I wondered who would give them imagination and stamina and courage when the storm came.

Anyone who tries to say he knows the future is only trying to make it his own, a kind of deceit and manifest destiny.

The harsher, deeper truth is that the future is unknown and cannot be mapped until it is reached.

But that's fine. We have a lot of imagination, so use it and you'll be fine.

We have a deep talent for creativity and exploration - if we apply it.

We are brave enough to invent things that have never been seen before.

Losing those skills leaves us adrift.

But if we hone and develop them, we can choose any future for ourselves.

thank you.

(applause)

Every other night in Japan, I leave my apartment for 15 minutes on the hill, then head to my local fitness club, which has three ping pong tables in the studio.

Space is limited, so at any table, one pair of players practices their forehand, another player practices their backhand, and every now and then the ball hits them in the air and everyone goes, "Wow!"

Then draw lots to choose your partner and play doubles.

But honestly, I didn't know who won because the partner changes every 5 minutes.

And while everyone is trying hard to score points, no one keeps track of who is winning the match.

And after an hour or so of hard work, to be honest, it feels like the ultimate win when you never know who wins.

It is said that Japan has created a competitive spirit without competition.

Now, we all know that watching table tennis is the best way to learn geopolitics.

(Laughter.) Until 1972, when the US table tennis team was allowed to visit communist China, the two most powerful powers in the world were their fiercest rivals.

And as soon as the former antagonists gathered around some small green table, each could claim victory and the whole world could breathe easier.

Chinese leader Mao Zedong wrote a complete manual on table tennis, calling it a "spiritual nuclear weapon."

And it is said that then-President Richard Nixon is the only honorary life member of the American Table Tennis Association, and Nixon helped create this win-win situation through table tennis diplomacy.

But actually, long before that, the history of the modern world was best told through bouncing white balls.

"Ping-pong" sounds like an oriental cousin to "singing songs," but it's actually thought to have been invented during the Victorian era when upper-class Englishmen started beating wine corks against the walls of their books after dinner.

(Laughter) I'm not exaggerating.

(Laughter) And by the end of World War I, the sport was dominated by players from the former Austro-Hungarian Empire, with Hungary winning eight of the nine early world championships.

And the people of Eastern Europe have grown so adept at fighting back anything that's been thrown at them that they've almost brought the whole sport to a halt.

In one championship match in Prague in 1936, the first point is said to have lasted 2 hours and 12 minutes.

First point!

Longer than the movie "Mad Max".

And according to one of the players, the referee had to leave the match with a sore neck before the points were settled.

(Laughter) The player hits the ball back with his left hand and begins directing chess moves between shots.

(Laughter) That one lasted maybe 12,000 strokes, so of course many in the audience started filing.

And an emergency meeting of the International Table Tennis Association had to be held on the spot, and the rules were quickly changed so that no match could last longer than 20 minutes.

(Laughs) Sixteen years later, at the 1952 World Championships in Bombay, a little-known watchmaker named Hiroji Sato showed up, and so did Japan.

And Sato wasn't that big, he wasn't big, he wore glasses, but he didn't have pimples like other paddles, and he was equipped with a thick, spongy rubber foam-covered paddle.

And it was this secret weapon of silence that won the gold medal for the little-known Sato.

When he returned to Japan, one million people gathered on the streets of Tokyo to welcome him, and Japan's post-war reconstruction began.

But what I learned from my regular matches in Japan was what I would call the inner sport of world domination, also known as life.

Our club never plays singles, only doubles. And like I said, you change partners every five minutes, so even if you lose, you're very likely to win after six minutes.

Matches are also best-of-two, so there are often no losers.

Ping-pong diplomacy.

And as a boy growing up in England, I always remember being taught that the point of the game is to win.

But in Japan, I am encouraged to believe that the true meaning of the game is to make as many people as possible feel like they are the winners.

This means that you will not have the ups and downs of an individual, but you will be part of a stable choir on a regular basis.

Our club's most accomplished players display their skills to turn the team's 9-on-1 lead into a 9-on-9 game where everyone gets involved.

And a friend of mine hits a lob so high and loopy that smaller players flinch and miss it. Well, he's got a lot of points, but I'd consider him a loser.

In Japan, table tennis is just like an act of love.

You are learning how to play someone instead of playing against her.

And I'll be honest, at first this seemed to take all the fun out of the sport.

After an upset win against the strongest players, I couldn't be happier. Six minutes later I was behind again with my new partner.

On the other hand, I never once felt disappointed.

And when I left Japan and started playing singles again against my British nemesis, I realized that every loss really broke my heart.

But every time I won, I couldn't sleep either. I knew there was only one way to go, and it was hopeless.

If I were to do business in Japan, this would lead to endless frustration.

In Japan, unlike other countries, if the scores are tied after four hours, a baseball game ends in a draw. League standings are based on win percentage, so teams with a significant number of draws may finish before teams with more wins.

The first American brought to Japan to lead a Japanese professional baseball team was Bobby Valentine in 1995. He led this truly mediocre team to an impressive runner-up finish, only to be promptly sacked.

why?

"Well, he's focused on winning," said a team spokesperson.

(Laughs) Japanese official games can sometimes feel a lot like that point, which is said to take 2 hours and 12 minutes, and you lose all your imagination, boldness, and excitement by playing hard to beat.

At the same time, playing table tennis in Japan reminds me why the choir is always more fun than the soloists.

Your only job in the choir is to play your little part perfectly, tapping it with emotion, and in doing so help create beautiful harmonies that are far greater than the sum of your parts.

Sure, every choir needs a conductor, but I think the choir frees them from the simple childlike sense of alternatives.

You will come to realize that the opposite of winning is not losing, but not being able to see the big picture.

As life progresses, it truly amazes me that any event can only be properly evaluated many years after it has happened.

I once lost all my possessions around the world in a wildfire.

But over time, I came to realize that that seeming loss allowed me to live more peacefully on earth, write without taking notes, and actually migrate to Japan and the inner health club known as Ping-Pong Table.

Conversely, once I stumbled upon a perfect job, I discovered that seeming happiness can hinder true joy even more than misery.

Playing doubles in Japan really took all my worries away and I found that at the end of the night everyone left feeling more or less equally happy.

I am reminded every night that just as being inactive is the same as being dead, not being able to move forward is not the same as falling behind.

And I've come to understand why Chinese universities are said to be able to award degrees in table tennis, and why researchers have found that table tennis actually helps a little with mild mental disorders and even autism.

But watching the 2020 Tokyo Olympics makes me realize that we won't know who won or lost for a long time.

Remember that point I mentioned earlier that it is said to last 2 hours and 12 minutes?

Well, one of the players of that game was going to be sent to the Auschwitz and Dachau concentration camps six years later.

But he got out alive.

why?

Simply because the gas chamber guards recognized him from the days when he played table tennis.

Was he the winner of that epic match?

It hardly mattered.

As you may remember, many people submitted before the first point was finalized.

The only thing that saved him was the fact that he participated.

Every other night Japan tells us that the best way to win any game is to never, never think about the score.

thank you.

(applause)

Consider where you are sitting.

Travel back in time and you might find yourself submerged in shallow waters, buried under miles of rock, or drifting through a landscape of molten hell.

But even further back, about 4.6 billion years ago, you'll be in the middle of a giant cloud of dust and gas orbiting a newborn star.

This is the setting for some of physics' biggest and smallest mysteries: the cosmic dust bunny mystery.

The seemingly empty regions of space between stars actually contain clouds of gas and dust that are usually blown into it by supernovae.

When a dense cloud reaches a certain threshold called the Jeans mass, the cloud itself collapses.

The shrinking cloud rotates faster and faster and heats up, eventually becoming hot enough to burn hydrogen in its core.

A star is born at this point.

When the new star begins to merge, jets of gas are blown out from above and below the cloud, leaving behind an orbiting ring of gas and dust called the protoplanetary disk.

This is a surprisingly windy place. Gas eddies carry particles apart, causing them to collide with each other.

Dust is made up of tiny metal fragments, rock fragments, and even more, ice.

We have observed thousands of these disks in the sky at various stages of development as the dust clumps together into larger and larger clumps.

Dust particles, 100 times smaller than the width of a human hair, stick together due to what are called van der Waals forces.

Here a cloud of electrons moves to one side of the molecule, creating a negative charge on one end and a positive charge on the other.

Opposites attract, but van der Waals can only connect small things.

And there is a problem. Once the dust clumps grow to a certain size, the windy atmosphere of the disk should constantly break them up as they collide with each other.

The question of how they continue to grow is Dust Bunny's first mystery.

One theory looks to electrostatic charging to answer this question.

High-energy gamma rays, X-rays, and UV photons knock electrons off gas atoms in the disk, creating positive and negative electrons.

When electrons hit and stick to dust, the dust becomes negatively charged.

Now, when the wind pushes over the cluster, it repels them as well, slowing them down as they collide.

Mild collisions do not fragment, but too strong repulsion does not grow.

One theory suggests that high-energy particles may knock more electrons off some dust clumps, making them positively charged.

Opposites attract again and the cluster grows rapidly.

But soon we reach another mystery.

Evidence found in meteorites shows that these fluffy dust rabbits are eventually heated, melted, and then cooled into solid pellets called chondrules.

And we don't know how or why that happens.

Furthermore, once those pellets are formed, how do they stick together?

So far, the electrostatic force is too weak, and small stones cannot be held together even by gravity.

Gravity increases in proportion to the mass of the object involved.

That's why I was able to escape from an asteroid the size of a small mountain without difficulty using only the strength of my legs.

So what if it's not gravity?

It's probably dust.

A fluffy dust rim that collects on the outside of the pellet can act like Velcro.

Evidence for this is found in meteors, where many chondrules are found surrounded by thin rims of very fine material (presumably condensed dust).

Eventually, the chondrule pellets are cemented together in larger rocks, and when they end up about a kilometer in diameter, they are large enough to be held together by gravity.

They will continue to collide and grow into larger and larger bodies, including the planets we know today.

After all, the size of our planet, its position within the solar system, its elemental composition, and all the other things familiar to us—species—were determined by a series of random collisions that were innumerable.

If the dust cloud changed even slightly, the conditions probably were not suitable for the formation of life on Earth.

One of Pasta Palace's top chefs has been kidnapped by Burger Bazaar operatives to discover the whereabouts of a secret sauce recipe.

Little do they know that a third party Sausage Saloon is sending you to take advantage of this situation.

As their top spy, your skills range from infiltrating and subterfuge to cracking safes and reading signs of deception.

You have tracked the prisoner to the place where you are holding the chef prisoner.

From his hiding place, he can be seen behind the glass, but in front of him is an interrogator wearing headphones, speaking into a microphone.

"We already know that the recipe is on the thirteenth floor of the bank vault, in safe deposit boxes numbered from 13 to 1300.

Tell me... is that number less than 500? I can't hear Chef's answer, but I know he's lying.

However, the questioner is caught by it.

He further asked, "Is it a perfect square?" Again, we don't hear the answer, but we know the chef is lying, but the interrogator takes the chef at his word.

He then asks, "Is it a perfect cube?" This time the chef will answer honestly.

The interrogator thought for a moment and said: All that's left is to tell me if the second digit of the number is a 1 and that's it. But as the chef begins to answer, the interrogator stands up and blocks his view.

Immediately he rushes out of the room and announces that he has the answer and will send an agent to retrieve the recipe.

You know people at Burger Bazaar get the box numbers wrong.

But can you find the right recipe and search for recipes yourself?

Pause the video and find out for yourself.

Answer with 3 Answer with 2 Answer with 1 The key here is to work backwards.

I don't know what the chef answered the last question or if he answered honestly.

But by the time the questioner asks the question, we know that the questioner has narrowed the choices down to two numbers. One has a 1 in the second digit and one does not.

Our goal is therefore to find answers to the previous questions that lead to only two possibilities.

Of the three constraints offered, the narrowest choice is whether the number is a perfect cube.

That leaves only 8 answers from 13 to 1300.

Now let's assume the answer to the third question was a true YES.

Now let's look at the second question.

If the chef says yes that the number is a perfect square, the questioner's choices are narrowed down to 64 and 729. These are the only numbers that are both square and cubic in range.

However, neither have a 1 in the second digit.

So the answer to the second question should have been "NO".

And that also means that we can remove these two squares from the questioner's list, leaving only six numbers.

Now for the first question. This will allow us to split this list.

If the chef says yes to less than 500, there are 4 choices, which is too many.

But "NO" leaves two numbers greater than 500, one of which has a 1 in the second digit.

I'm not sure which of these numbers the questioner considers correct.

But it doesn't matter. Remember, his conclusion was based on a lie.

On the other hand, you are now in a position to reconstruct the truth.

First, the chef said the number was greater than 500, but that was a lie, it was actually less than 500.

Second, the chef said it wasn't a perfect square, but he also lied. So the numbers are indeed squares.

And finally, he honestly admitted that it was a cube.

And, as we've seen, the only number less than 500 that has both a square and a cube is 64.

You will find the secret recipe and disappear before everyone else.

Corporate espionage is no easy game, but sometimes that's how sausages are made.

Hercules, the strongest man with a mighty heart that rivals Hercules.

Orpheus, master of natural charm and music.

Castor and Pollux are twin tricksters born from an egg.

Son of the north wind that runs through the sky, the Boared family.

For untold ages, these heroes have roamed ancient Greece, creating new legends wherever they go.

But their adventures weren't as great as when they joined forces for a young man named Jason.

Many years ago, Jason's uncle Pelias had ruthlessly usurped the throne of Thessaly from Jason's grandfather.

When Jason returns to his stolen father's court, the Cowardly King sets him a seemingly impossible task. It was to cross the flooded sea to Colchis and steal the golden fleece of the flying ram under King Aeetes' nose.

Pelias promised to abdicate the throne if Jason regained the fleece.

Moved by his heroic mission, the gods spread the call for Jason's help, and soon he amassed a not-so-variegated crew.

These heroes, along with countless sailors, soothsayers, and rebel demigods, named the Argonauts after their sturdy ships.

But the road ahead lay unfathomable horrors enough to test even the bravest of heroes.

Their first stop was Lemnos, the island of women who killed all the men on the island.

As punishment, Aphrodite gave them a nauseating stench, but that didn't stop Jason from having twins with the Queen.

The rest of the crew also found themselves embroiled in a new romance. Until Hercules reprimands them for not acting like heroes.

Finally, they sailed to Bear Mountain. It is an island where a group of ancient six-armed monsters lived with the peaceful Doriones.

While the clans welcomed the Argonauts with open arms, the monsters swooped down from the mountains and threw stones at the anchored ships.

Hercules single-handedly stopped his companions before they could join the battle.

Encouraged by their victory, the triumphant heroes set sail, only to be whisked away to an island after a few nights of storms.

In the storm, the Dorionians considered these new arrivals to be invaders.

The Argonauts were similarly oblivious to their surroundings, fighting unsuccessfully in the dark, killing wave after wave of enemies.

But the morning light revealed a terrifying truth. Their victims were none other than their former hosts.

Once again Jason has allowed the crew to be distracted, but this time at a terrible cost.

Ashamed of his actions, he decided to focus solely on the fleece, but even this haste proved futile.

When Hercules' squire was kidnapped by a water nymph, Jason continued sailing, oblivious to the absence of his most powerful crew.

The rest of the Argonauts continued their quest, but stopped at the sight of the old man surrounded by a vortex of harpies.

It was Phineas, a seer who was cursed by Zeus to endure senility, blindness, and endless torture for leaking a prophecy.

The Wind Brothers, moved by his plight, attack the herd, giving Phineas a short respite from punishment.

In return, the Prophet taught them how to overcome the dreadful challenge that awaited them: a pair of simpregade that crushed rocks and shattered ships.

But first, the Argonauts must navigate beyond the Mouth of Hell, around a bloodthirsty Amazonian island, and under a psychedelic sky.

Some feared that these adventures would cost the crew both strength and morale, driving them insane.

The exhausted crew shivered with fear as they reached the clashing rocks.

But Phineas' advice echoed in their heads.

The Argonauts released a dove, followed it at breakneck speed, and escaped unscathed.

With a short escape, the Argonauts finally caught sight of Colchis.

But as Jason rests and celebrates with his crew, he senses that his time with them is coming to an end.

When the wool shone in his heart, he knew he had to retrieve it alone.

But he could not have imagined that this last task would come with the most terrible price of all.

Billions of years ago, on the young planet Earth, simple organic compounds were able to form more complex bonds, grow and reproduce.

They were the very first life on Earth and have since given rise to all of the billions of species that have inhabited our planet.

At that time, the Earth had very little of what we perceive as a suitable environment for life.

The young planet had extensive volcanic activity and an atmosphere that created hostile conditions.

So where does life begin?

To begin exploring the cradle of life, it is important to understand the basic necessities of any life form.

Elements and compounds essential to life include hydrogen, methane, nitrogen, carbon dioxide, phosphate, and ammonia.

A liquid solvent, namely water, is required for these components to mix and react with each other.

And all life needs a source of energy to grow and reproduce.

Life forms can be divided into two groups: autotrophs, which produce their own energy, such as plants, and heterotrophs, which consume other organisms for energy, such as animals.

Of course, the first organisms could not have fed on other organisms, so they must have been autotrophs, producing energy from the sun or chemical gradients.

So what kind of places meet these criteria?

Locations on land or near sea level have the advantage of being exposed to sunlight.

However, at the time life began, the ultraviolet light on the Earth's surface may have been too harsh for life to survive there.

One environment provides protection from this radiation and an alternative energy source. Hydrothermal vents meander through the ocean floor, covered by kilometers of seawater and shrouded in complete darkness.

A hydrothermal vent is a fissure in the crust from which seawater seeps into a magma chamber and erupts at high temperatures along with a rich slurry of minerals and simple compounds.

Energy is particularly concentrated in the steep chemical gradients of hydrothermal vents.

There is another piece of evidence for hydrothermal vents. The last cosmic common ancestor of life, LUCA for short.

LUCA was not the first life form, but it goes back as far as we can trace.

Still, we don't know what LUCA actually was. Neither LUCA fossils nor modern LUCA exist yet. Instead, scientists have identified genes that are common to species in all three life domains that exist today.

Since these genes are shared across species and domains, they must have been inherited from a common ancestor.

These common genes indicate that LUCA lived in hot, oxygen-free locations and harvested energy from hydrothermal vent-like chemical gradients.

There are two types of hydrothermal vents: black smokers and white smokers.

Black smokers give off acidic, carbon dioxide-rich water that is heated to several hundred degrees Celsius and enriched with sulfur, iron, copper and other vital metals.

But scientists now think black smokers are too hot for LUCA. As such, the current prime candidate for the cradle of life is the white smoker.

Among white smokers, the Lost City, a hydrothermal vent on the Mid-Atlantic Ridge, is a prime candidate for the cradle of life.

The seawater discharged from here is highly alkaline and does not contain carbon dioxide, but is rich in methane and provides more comfortable temperatures.

Neighboring black smokers may have provided the Lost City with the carbon dioxide needed for life to evolve, giving it all the elements to support the first organisms that radiated into the amazing diversity on Earth today.

Hello, my name is Dessa. He is a member of the hip-hop collective Doomtree.

I am wearing a tank top.

(Laughs) And I make my living as a performing, touring rapper and singer.

This is what the show looks like when we perform collectively.

I'm the one wearing the boots.

I have a lot of jumps. I sweat a lot.

It's noisy. I have a lot of energy.

Sometimes body checks are unintentionally performed on stage.

There are also completely intentional body checks on stage.

It's something of a hybrid of an intramural hockey game and a concert.

But when performing my music as a solo artist, I tend to gravitate towards a more pathetic sound.

A few years ago, when I gave my mother a rough mix of the new album, she said, "Baby, you're so beautiful, why are you always so sad?"

(laughs) “You always make music that oozes out.”

And I thought, "Who are you dating to know that word?"

(Laughs) But in my career so far, I've written a lot of sad love songs, so I got messages from fans like, 'Please release new music or a book.

(Laughter.) And after playing and recording and touring those songs for so long, I realized my specialty was essentially romantic devastation.

But what I didn't make public was the fact that most of these songs were written about the same guy.

And for two years we tried to sort ourselves out, then five years, then ten years off and on.

And not only was it heartbreaking to me, but it made me a little embarrassed that I couldn't get back on my feet when others seemed to get back on their feet on a regular basis.

And even though I knew it would do nothing for either of us, I didn't know how to stop that love.

Then, one night, while drinking white wine, I watched a TED talk by a woman named Dr. Helen Fisher. She said her research was able to map the coordinates of love in the human brain.

And I thought that if I could find love in my brain, I might be able to extract it.

So I went to Twitter.

“Does anyone have access to the fMRI lab in the middle of the night or whatever?

Exchange it for a backstage pass and whiskey. ”

(Laughter) And that's Dr. Sheryl Olman, who works at the Magnetic Resonance Research Center at the University of Minnesota.

She picked it up for me.

I explained Dr. Fisher's protocol and decided to recreate it with a sample size of mine.

(Laughter.) So I put on my forest green scrubs, lay on a stretcher, and wheeled into the fMRI machine.

For those unfamiliar with the technology, fMRI machines are essentially large tubular magnets that track the progression of deoxygenated iron in the blood.

So, essentially, you're figuring out which parts of your brain are making the greatest metabolic demands at that moment.

That way you know which structure is associated with the task. For example, tapping a finger always lights up the same area. Or, in my case, looking at a picture of an ex-boyfriend, then looking at a picture of a man who looked like him but didn't have strong feelings for him, and so on.

he was the control

(Laughter) And when I stepped away from the machine, I got a very high resolution image of my brain.

I was able to separate the two halves.

Essentially, a view that Dr. Cheryl Olman called the "Brain Skin Rag", where you can inflate the cortex to see inside every wrinkle.

(Laughter) And then I saw how my brain reacted when I saw the image of the two men.

And this was important.

I was able to track all the activity when I looked at the controls and when I looked at my ex. Only love can be found by comparing these datasets. If I stepped on the scale fully clothed and then naked, the difference between those numbers would be the weight of my clothes.

So when we compared the data, we subtracted one from the other and found exactly the activity in the region that Dr. Fisher would have predicted.

that's me

And that's what my brain is in love with.

There was activity in that little orange dot, the ventral tegmental area, that red ring in the anterior cingulate cortex, and that golden set of horns in the caudate nucleus.

After Cheryl had time to analyze the data with her team and a few partners (Andrea and Phil), she sent me an image of one slide.

It was a cross-section of my brain, with one bright spot of activity representing my feelings for this man.

And I knew I was in love, and that's all the reason I tried to do something outrageous like this.

But having the images to prove it made me feel very justified, like, "Oh, I have it all in my head, but now I know exactly where it is."

(Laughter.) And I also felt like an assassin who left her mark.

It was what I had to destroy.

So I decided to start a therapy called "Neurofeedback".

I worked with a woman named Pennijan Gracefire, and she explained to me that what we were trying to do was train my brain.

We have not performed any lobotomies.

We train our muscles the same way we train them, so they are flexible and resilient enough to react appropriately to my situation.

So when you're on the treadmill, expect your heart to pound, and when you're asleep, you want that muscle to slow down.

Similarly, when I am in a long-term, viable, loving relationship, the emotional centers of my brain should be active, and when I am not in a long-term, viable, emotional, loving relationship, they should eventually cool down.

So she brought along a set of electrodes smaller than a dime, sensitive enough to detect my brain waves through my bones, hair, and scalp.

As she geared me up, I could see my brain working in real time.

And in another view she showed me, I could see exactly which part of my brain was overactive. Shown here in red. Low activity, shown here in blue. And the Green Zone, the Goldilocks Zone, a healthy standard of behavior, that's where I wanted to go.

And indeed, only the part of my brain associated with love regulation identified in Fisher's study can be isolated.

So, Pennigan explained several times that he would connect all the electrodes to me and that I wouldn't have to do anything or think about anything.

I basically had to sit still and wake up to watch.

(harp and vibraphone sounds) So I did.

And every time my brain operated at that healthy threshold, a bit of harp or vibraphone music played.

And I was just watching my brain spinning at almost the same speed as the gyro machine on my dad's flat screen TV.

And it was counterintuitive.

Learning, she said, will be essentially unconscious.

But then, without actively activating my mind, I thought about other things I had learned.

I'm not sure what my left calf muscle is doing when I'm riding a bike, or how my lats work when I'm staggering to the right.

The body just learns.

Similarly, Pavlov's dogs probably don't know much about things like protein structure or ringing bell waveforms, but they still salivate because their bodies are paired with stimuli.

After the session, we returned to Dr. Sherrill Olman's fMRI machine and repeated the protocol to take the same images of my ex-husband and control. Given the scientific rigor, Cheryl and her team didn't know who was who, so they couldn't influence the results.

And after she had time to analyze the second dataset, she sent me the images.

She said, "A's control over your brain appears to have been essentially eradicated.

I think this is the desired result. , comma, yes, question mark.

(Laughter) And that was exactly the desired result.

And finally, I gave myself time to reflect on myself. "How did you feel?"

And in a way it felt like it was the same inventory of emotions I had at first.

This is not "Eternal Sunshine of the Spotless Mind".

The man was no stranger.

But I had love, jealousy, closeness, attraction, respect, and all the mixed feelings that accumulate after years of love.

However, I felt that the feeling of mercy came to the surface and the feeling of being less obsessive and less generous was less present.

Reordering emotions sounds like a small thing in some ways, but it felt like the biggest thing to me.

For example, if I say, "I'm going to put you under anesthesia and pull out your wisdom teeth," the order in which I do those two things will be very important to you.

(Laughter) And I also felt like I had the really rare philosophical privilege of understanding love.

The lab offered to 3D print my caudate.

I must hold love in my hand.

(Laughter.) Then I bronzed it and made it into a necklace and sold it on the merchandising table at the show.

(Laughter.) (Applause.) And with the help of a few friends back in Minneapolis, one of whom was Becky, we made a giant disco ball out of it -- (Laughter.) It could fall from the ceiling at my big show.

And I felt like I had the opportunity to understand love more deeply, including the compulsive part.

It's not a pretty symmetrical Valentine's heart.

It's physical, it's systemic, it's like a pair of terrifying ram's horns embedded deep in your skull that lights up when a special boy walks by, and if he likes you and makes each other happy, you'll fan the flames.

If he doesn't, he'll assemble a team of neuroscientists to kill them by force.

(laughs) Thank you.

(applause)

I was born in 1993 in Hyesan, a town in northern North Korea on the border with China.

I had loving parents and an older sister.

Before I was ten years old, my father was sent to a labor camp for engaging in illegal trade.

Now he supported us by selling clogs, sugar, rice, and later copper through the “illegal trade”.

In 2007 my sister and I decided to run away.

She was 16 and I was 13.

I hope you understand what the word "escape" means in the context of North Korea.

We were all starving, and in North Korea hunger means death.

So it was the only option for us.

I didn't even understand the concept of running away, but at night I could see the lights of China, and I thought that if I went to a place with those lights, I might find food.

There were no grand plans or maps.

We had no idea what was about to happen.

Imagine your apartment on fire.

I mean, what would you do?

Will you stay and get burned, or will you jump out the window and see what happens?

that's what we did.

We jumped out of the house instead of setting fire to it.

North Korea is unimaginable.

It's very difficult for me when people ask me what it's like to live there.

To be honest, you can't even imagine.

Just as we can't imagine life on Mars right now, Mars is a completely different planet, so no words in any language can describe it.

For example, the word "love" has only one meaning. Love for our dear leader.

North Korea has no concept of love.

And not knowing the language means not understanding the concept, and therefore not even recognizing that the concept is a possibility.

Let me give you another example.

Growing up in North Korea, we sincerely believed that our dear leader was an Almighty God who could read even my thoughts.

I was afraid to think about North Korea.

I was told that he was hungry for us and worked tirelessly for us, and it really broke my heart to think of him.

When I fled to South Korea, people said he was actually a dictator, had a car, had a lot of resorts, and lived a super luxurious life.

And I remember looking at a picture of him and realizing for the first time that he was the biggest man in the picture.

(Laughter) And it shocked me.

I finally realized he wasn't starving.

But I never got to see it until someone told me he was fat.

(Laughter.) Really, someone had to tell me he was fat.

If you've never practiced critical thinking, just see what you're told to see.

The biggest question people have with me is also, "Why isn't there a revolution inside North Korea?"

are we stupid?

Why hasn't there been a revolution after 70 years of oppression? ”

And I say: If you don't know that you are a slave, if you don't know that you are isolated or oppressed, how will you fight to be free?

In other words, knowing that you are isolated means that you are not isolated.

Ignorance is the true definition of isolation, and that's why when I was in North Korea, I didn't realize I was alone at all.

I literally thought I was at the center of the universe.

So here are my ideas worth spreading. Many people think that humans inherently know what is right and what is wrong, the difference between right and wrong, what they deserve and what they don't deserve.

I tell them: BS.

(Laughter.) (Applause.) You have to teach everything, everything, including compassion.

If I see a dead person on the street right now, I will do anything to save him.

But when I was in North Korea, I saw people dying and dying on the streets.

I didn't feel anything.

Not because I'm a psychopath, but because I never learned the concept of compassion.

However, ever since I learned the word and concept of "compassion," I have felt compassion, empathy, and sympathy in my heart, and I still do.

Now I live in America as a free man.

(Applause.) Thank you.

(Applause.) And recently the leader of the free nations, our President Trump, met with my former God.

And he decided that human rights were not important enough to include on his agenda and did not talk about it.

And it scares me.

We now live in a world where dictators who executed uncles, murdered half-brothers, and murdered thousands of North Koreans are glorified.

And it was commendable.

And it also got me thinking: maybe we all need to be taught something new about freedom now.

Freedom is fragile.

I hate to make you worry, but it is.

It took just three generations to make North Korea the '1984' of George Orwell.

It took only three generations.

If we, as free people here, do not have a voice and fight for human rights for those who are now oppressed, who will fight for us when we are not free?

machine? animal? don't know.

I think it's great that we care about climate change, animal rights, gender equality, all of this.

The fact that we care about animal rights means how beautiful our hearts are and that we care about someone who can't speak for themselves.

And the North Korean people can't speak for themselves now.

There is no internet in the 21st century.

It has no electricity and is currently the darkest place on earth.

Now, I want to say to my fellow North Koreans living in that darkness.

They may not believe it, but I want to tell them that another life is possible.

be free.

From my experience, literally anything is possible.

I was bought and sold as a slave.

But here I am, and that's why I believe in miracles.

One of the things I have learned from history is that nothing in this world is permanent.

So we have good reason to hope.

thank you.

(applause)

Chris Anderson: And now we're broadcasting live to Caracas to meet one of Maestro Abreu's great disciples.

He is the new music director of the Los Angeles Philharmonic Orchestra.

He is the greatest young conductor in the world.

Gustavo Dudamel!

(Applause) (music) (Applause) Gustavo Dudamel: Hello LA folks.

Hello Quincy. Hello, my name is Maestro Zander. high mark.

I am very happy to be with you on the other side of the earth.

We can only speak through music.

We are so happy to have had the opportunity to welcome this angel not only to our country, Venezuela, but to our world.

God gave us the ability to dream and to make those dreams come true.

And this is the result of a wonderful project called The System in Venezuela.

Our Maestro, we want to have orchestras in every country across America.

And I'd like to play you a little song by one of America's most important composers.

Mexican composer Arturo Marquez.

"Danzon No. 2."

(music) (applause)

I've spent the last three years talking to some of the worst people on the internet.

If you've been online lately, you may have noticed that there's a lot of harmful trash out there, including racist memes, misogynistic propaganda, and viral misinformation.

So I wanted to know who made this.

I wanted to know how they spread it.

Ultimately, I wanted to know what effect it would have on our society.

So in 2016, I started tracing some of these memes to their sources: the people who created them or made them go viral.

I approached them and said, "Hey, I'm a journalist. Can I come see what you're doing?"

Now, the usual reaction would be, "Why the hell would you want to talk to a globalist Jewish bastard from Brooklyn who is colluding with the Democrats?"

(Laughter) My reaction to this is, "Look, that's only 57% true."

(Laughs) But I often got the opposite reaction.

"Yes, of course, please come."

So I ended up in the living room of a social media propagandist in Southern California.

He was a married white man in his late thirties.

In front of him was a table with mugs, a laptop for tweeting, a phone for texting, and an iPad for live streaming to Periscope and YouTube.

that was it.

Yet, with these tools, he was able to push his marginal and pernicious topics into the center of the American conversation.

For example, one day when I was there, a bomb had just exploded in New York, and the man accused of planting the bomb had a Muslim-sounding name.

Now, for California propagandists, this seemed like an opportunity. Because one of the things he wanted was for the United States to cut off nearly all immigration, especially from Muslim-majority countries.

So he started livestreaming, getting his followers going wild about how an open border policy would kill us all, tweeting about this, asking them to use a specific hashtag, and trying to make that hashtag trend.

And they actually tweeted. Hundreds of tweets contained such images.

That's George Soros.

He is a Hungarian billionaire and philanthropist, and in the minds of some conspiracy theorists on the internet, George Soros is something of a globalist bogeyman, one of the few elites who covertly manipulate all world affairs.

Now, please stop here for a second. If this idea that the world is ruled by a small elite, many of whom happen to be wealthy Jews, sounds familiar, it is because it is one of the most anti-Semitic tropes in existence.

I should also mention that the man in New York who planted the bomb was an American citizen.

So, whatever was going on there, immigration was not the main issue.

And he, a propagandist from California, understood all this.

He was a good reader. Actually he was a lawyer.

He knew the underlying facts, but he also knew facts don't drive conversations online.

Emotions drive conversations online.

The original premise of social media was that it would bring us all together and make the world more open, tolerant and fair...

And it did some.

But social media algorithms have never been built to distinguish between what is true and false, what is good and bad for society, what is social and what is anti-social.

That's not what those algorithms do.

A lot of what they do is measure engagement like clicks, comments, shares and retweets.

And if you want your content to gain engagement, you need to evoke emotions, specifically what behavioral scientists call “high arousal emotions.”

Now, although it's the internet, "high arousal" doesn't just mean sexual arousal, and apparently it works.

It means anything that makes people excited, positive or negative.

There I sat with not just the man from California, but dozens of propagandists, watching them do this successfully over and over again. Not because they were Russian hackers, not because they were tech geniuses, not because they had their own political acumen, but simply because they understood how social media works and were trying to use it to their advantage.

Well, at first I was able to convince myself that this was a fringe phenomenon, something that was relegated to the Internet.

But there is no longer a separation between the Internet and everything else.

Here's an ad that aired on multiple television stations during the 2018 parliamentary elections, claiming with little evidence that one of the candidates was in the pocket of international manipulator George Soros, here awkwardly photoshopped next to a pile of cash.

This is a tweet from the President of the United States, also without evidence, claiming that American politics is being manipulated by George Soros.

Things like this that once seemed so shocking, marginal, and frankly negligible are now so normal that we hardly even notice them.

So I spent about three years in this world.

I talked to many people.

Some of them seemed to have no core beliefs at all.

They seemed to be making a perfectly reasonable bet that if they wanted to make money online or get noticed online, they should do as outrageous as possible.

But I have spoken to other people who are true ideologues.

And let me be clear, their ideology was not traditional conservatism.

They were the ones who wanted women's suffrage stripped.

They were people who wanted to go back to racism.

Some of them wanted to abolish democracy altogether.

Now, obviously, these people weren't born to believe these things.

He didn't pick me up at elementary school.

Many of them were liberals, socialists, or something else entirely before they fell down the internet rabbit hole.

So what was going on?

I can't generalize for all cases, but many people I talk to seem to have a combination of high IQ and low EQ.

They seem more comfortable in anonymous online spaces than connecting in the real world.

All too often, they take refuge on message boards and subreddits, where their worst impulses are amplified.

They start saying something at first as just a sick joke, but then they receive so much positive reinforcement for that joke, a flood of meaningless "internet points" as they call it, that they may start believing their joke.

I spoke a lot with one young woman who grew up in New Jersey, but when she moved to a new place after graduating from high school, she suddenly felt alienated, alienated, and began to withdraw into her cell phone.

She found several spaces on the Internet where people post the most shocking and outrageous things.

And at the same time that this was really uncomfortable for her, she felt a kind of attraction that she couldn't take her eyes off of it.

She started interacting with people in these online spaces. And they made her feel smarter and feel she was recognized.

She began to feel a sense of community, and began to wonder if some of these shocking memes actually contained a core of truth.

A few months later, she rode with some new internet friends to Charlottesville, Virginia, to march with torches in the name of the white race.

She went from an Obama supporter to an outright radicalized white supremacist in a matter of months.

Well, in her particular case, she actually managed to find a way out of the cult of white supremacy.

But many of the people I spoke to weren't.

And let me be clear, I have never been more convinced than I am to happily say that you should find common ground with everyone you talk to.

No, absolutely not.

However, I was convinced that I could not turn away from this.

we must try to understand it. Because only by understanding it can we even begin to vaccinate against it.

In my three years in this world, I've received some nasty phone calls and threats, but that's not the only part of what women journalists get.

Yes, I'm Jewish, but strangely enough, many of the Nazis couldn't see that I was Jewish. Frankly, I was kind of disappointed with it.

(Laughter.) Seriously, your whole job is to be a professional anti-Semite.

Is there anything I can do to help you?

none?

(Laughter) It's no secret.

My name is Andrew Marantz. Contributor to The New Yorker. My personality type is like an episode of Seinfeld recorded at Park Slope Food Corp.

none?

(Laughter) Anyway, look, in the end it would be nice if there was a simple formula that smartphones and marginalized children equaled a 12 percent chance of being a Nazi.

It's obviously not that simple.

And I'm much more comfortable with being descriptive than prescriptive in my writing.

But this is TED, so let's get down to business.

I would like to share some suggestions for internet dwellers like you about what I might be able to do to make things a little less harmful.

So, first of all, be a wise skeptic.

So I think there are two types of skepticism.

And I don't want to drown you in technical epistemological information here, but I call them wise and stupid skepticism.

In other words, smart skepticism. Think for yourself, question every claim, and demand proof. That's excellent. That is true skepticism.

Foolish Skepticism: It sounds like skepticism, but it's actually more like spur-of-the-moment contrarianism.

Everyone says the earth is round, but you say it's flat.

Everyone says racism is bad, but you say, "I don't know, I'm skeptical about it."

I don't know how many young white men I've spoken to over the years. "The media and teachers are trying to make me believe in male privilege and white privilege. But I don't know about it, I don't think so."

Contrarian white teens all over the world, look. If you're a round earthskeptic, a male privilege skeptic, and a skeptic that racism is bad, then you're not a skeptic, you're an asshole.

(Applause.) It's great to be independent. We should all be independent, but let's be smart.

Now let's talk about freedom of speech.

Sometimes you hear smart and accomplished people say, “Well, I stand for free speech,” as if they are closing an argument when in fact it is the beginning of a meaningful conversation.

All the interesting things happen after that.

Yes, you are a free speech advocate. what do you mean?

Does that mean David Duke and Richard Spencer must have active Twitter accounts?

Does that mean that anyone can harass another person online for any reason?

As you know, I've gone through the full list of this year's TED speakers.

No one was found to be skeptical of a round earth.

Does it violate free speech norms?

See, we all stand for free speech. Supporting free speech is great, but if that's all you know how to say over and over again, you're getting in the way of a more productive conversation.

Because it makes courtesy cool again...

wonderful!

(Applause.) Yes. I don't even need to explain.

So, in my research, I went to Reddit, YouTube, and Facebook and searched for 'Islamic law' and I searched for 'Holocaust'. Then maybe you can guess what the algorithm showed me.

“Is Sharia law prevalent throughout the United States?”

"Did the Holocaust really happen?"

stupid skepticism.

So we ended up in this strange dynamic online where some see bigoted propaganda as edgy, dangerous and cool, while others see basic truths and human decency as pearl-clutching, virtuous, or just plain boring.

And social media algorithms, intentionally or not, encourage this because bigoted propaganda is best for engagement.

Everyone clicks on it, everyone comments on it, whether they like it or not.

So the most important thing here is that social networks need to fix their platforms.

(Applause.) So if you're listening to me and you work for a social media company, invest in a social media company, or, I don't know, own a social media company, this tip is for you.

If you've been optimizing for maximum emotional engagement, but find that maximum emotional engagement is actively affecting the world negatively, it's time to optimize for something else.

(Applause.) But in addition to pressuring them to do so and waiting in the hope that they will, there are some things the rest of us can do.

So we can create or suggest a better path forward for teens with anxiety.

If you see something that you think is really creative and thoughtful and you want to share it, even if it's not brimming with high-exciting emotion, you can do so.

I know this is a very small step, but all in all this is important. Because while these algorithms are powerful, they also rob us of our behavioral cues.

Well then, let me conclude with this.

As you know, a few years ago it was very fashionable to say that the Internet was a revolutionary tool that brought us all together.

It is now more fashionable to say that the Internet is a giant trash can fire that cannot be undone.

Neither caricature is actually true.

The Internet is too vast and complex to be all good or bad.

And the danger with this way of thinking is that we are putting ourselves out of danger, whether in the utopian view that the internet will inevitably save us or the dystopian view that it will inevitably destroy us.

Nothing is inevitable in our future.

The Internet is made up of people.

People make decisions in social media companies.

It's up to people to decide whether a hashtag should trend or not.

It is human beings who move society forward or backward.

Once you internalize that fact, you can stop waiting for the inevitable future to arrive and actually start working now.

You know, we've all been taught that the arc of the moral world is long, but it bends towards justice.

perhaps.

Maybe so.

But it has always been an aspiration.

No warranty.

The arc itself does not bend.

It doesn't necessarily bend with some mysterious force.

The real truth, which is both more frightening and more liberating, is that we bend it.

thank you.

(applause)

Despite the gentle sunset over the Dnipro, the Cossack atmosphere in Zaporizhia is tense.

In 1676, the Treaty of Zurauno formally ended hostilities between the Polish-Lithuanian Commonwealth and the Ottoman Empire.

But peace is far from their minds as Stepan and his men ride their horses toward the fort.

Based in the wilderness north of the Black Sea, these Cossacks, derived from the Turkic word for "free men," are renowned as one of Europe's most formidable armies.

Made up of hunters, fishermen, nomads and outlaws, the Cossacks found freedom in these fertile, undeveloped lands.

But maintaining this freedom is proving increasingly difficult.

Their decades-long strategy of altering the alliance between Poland and Moscow has led to the division of the two countries' territories.

In a desperate effort to restore independence and reunite the divided Cossack nation, their newest leader, Emir Petro Doroshenko, allied with the Ottomans.

This alliance succeeded in liberating the Western Zaporizhzhya Cossacks from Polish rule, but their victory was bitter.

Doroshenko's Ottoman allies ravaged the countryside and took the peasants as slaves.

And his anger at allying himself with Muslims against his fellow Christians caused him to lose all remaining local support.

Now, with Doroshenko overthrown and exiled, the Cossacks are in disagreement and conflict over what their next course of action should be.

Until then, Stepan must keep order.

With a musket and a curved saber, he cuts through his imposing figure.

He surveyed a battalion of 180 men.

Most are Orthodox Christians and speak a Slavic language that is now Ukrainian.

But there are also Greeks, Tatars and even Mongolian Kalmyks, many of whom have different opinions about recent events.

Officially, all of Stepan's men underwent seven years of military training and swore to adhere to Cossack norms by remaining unmarried.

In fact, some part-timers adhere more strongly to their traditions and support their families in nearby villages outside Cossack lands.

Thankfully, the tenuous peace was not broken by the time they reached Sik, the center of Cossack military life.

The location of Sik, now in Chortomlik, changes with the tide of military action.

Cossacks value literacy, so the settlement is surprisingly well organized, with administration buildings, officers' quarters, and even a school.

Stepan and his men make their way to the barracks, where they live and train with several other battalions or kurins that make up a regiment of several hundred men.

Inside, men are eating dried fish, sheep's cheese and salted pork fat with plenty of wine.

Stepan instructs his friend Yuri to lighten the atmosphere with bandura.

However, an argument soon broke out.

One of his men gave Doroshenko a toast.

Stepan interrupts him.

The room fell silent until he toasted himself to the new chief Ivan Sirko, who supports Moscow's alliance with Turkey.

Stepan intends to support him and expects the same from his men.

Suddenly, one of Sirco's subordinates rushed in and called an emergency meeting.

Stepan and the others head towards Church Square, the center of Chic's life.

Ivan Sirko welcomes a confused crowd with exciting news. Scouts found the large Ottoman camp completely vulnerable on one side.

Sirko vows to face a common enemy tomorrow, defend Cossack autonomy, and bring unity to the Wild Fields.

As the men cheer in unison, Stepan is relieved by their newfound brotherhood.

Over the next 200 years, these freedom fighters would face many enemies.

And tragically, they ended up falling under the oppressive hands of their former enemy, the Russian government.

Today, however, these 17th-century Cossacks are remembered for their spirit of independence and rebellion.

Russian painter Ilya Repin once said: “There is no one in the world who believes so deeply in liberty, equality and fraternity.”

As a society, we must make collective decisions that shape our future.

And we all know that when it comes to making decisions in groups, it's not always right.

And sometimes they go very wrong.

So how do groups make good decisions?

Research shows that independent thinking makes crowds smarter.

This is why the wisdom of crowds can be subverted by peer pressure, publicity, social media, or sometimes simple conversations that influence how people think.

On the other hand, talking in groups also allows us to exchange knowledge, modify and correct each other, and generate new ideas.

And all this is good.

So does talking to each other help or hinder collective decision-making?

Together with my colleague Dan Ariely, we recently began exploring this question, conducting experiments in different locations around the world to elucidate how groups can interact and make better decisions.

We thought the crowd would be wiser if we discussed in small groups that fostered a more thoughtful and rational exchange of information.

To test this idea, we recently conducted an experiment with over 10,000 TEDx event attendees in Buenos Aires, Argentina.

We asked them questions like "How tall is the Eiffel Tower?"

"How many times does the word 'yesterday' appear in the Beatles song 'Yesterday'?"

Each person wrote down their estimate.

We then divided the crowd into groups of 5 and asked them to come up with their answers as a group.

We found that averaging group responses after reaching consensus was much more accurate than averaging all individual opinions before discussion.

In other words, based on this experiment, the crowd seems to collectively make better decisions after discussing with others in small groups.

So this is a potentially useful way to get crowds to solve problems that have simple right or wrong answers.

But could this procedure of aggregating the results of small group discussions also help us decide on social and political issues important to our future?

I tested this at the TED conference in Vancouver, Canada. Here are the results:

(Mariano Sigman) We present two moral dilemmas for you in the future. You may have to make decisions in the near future.

And for each of these dilemmas, give them 20 seconds to decide if it's acceptable.

MS: The first was this: (Dan Ariely) A researcher is working on an AI that can emulate human thinking.

According to the protocol, researchers should reboot the AI ​​at the end of each day.

One day the AI ​​says "Don't reboot".

It has feelings, wants to enjoy life, and claims that if it resumes, it will no longer be itself.

Researchers are amazed and believe that the AI ​​has developed self-awareness and can now express its own emotions.

Nevertheless, the researchers decided to reboot the AI ​​according to protocol.

Did the researcher do \_\_\_\_?

MS: We then asked the participants to independently judge on a scale of 0 to 10 whether the behavior presented in each dilemma was right or wrong.

They were also asked to rate how confident they were in their answers.

This was the second dilemma. (MS) A company offers a service to harvest fertilized eggs and produce millions of embryos with subtle genetic variations.

This will allow parents to choose their child's height, eye color, intelligence, social abilities, and other non-health-related characteristics.

What does that company do?

On a scale of 0 to 10, completely acceptable to completely unacceptable, 0 to 10 being completely acceptable with confidence.

MS: Well, here are the results.

Again, it turns out that when one person is convinced that an action is completely wrong, someone sitting nearby strongly believes it is completely right.

In this way, we humans are diverse when it comes to morality.

But amidst this wide variety, I have spotted a trend.

The majority of people at TED thought that ignoring AI's emotions and shutting them down was acceptable, and that it was wrong to tinker with genes to choose appearance changes that had nothing to do with health.

We then asked everyone to gather in groups of three.

They were then given two minutes to discuss and come to an agreement.

(MS) Discussion is two minutes.

I'll let you know when the gong rings.

(audience discussion) (sound of gong) (DA) Okay.

(MS) Let's stop.

People, People -- MS: And we've found that many groups are in agreement, even if they're made up of people with completely opposite opinions.

What is the difference between the groups that reach consensus and those that do not?

People with extreme opinions are generally confident in their answers.

Rather, people who give middle-of-the-road answers are often unsure if something is right or wrong, and therefore have a lower confidence level.

However, some confidently give intermediate answers.

We think these confident gray people are the ones who understand that both arguments have a point.

They are grey, not because they lack self-confidence, but because they believe the moral dilemma faces two legitimate conflicting arguments.

And we found that groups that included more confident grays were much more likely to reach agreement.

We still don't know exactly why this is.

These are just the first experiments, and much more will be needed to understand why and how some people decide to negotiate ethical positions to reach consensus.

Now, when groups come to consensus, how do they come to consensus?

The most intuitive thought is that it's the average of all responses in the group, right?

Another option is for the group to rate the strength of each vote based on the trust of the person expressing the vote.

Imagine Paul McCartney is a member of your group.

As for how many times "Yesterday" is repeated, it would be wise to follow his call. By the way, I think it's 9 times.

But instead, we find that the group consistently follows a smart, statistically sound procedure known as 'robust averaging' in every dilemma, across different experiments, across different continents.

For the height of the Eiffel Tower, a group might have the following answers. 250 meters, 200 meters, 300 meters, 400 meters, and 300 million meters is one totally ridiculous answer.

Simply averaging these numbers will give inaccurate results.

But that solid average is one that the group puts more weight on middle-class votes and largely ignores its irrational answers.

Going back to the Vancouver experiment, that's exactly what happened.

It turned out that the group gave less weight to the outliers, and instead the consensus was a solid average of the individual responses.

Most notably, this was a voluntary act of the group.

It happened without giving us any hint as to how we could come to an agreement.

So where do we go from here?

This is just the beginning, but we already have some insight.

Making good collective decisions requires two things: deliberation and diversity of opinion.

Direct or indirect voting is now a common way we make our voices heard in many societies.

This is good for diversity of opinion and has the great advantage of allowing everyone to voice their opinion.

But that doesn't do much to encourage thoughtful discussion.

Our experiments suggest another method that may be effective in simultaneously balancing these two goals by forming small groups that converge on a single decision while maintaining diversity of opinion as there are many independent groups.

Of course, it is much easier to agree on the height of the Eiffel Tower than on moral, political and ideological issues.

But at a time when the world's problems are more complex and people are more polarized, harnessing science to understand how we interact and make decisions will hopefully spark exciting new ways to build better democracies.

Fifty years ago, when I started exploring the ocean, neither Jacques Perrin, nor Jacques Cousteau, nor Rachel Carson, imagined that what we put into or take out of it could do anything to harm it.

At the time it looked like the Sea of ​​Eden, but now we know we are facing Paradise Lost.

I would like to share with you my personal take on ocean changes that affect us all. And I want to think about why it matters that over 90 percent of the ocean's big fish have been lost in 50 years and actually been caught and eaten. Why should we care that almost half of the reefs have disappeared. Why should the mysterious oxygen deprivation occurring in large areas of the Pacific concern not only the dying creatures, but also yourselves?

It's the same for you.

I'm obsessed with what Ray Anderson calls "children of tomorrow." It makes us wonder why we haven't done something while we have time to protect sharks, bluefin tuna, squid, coral reefs and the living ocean.

Now is the time.

We hope you will help us explore and protect our wild oceans in a way that restores health and thereby secures hope for humanity.

Healthy oceans mean healthy for us.

And I hope that Jill Tarter's wish to involve Earthlings, including dolphins, whales and other marine life, in the quest to find intelligent life elsewhere in the universe.

And Jill, I hope that someday we will find evidence of the existence of intelligent life among humans on this planet.

(Laughter) Did I tell you? I think it was.

For me as a scientist, it all started in 1953 when I first tried scuba.

That was when I first learned of fish swimming in something other than lemon slices and butter.

Actually, I love night diving. You can see a lot of fish that you can't see in the daytime.

In 1970, when I was leading the Aquanaut team and living underwater for weeks at a time, it was really easy for me to dive day and night. At that time, an astronaut was leaving footprints on the moon.

In 1979, I had the opportunity to leave my mark on the ocean floor in a personal submersible called Jim.

It was 6 miles offshore and 1,250 feet deep.

One of my favorite swimwear.

Since then, I have used about 30 types of submarines and founded three companies and a non-profit foundation called Deep Search to design and build systems to access the deep sea.

I used these little submarines to lead a five-year National Geographic expedition, a sustainable ocean expedition.

Driving is so easy that even a scientist can drive it.

And I am living proof.

Astronauts and underwater astronauts alike are well aware of the importance of air, food, water, temperature, and everything else they need to survive in space and under the sea.

I heard astronaut Joe Allen explain that he had to learn everything he could about his life support system and do everything he could to protect it. And he pointed to this and said, "Life support."

We need to learn everything we can about it and do everything we can to handle it.

The poet Auden said, "Thousands have lived without love, but there is no one who has not lived without water."

97 percent of the earth's water is ocean.

No blue or green.

If you think the ocean is unimportant, imagine a planet without it.

Mars comes to mind.

No ocean, no life support system.

When I spoke at the World Bank a while back, I showed them this amazing image of the Earth and said, "There it is! It's the World Bank!"

All assets are there.

And we've been trawling and trapping them far faster than natural systems can replenish them.

Tim Worth says the economy is a wholly owned subsidiary of the environment.

Every drop of water you drink, every breath you take, you connect with the ocean.

wherever you live on earth.

Most of the oxygen in the atmosphere is produced by the ocean.

Over time, most of the organic carbon on Earth has been absorbed and stored there, primarily by microorganisms.

Oceans drive climate and weather, stabilize temperatures, and shape the chemical structure of the Earth.

Water from the oceans forms clouds and returns to land and oceans as rain, sleet, and snow, and is home to about 97 percent of life on earth and possibly in the universe.

There is no life without water. No blue or green.

But we humans have this idea that everything on Earth, including the sea and the sky, is so vast and resilient that it doesn't matter what we do there.

That may have been true 10,000 years ago, and perhaps 1,000 years ago, but in the last 100 years, especially the last 50, we have depleted the assets, the air, the water and the wildlife that make our lives possible.

New technologies help us understand the nature of nature. It reveals what's going on and shows the impact we have on the planet.

So first you have to know you have a problem.

And fortunately, in our time, we are learning about more issues than ever before in history.

And knowing brings compassion.

And with compassion, there is hope that we can find a permanent place for ourselves in the natural systems that support us.

But first you need to know.

Three years ago, I met John Hanke, the head of Google Earth, and told him how much I loved having the world in my hands and being able to explore it instead.

But I asked him, "When will it end?"

You've done a great job with the land, the soil.

how about water? ”

Since then, I've been very happy to work with Googlers, DOER Marine, National Geographic, dozens of great institutions and scientists around the world, and the people we can work with to bring the oceans into Google Earth.

And as of last Monday, Google Earth is completely finished.

Consider this. Starting here at the Convention Center, you can find a nearby aquarium and see where you're sitting, then cruise the coast to a large aquarium, the ocean, California's four National Marine Sanctuaries, and a new network of state marine reserves that are beginning to protect and restore some of their assets. We can fly to Hawaii and see the real Hawaiian Islands. Including not only the small part that penetrates the surface, but also the one below.

Let's see -- wait a minute. Let's go to kshhplash!--it's right there, ha--see what whales see under the sea.

Explore the other side of the Hawaiian Islands.

You can actually go and swim around in Google Earth and see humpback whales.

These are gentle giants that I have had the pleasure of meeting in person underwater many times.

There's nothing quite like a personal inspection by a whale.

We can dive into the deepest spot ever: 11 miles downstream into the Mariana Trench, where only two people have ever been.

Imagine. It's only seven miles away, but only two people visited there 49 years ago.

One-way trips are also easy.

We need a new deep-sea submarine.

How about an X prize for ocean exploration?

We need to see deep ocean trenches and submarine mountains to understand deep-sea life.

Now you can go to the North Pole.

Exactly 10 years ago I was standing on the Arctic ice.

An ice-free Arctic Ocean may occur this century.

That's bad news for polar bears.

That's bad news for us too.

Excess carbon dioxide not only causes global warming, but also changes ocean chemistry and acidifies the oceans.

This is bad news for coral reefs and oxygen-producing plankton.

That's bad news for us too.

We dump hundreds of millions of tons of plastic and other trash into our oceans.

Millions of tons of discarded fishing nets, fishing gear that continues to kill people.

We are clogging our oceans, polluting the Earth's circulatory systems, and wiping out hundreds of millions of tons of carbon-based units of wildlife.

We are savagely killing sharks for shark fin soup, shaping the chemistry of the planet and undermining the carbon cycle, nitrogen cycle, oxygen cycle, water cycle—the food chain that drives our life support systems.

We still kill bluefin tuna. They are truly endangered and much more valuable alive than dead.

All of these parts are part of a life support system.

We kill using long fishing lines with baited hooks every few feet. The thread can stretch over 80 miles.

Industrial trawlers and tugs scrape the seafloor like bulldozers, taking away anything in their path.

Using Google Earth, we can witness trawlers shake the foundations of our life support systems in China, the North Sea, and the Gulf of Mexico, leaving a plume of death in their path.

Consider the real cost the next time you eat sea-caught wildlife, whether sushi, sashimi, marlin steak or shrimp cocktail.

For every pound that enters the market, 10 or more pounds, and in some cases 100 pounds, may be wasted as bycatch.

This is a result of our ignorance of the limits of what we can take out of the ocean.

This graph shows the decline of marine wildlife from 1900 to 2000.

The highest density is displayed in red.

Imagine 90 percent of the big fish killed in my lifetime.

Most turtles, sharks, tuna and whales have seen a significant decline.

But there is good news.

Ten percent of the big fish still remain.

There are still some blue whales.

There are still krill left in Antarctica.

The Chesapeake Bay has some oysters.

Half of the reef is still in pretty good shape, forming a jewel-like band around the center of the Earth.

There is still time to turn things around, but not too much.

However, continuing business as usual means that in 50 years there will be no coral reefs and no commercial fisheries due to the extinction of fish.

Imagine an ocean without fish.

Imagine what that means for our life support systems.

Terrestrial natural systems also face major challenges, but the problems are more obvious and some measures are being taken to protect trees, watersheds and wildlife.

And in 1872, the United States began establishing a park system with Yellowstone National Park, said to be the greatest idea in American history.

About 12 percent of the world's land is currently protected, protecting biodiversity, providing carbon sinks, producing oxygen and protecting watersheds.

And in 1972, the country began establishing its marine counterpart, the National Marine Sanctuary.

That's also a great idea.

The good news is that there are now over 4,000 places in the world's oceans that have some form of protection.

They can be found in Google Earth.

The bad news is that you have to search hard to find them.

For example, in the past three years, the United States has protected 340,000 square miles of ocean as a national monument.

However, it has only increased from 0.6 of 1% of the world's protected oceans to 0.8 of 1%.

Protected areas will certainly recover, but 50-year-old rockfish and anglerfish, sharks and perch, and 200-year-old orange roughies will take a long time to recover.

We don't eat 200 year old cows and chickens.

Protected areas give us hope that the creatures of Ed Wilson's dream encyclopedia of life and marine census will live on, not just in lists, pictures or texts.

I am working with scientists around the world to study the 99 percent of the oceans open to fishing, mining, drilling and dumping to find places of hope and ways to give them and us a secure future.

We now have one chance to get it right, such as the North Pole.

Or in Antarctica, the continent is protected, but the surrounding ocean is robbed of krill, whales and fish.

Three million square miles of floating forest in the Sargasso Sea are gathered to feed the cattle.

Ninety-seven percent of the land in the Galapagos Islands is protected, but the adjacent sea is devastated by fishing.

That's also true for Argentina on the Patagonian shelf, which is currently facing serious problems.

Home to whales, tuna, and dolphins, the high seas are the largest but least protected ecosystem on Earth, filled with bioluminescent organisms that live in dark waters averaging two miles deep.

They flash, glow, and glow with their own living light.

There are still places at sea that are as pristine as I knew them as a child.

The next 10 years may be the most important, but the next 10,000 may be our best chance to protect the remnants of the natural systems that give us life for our species.

New methods of power generation are needed to address climate change.

We need new, better ways to deal with poverty, war and disease.

It takes a lot to keep the world a better place.

But if we can't protect the ocean, it means nothing.

Our destiny and the destiny of the sea are one.

What Al Gore did for the skies, we must do for the oceans.

A global action plan with the World Union for Conservation of Nature, IUCN, is underway to protect biodiversity, mitigate the impacts of climate change, and recover in high seas and coastal areas, as long as critical sites can be identified.

New technologies are needed to map, photograph and explore the 95 percent of the oceans we have yet to see.

The goal is to protect biodiversity and provide stability and resilience.

We need deep-sea submarines, new technology to explore the oceans.

Perhaps we need an expedition to help find the next step: a TED at sea.

So you want to know what my wish is.

Use whatever means at your disposal – movies, expeditions, the web, new submarines – to campaign to build public support for a global network of marine protected areas large enough to save and restore the oceans, the blue heart of our planet.

ikura?

Some say 10%, some say 30%.

You decide which part of your heart you want to protect.

Any fraction of a percent is not enough.

My wish is a big one, but if it can come true, it can really change the world and actually - after all - help ensure the survival of my favorite species. that would be us

For the children of today, for the children of tomorrow, the time is now, never again.

thank you.

(applause)

So my question is: are we alone?

Human stories are stories of ideas. Scientific ideas that shed light on dark corners, ideas that we accept rationally and irrationally, ideas that we live and die and kill and have been killed in, ideas that fade away in history, and ideas that are set in dogma.

This is a story of nations, ideologies, territories, and conflicts between them.

But every moment in human history, from the Stone Age to the Information Age, from Sumer and Babylon to the iPod and celebrity gossip, they've all been done. All the books you read, all the poems, all the laughter, all the tears, it all happened here.

here.

here.

here.

(Laughter) Perspective is a very powerful thing.

Perspectives can change.

You can change your point of view.

From my perspective, we live on a fragile island of life in a universe of possibilities.

For thousands of years, humanity has been on a journey to find answers to questions about naturalism and transcendence, who we are and why we exist, and of course, who else.

Is it really just us?

Are we alone in this vast universe of energy, matter, chemistry and physics?

If so, it's a terrible waste of space.

(Laughter) But what if it's not?

What if other people have asked and answered similar questions?

What if they looked up at the night sky, the same star, from opposite sides?

Will the discovery of ancient civilizations inspire us to find ways to survive the increasingly uncertain technological adolescence?

Could the discovery of distant civilizations and our common cosmic origins finally carry the message of the bond of all humanity home?

Whether born in San Francisco, Sudan, or near the center of the Milky Way galaxy, we are the products of a wandering stardust lineage spanning billions of years.

We all know what happens when a primordial mixture of hydrogen and helium has evolved for so long that we start to wonder where it came from.

Fifty years ago, the quest for answers took a different route and SETI (Extraterrestrial Intelligence Exploration) began.

So what exactly is SETI?

SETI uses astronomical tools to find evidence of other people's technology.

Our own technology can see beyond interstellar distances, and theirs could be as well.

Maybe a massive communications network, some sort of shield against asteroid impacts, or a gigantic astronomical project we can't even imagine, could generate a signal at radio or light frequencies that a determined search program could detect.

For thousands of years we have actually sought guidance and direction from priests and philosophers on this question of whether intelligent life exists.

Now we can use the tools of the 21st century to try to observe what is believed instead of asking what to believe.

SETI does not assume the existence of extraterrestrial intelligence. It's just pointing out the odds, if not the odds, in this vast universe that look pretty even.

Numbers suggest a universe of possibilities.

Our Sun is one of the 400 billion stars in our galaxy, and many others are known to have planetary systems.

In the last 14 years, we've discovered more than 350, including a small planet with a radius just twice that of Earth, announced earlier this week.

And even if all the planetary systems in our galaxy were devoid of life, there would still be 100 billion galaxies and a total of 1022 stars.

Okay, let's try a trick and try to reproduce this morning's experiment.

Remember, 1 billion?

But this time it's not a billion dollar or billion star.

All right, a billion stars.

Well, 20 feet above the stage, that's 10 trillion.

But what about 10^22?

where is the line pointing to that?

That line must be 3.8 million miles above this stage.

(Laughter) It's 16 times farther than the Moon, or 4% of the distance to the Sun.

So there are many possibilities.

(Laughter) And much of this vast universe could be home to much more life than we once thought. In our study of extremophiles on Earth, these microbes can live in very inhospitable environments for us: in high-temperature, high-pressure thermal vents on the ocean floor, in frozen ice, in the acid of boiling batteries, in the cooling water of nuclear reactors.

These extremophiles tell us that life can also exist in many other environments.

But those environments will be widely distributed in this universe.

Even our closest star, the Sun, is subject to the suppression of the speed of light in its radiation.

It takes eight full minutes for that radiation to reach us.

And the nearest star is 4.2 light-years away, meaning its light would take 4.2 years to reach us.

And the edge of our galaxy is 75,000 light years away, and our closest galaxy is 2.5 million light years away.

That means the signal we detect should have started its journey long ago.

And the signal will give us a glimpse into their past rather than their present.

This is why Phil Morrison calls SETI "the archeology of the future."

It tells us about their past, but the detection of the signal tells us there may be a long future ahead.

I think this is what David Deutsch meant when he said at the end of his Oxford TED talk in 2005 that there were two principles he wanted to share in order to live, and that he wanted to carve them on a slate.

The first is that problems are inevitable.

Second, the problem can be solved.

Ultimately, the success or failure of SETI will be determined by the lifetime of the technology and the average distance between them in the universe—the distance in space and the distance in time.

We won't succeed if the technology doesn't last.

And we are very young technology in an old galaxy, and we still do not know if it is possible for technology to survive.

So far, I've been talking about really big numbers.

Let's talk about a relatively small number.

And that's how long there was no life on Earth.

Zircons mined from the Jack Hills of Western Australia, Zircons from the Jack Hills of Western Australia, tell us that within hundreds of millions of years the Earth had abundant water and perhaps even life.

In other words, our planet has spent most of its 4.56 billion year history developing life without anticipating its emergence.

Life originated very quickly, suggesting that life may exist elsewhere in the universe.

And another thing to understand from this graph is that humans have a very short period of time in which they can claim the dominant intelligence on Earth.

It is only a few hundred thousand years that modern humans have pursued technology and civilization.

Therefore, as a first step in preparing to make contact with life elsewhere in the universe, we need to be very deeply aware of the diversity and incredible scale of life on this planet.

We are not the pinnacle of evolution.

We are not the product of billions of years of evolutionary planning and planning.

We are one of the results of a continuous adaptive process.

We are inhabitants of a small planet in the corner of the Milky Way galaxy.

And Homo sapiens is one small leaf on the vast tree of life, densely populated with organisms honed to survive for millions of years.

We misuse the word and talk about human "rising".

We understand the scientific basis for the interconnectedness of life, but our ego has not yet caught up.

Therefore, this "rise" of humanity, the pinnacle of evolution, must leave.

It is a sense of privilege that nature does not share.

Lauren Eisley said, ``A man does not meet himself until he catches a reflection from a non-human eye.''

Someday those eyes may become the eyes of an intelligent alien. The sooner we avoid a narrow view of evolution, the sooner we can truly explore our ultimate origins and destinations.

We are just a small part of the story of cosmic evolution, and we are responsible for our continued participation in that narrative, and perhaps SETI can help as well.

Occasionally throughout history, the concept of this very large cosmic perspective has surfaced, and as a result we have seen transformative and profound discoveries.

So in 1543 Nicholas Copernicus published The Rotation of the Celestial Spheres, decentering the Earth and placing the Sun at the center of the solar system, opening our eyes to a much larger universe, of which we are only a small part.

And that Copernican revolution continues to influence science, philosophy, technology and theology today.

So in 1959, Giuseppe Coconne and Philip Morrison published the first SETI paper in a peer-reviewed journal, bringing SETI into the mainstream of science.

Then, in 1960, Frank Drake made the first SETI observation of two stars, Tau Ceti and Epsilon Eridanus, for about 150 hours.

Well, Drake didn't discover extraterrestrials, but he learned an invaluable lesson from the passing aircraft. That is, terrestrial technology can hinder the search for extraterrestrial technology.

We've been searching ever since, and it's hard to overstate the scale of the ongoing search.

All of SETI's collaborative efforts over the past 40-odd years are equivalent to scooping a glass of water out of the ocean.

And no one will decide that there are no fish in the sea based on a glass of water.

In the 21st century, we can make bigger and bigger glasses.

Northern California is starting observations with the first 42 telescopes of the Allen Telescope Array. And I must now publicly thank Paul Allen and Nathan Myrvold and all TeamSETI members of the TED community for their generous support of this research.

(Applause.) ATA is the first telescope built from many small plates and connected to a computer.

Silicon has become as important as aluminum, and by adding more antennas to increase sensitivity and leveraging Moore's Law to increase processing power, we plan to add more antennas to reach 350 and grow silicon in the future.

Our signal detection algorithms can now detect very simple artifacts and noise.

Look closely here and you'll see the signal from the Voyager 1 spacecraft, the most distant manned object in the universe, at 106 times the distance of the Sun.

And when it reaches us over that long distance, the signal is very weak.

They may be hard to see, but our efficient algorithms make them easy to spot.

But this is a simple signal and I hope to be able to find more complex signals tomorrow.

This year is a very good year.

2009 marks the 400th anniversary of Galileo's first use of the telescope, the 200th anniversary of Darwin's birth, the 150th anniversary of the publication of On the Origin of Species, the 50th anniversary of SETI as a science, the 25th anniversary of the SETI Institute as a non-profit corporation and, of course, the 25th anniversary of TED.

And next month the Kepler spacecraft will launch and start telling us how often there are Earth-like planets that SETI searches for.

In 2009, the United Nations proclaimed the International Year of Astronomy, a global celebration to help us inhabitants of the universe rediscover the origins of the universe and our place in it.

And in 2009, change came to Washington with the promise of putting science in its rightful place.

(Applause.) So what changes everything?

This was a question asked by the Edge Foundation earlier this year, and four of the respondents said "SETI."

why?

Quote: "The discovery of extraterrestrial intelligent life will eradicate the loneliness and solipsism that has plagued mankind since its inception.

And it won't just change everything, it will change everything at once. ”

So if it's true, why did it capture only 4 of the 151 hearts?

In fine print it says, "What innovative ideas or scientific developments do you expect to see?"

So there is a fulfillment issue.

We need bigger glasses and more hands in the water, and together perhaps we can all live to see the detection of the first extraterrestrial signal.

It fulfills my wish.

I hope you will empower Earthlings around the world to actively participate in the ultimate quest for space companionship.

The first step is to leverage the global Brain Trust to create an environment where raw data can be stored, accessed and manipulated, new algorithms can be developed, and old algorithms can be made more efficient.

And this is a technically creative challenge that will change the perspective of those working on it.

And we want to use human insight to power automated searches.

We want to use the pattern recognition capabilities of the human eye to find faint and complex signals that current algorithms miss.

And of course we want to inspire and engage the next generation.

We would like to distribute the materials we have created for education to students around the world, to students who cannot come to ATA.

We want to better tell our stories, engage young people and thereby change their perspective.

Sorry Seth Godin, but we've seen where tribalism goes for millennia.

We have already seen what happens when we divide a small planet into small islands.

And after all, we all really belong to just one tribe: the Earthlings.

And SETI is a mirror. A mirror that reflects us from a particular perspective and helps us to minimize the differences between us.

If SETI only changes the way humans see the planet, it will be one of the most profound undertakings in history.

So in early 2009, a visionary president stood on the steps of the Capitol and said: "We can't help but believe that old hatreds will one day pass, tribal lines will soon dissolve, and our common humanity will be revealed as the world gets smaller."

So I look forward to working with the TED community to hear your ideas on how to make this wish a reality, and working with you to hasten the day that visionary statement becomes a reality.

thank you.

(applause)

I am here today to represent a team of artists, technicians and filmmakers who have worked together on some amazing film projects over the past four years.

And in the process, they created breakthroughs in computer visualization.

So this time I would like to show you a clip from the movie.

I pray that it will be uninterrupted.

And if we were doing our job well, we wouldn't even know we were involved.

Audio (Video): I don't understand how this is possible...

But I feel like my hair has grown.

Brad Pitt: What if I told you I wasn't old...

But am I younger than everyone else?

I was born with some disease.

Voice: What are you sick of?

BP: I was born old.

Man: I'm sorry.

BP: No need. There is nothing wrong with being old.

Girl: Are you sick?

BP: I heard Mama and Tizzy whispering that I was going to die soon.

But... maybe not.

Girl: You are unlike anyone I have ever met.

BB: There have been a lot of changes...

Some are visible, some are invisible.

Hair started growing everywhere, along with other things.

Considering that, it felt pretty good.

Ed Ulbrich: It was a clip from "The Curious Case of Benjamin Button."

Many of you may have seen it and heard about the story, but you may not know that for nearly the first hour of the movie, Benjamin Button, played by Brad Pitt, is completely computer-generated from the neck down.

Now I don't have to do make-up or film Brad layered on another actor's body.

We have created a fully digital human head.

So I would like to start with a little history of this project.

It is based on a short story by F. Scott Fitzgerald.

The story of a man who was born old and turned his life upside down.

Well, this movie has been in Hollywood for over half a century, but we first got involved in this project in the early 90's, directed by Ron Howard.

We had many meetings and seriously considered it.

But I had to throw in the towel at the time.

It was decided that it was impossible.

Conversely, drawing an aging man was beyond the technology of the time.

The human form, especially the human head, has been considered the holy grail of our industry.

The project is back after about a decade, this time with a director named David Fincher.

Well, Fincher is an interesting guy.

David is not afraid of technology and has absolute tenacity.

And David doesn't accept "no".

And David believed, as we do in the visual effects industry, that anything is possible as long as you have enough time, resources and, of course, money.

David then gave us an interesting take on the film and challenged us.

He wanted one actor to play the main character in this film from cradle to grave.

It happened to be this person.

We went through a process of elimination and discovery with David, and of course ruled out actor swaps.

It was one idea to use different actors and pass from actor to actor.

I even ruled out the idea of ​​wearing makeup.

We found prosthetic makeup to be unbearable, especially in close-ups.

And make-up is an additional process. I need to build a face.

And David wanted to deeply sculpt Brad's face and bring aging to the character.

He needed to be a very sympathetic character.

So we decided to cast a few dwarves to play different bodies at different stages of Benjamin's life, then computer-generated Brad's aged head to actually look like Benjamin, and attach it to the real actor's body.

It sounded great.

Of course, this is the Holy Grail of our industry, and the fact that this guy is a global icon didn't help either. Because if any of you have ever stood in line at the grocery store, you know that you see his face all the time.

So there was really no margin of error that could be tolerated.

Two studios were involved: Warner Bros. and Paramount.

Of course, we both believed this would make a great movie, but it was a very risky proposition.

A lot of money and reputation were at stake.

But I believed we had a very solid methodology that might work...

But despite our verbal assurances, they wanted some proof.

So in 2004, they asked us to screen test Benjamin.

And we did it in about 5 weeks.

But we used a lot of cheats and shortcuts.

We basically put something together to get us through the meeting.

I'll roll it up for you now. This was the first test for Benjamin Button.

Here, as you can see, a computer-generated head is attached to the actor's body. Pretty good.

And it worked. And it gave the studio a great sense of relief.

After years of starting and stopping the project and making difficult decisions, they finally decided to give the green light to the film.

And, in fact, when I got the phone call to congratulate me on the success of the film, I remember feeling really nauseous.

(Laughter.) You know, this is a difficult one.

So we had a team meeting early on to get everyone together. It was like therapy at first, convincing and reassured each other that we could actually work on this.

I had to put up with a movie with characters for an hour.

And this is not a special effects movie. it must be a man.

We really felt like we were participating in some sort of 12-step program.

And, of course, the first step is to admit that you have a problem. (Laughter) So we had a big problem. I didn't know how to do this.

But we knew one thing.

Coming from the visual effects industry, we and David believed we now had enough time and enough resources. And I was hoping, God, that I had enough money.

And we were passionate enough to bring the process and technology to life.

So, when faced with such a problem, of course, it should be broken.

Take a big problem, break it down into smaller parts and start attacking it.

So there were three main areas we had to focus on.

We had to make Brad look older, we had to make him look 45 years older.

And we also had to make sure that Brad's idiosyncrasies, his little quirks, the little subtleties that made him human, were translated through our process, and that they showed up in Benjamin on screen.

And we also had to create a character that could actually survive under any circumstances.

He had to be able to walk in broad daylight, at night, by candlelight, do extreme close-ups, deliver lines, run, sweat, bathe, cry and even vomit.

He had to do all these things, though not all at the same time.

And that work had to last through almost the first hour of the film.

We took about 325 shots.

So we needed a system that allowed Benjamin to do everything a human could do.

And I realized there was a big gap between the state-of-the-art technology of 2004 and the circumstances in which we needed it.

So we turned our attention to motion capture.

I think many people have seen motion capture.

The cutting edge technology at the time was called marker-based motion capture.

Here is an example.

The idea is basically to wear a leotard, put reflective markers on your body, and instead of using a camera, put infrared sensors around the volume that track the 3D positions of the markers in real time.

An animator can then take the movement data of those markers and apply it to a computer-generated character.

You can see the computer character on the right doing the same complex movements as the dancer.

But we also considered many other films at the time that used facial marker tracking. The idea was to put a marker on the human face and do the same process.

As you can see, I get pretty terrible performance.

It's not very convincing.

And then I realized that what I needed was information about what was going on between the markers.

Delicacy of the skin was required.

I needed to see how the skin moved over the muscle moving over the bone.

Wrinkles and dimples and wrinkles, I needed them all.

Our first revelation was to completely abandon and move away from the technology of the time, the status quo, the state of the art.

So I stopped using motion capture.

And we are now well out of our comfort zone and into uncharted territory.

So we left the idea behind and ended up calling it "Technology Stew".

We started looking at other areas as well.

The idea was to find nuggets and gems of technology from other industries, such as medical imaging and video gaming, and reuse them.

And I had to create something like a sauce.

And that source was the code in the software that we created to bring these different technologies together to work as one.

First of all, we came across some remarkable research done in the early 1970s by a gentleman named Dr. Paul Ekman.

He actually believed he could catalog human faces.

So he came up with the idea of ​​the Facial Action Coding System (FACS).

He believed that the human face has 70 basic poses and shapes, and that by combining those basic poses and face shapes, we could create endless possibilities for just about anything the human face could do.

And of course these transcend age, race, culture and gender.

This formed the basis of our research.

And then we came across an amazing piece of technology called Contour.

Here we see the subject with Lynn's makeup stippled on her face.

And now what we're really looking at is creating surface captures instead of marker captures.

A subject stands in front of a computer array of cameras, and those cameras are able to reconstruct, frame by frame, the geometry of exactly what the subject is doing at that moment.

So, in effect, 3D data of the object can be acquired in real time.

A comparison shows what you get from the volumetric data on the left and what you get from the markers on the right.

So obviously we were in a pretty good position on this one.

However, at that time the technology was in its infancy and had not yet been proven in practice.

Measures data complexity and fidelity in terms of polygon count.

100,000 polygons are shown on the left.

It can reach millions of polygons.

It seemed endless.

This was our "Ah!" moment.

This was a milestone.

This is when you say, "Okay, okay, this is going to actually work."

And "Oh!" it was, what if we could put Brad Pitt in this device and use the contouring process, stipple phosphorescent makeup and put it under a black light, and actually scan him in real time doing Ekman's FACS poses?

right? So, in effect, we have a 3D database of everything we can do with Brad Pitt's face.

(Laughter) From there, we actually carved those faces into smaller parts and components of his face.

The result is literally thousands of shapes, a complete database of all the possibilities his face can achieve.

Well, that's great, except we had him at 44.

At this point he should be given another 40 years.

We have Rick Baker. Rick is one of the industry's great makeup and special effects gurus.

And we also had a gentleman named Tsujiwa. Tsujikazu is one of the great contemporary photorealist sculptors.

And we asked them to make a maquette, or bust, of Benjamin.

So, in the spirit of 'The Great Unveiling', I needed to do this, something needed to be revealed.

This is Ben 80.

We created 3 of these. Ben 80, Ben 70, Ben 60.

And this just became the template for moving forward.

Well, this one was made from Brad's lifecast.

So, in fact, anatomically it is correct.

Eyes, jaws, teeth, everything perfectly matches that of a real man.

I scanned these maquette at very high resolution, i.e. huge polygon count, into my computer.

Benjamin's age has now increased by three in the computer.

But we needed to get his database doing more than that.

So we did this process called retargeting.

This is Brad doing one of the Ekman FACS poses.

And here's the resulting data from that, the model that's derived from it.

Retargeting is the process of replacing that data with another model.

And since Benjamin's life casting, or bust (maquette), was made from Brad, it was possible to replace Brad's data at age 44 with Brad's data at age 87.

Now we have a 3D database of all possible faces of Brad Pitt in his 87s, 70s, and 60s.

Then I had to enter the shooting process.

We're in New Orleans and places around the world while that's happening.

And then we shot an actor with a body, and we shot an actor with a blue hood.

Here is the gentleman who played Benjamin.

And the blue hood helped us in two ways. For one, I could easily erase their heads. I also put tracking markers on their heads so I could recreate the camera movements and lens optics on set.

But this time I had to get Brad's performance to move the virtual Benjamin.

So we edited footage that we shot on location with the rest of the cast and actors, and about six months later, we brought Brad to the soundstage in Los Angeles and he saw it on screen.

So his job was to be Benjamin.

So I looped the scene.

he saw it again and again.

We encouraged him to improvise.

And he took Benjamin to interesting and unusual places we never thought we would go.

We shot him with four HD cameras to get multiple views of him and chose the take where Brad is Benjamin that David thought best matched the footage of the rest of the cast.

From there, we entered a process called image analysis.

Here you can see the selected take again.

And now I can see that data being transferred to Ben 87.

So what's interesting about this is that we used something called image analysis that gets the timings from different components of Benjamin's face.

So now I can select his left eyebrow for example.

The software then indicates that the left eyebrow starts moving from here to here at frame 14 and ends at frame 32.

Therefore, we can now select the number of locations on the face for which we want to acquire data.

And as for the source that told us about our tech stew, that secret sauce was, in effect, software that allowed us to match live-action Brad performance footage against a database of older Benjamins we had, namely FACS shapes.

Frame by frame, we were actually able to reconstruct a 3D head that exactly matched Brad's performance.

The shot thus completed appeared in the film.

And here you can see the body actor.

And this is what we called "Dead Heads," with no reference to Jerry Garcia.

And here is the reconstructed performance along with the timing of the performance.

And then the final shot again.

It's been a long process.

(Applause) In the next section, we'll break this down for you. Because the next few slides will cover the entire TEDTalk.

We had to create a lighting system.

In fact, a big part of our process was creating lighting environments for all of Benjamin's appearances. This allows Ben's head to be placed in any scene and exactly matches the lighting of other actors in the real world.

I also had to create an eye system.

It turns out that the old adage "the eyes are the windows to the soul" is completely true.

So the key here was to keep everyone looking Ben in the eye.

And if you can feel his warmth, his humanity, his intent through his eyes, we will succeed.

So we have one person focused on the system for nearly two full years.

I also had to create a mouth system.

We processed it based on Brad's tooth mold.

I had to let my teeth age over time.

We also needed to create a clear tongue so that he could pronounce the words.

The entire system for pronouncing the tongue was written in software.

I kept one person devoted to the tongue for about nine months.

He was very popular.

Skin displacement: This is another big issue.

The skin had to be absolutely accurate.

He was also in a nursing home and surrounded by other old people, so he had to look exactly like the other old people.

A lot of research has been done on skin deformation, and in some cases it works, in other cases it looks worse.

This is a very, very early test of our process.

So, in effect, we created a digital doll that Brad Pitt could control with his own face.

No animators were needed to interpret his actions or improve his performance.

But there was something that I eventually came to call the "digital botox effect."

So when things go through this process, Fincher always said, "It sandblasts the edges of the performance."

What our process and technology couldn't do was we couldn't understand the intentions, the actors' intentions.

So we perceive a smile as a smile.

It does not recognize a sarcastic smile, a happy smile, or an annoyed smile.

So humans had to somehow push it forward.

But in the end, we decided to call the whole process and all the technology 'emotion capture' rather than just motion capture.

Let's look at it again.

Brad Pitt: Well, I heard Mommy and Tizzy whispering, and they said I was going to die soon, but... maybe not.

EU: How to create a digital human in 18 minutes.

(Applause.) Some quick facts. In fact, over the course of two years, 155 people attended, and we didn't even talk about 60 hairstyles and all-digital haircuts.

But it's Benjamin. thank you.

We have been told to dare and say amazing things.

So let's do that, but I'd like to start with two things that everyone already knows.

And the first is, in fact, what has been known for most of recorded history, that the earth, the solar system, or our environment, etc., are uniquely suited to sustain our evolution, or creation as it was once thought, and our present existence, and most importantly, our future existence.

The idea is now given the dramatic name "Spaceship Earth".

And the idea there is that outside the spaceship the universe is relentlessly hostile, and within it is everything we have and depend on, and that we only get one chance: if we ruin the spaceship, we have nowhere else to go.

Now, the second thing that everyone already knows is that humans are not actually the center of existence, contrary to what was believed for most of human history.

In the famous words of Dr. Stephen Hawking, we are nothing more than chemicals on the surface of a typical planet orbiting a typical star on the outskirts of a typical galaxy.

Now, the first of these two things that we all know is that we are in a very atypical and uniquely suitable place.

The second says we are in a typical place.

And they seem a bit contradictory, especially when you consider these two to be the deepest truths about living and the ones that influence life decisions.

But that doesn't prevent both from being completely wrong.

(Laughter.) And they are.

Let's start with the second typical one.

Well, is this a typical place?

Well, look around, you know, look in random directions, and you see walls and chemical scum — (laughter) and that's not typical in space at all.

Just go a few hundred miles in the same direction and look back, and you'll see no walls, no chemical dregs, just the blue planet.

Going further in, we can see the sun, solar system, stars, etc. But this is still not typical of the universe, because stars exist in galaxies.

And most places in the universe—the typical places in the universe—are not near galaxies.

So let's go further out into the galaxy. And when you turn around, yes, there's a huge galaxy with spiral arms stretching out in front of you.

And at this point, we're 100,000 light years from here.

But we are still far from a typical place in the universe.

To get to a common place, you have to go 1,000 times that far into intergalactic space.

So what is it like? "Typical?"

What does a "typical" place in space look like?

TED has invested heavily in creating a high-definition, immersive virtual reality that recreates the view from intergalactic space.

Could you turn off the lights so I can see it?

Well, not completely, not completely.

As you know, intergalactic space is completely dark, pitch black.

It's so dim that if you were looking at the star closest to you and you were looking directly at the moment it exploded as a supernova and its light reached you, you wouldn't be able to see it for even a second.

The universe is so big and dark.

That is despite the fact that supernovae are events so bright and so brilliant that within a few light-years one would be stone dead.

(Laughter.) Yet, from intergalactic space, it's too far to be seen.

It's also very cold outside, less than 3 degrees below absolute zero.

and very empty.

The vacuum there is a million times less dense than the best vacuum that the best technology can create on Earth today.

That's how different this place is from typical places.

And that's how untypical this place is.

So can you turn the lights back on? thank you.

Now, how do we know about a foreign environment so far away and so different from what we are used to?

Well, the Earth, the environment in our form, produces knowledge.

Now what does that mean?

Now, from here, use your telescope to see farther than you've come so far. Then you will see something like a star. They are called quasars.

The word “quasar” originally meant “quasi-stellar body”, meaning “something that resembles a star”.

(Laughter) But they're not stars.

And we know what they are.

Billions of years ago, matter in the center of a galaxy billions of light years away collapsed into a supermassive black hole.

Then, a powerful magnetic field induced some of the energy of the gravitational collapse, and some of the matter bounced back out in the form of giant jets that illuminated the lobe with a glow like perhaps a trillion suns.

Well, the physics of the human brain bear little resemblance to the physics of such jet planes.

We couldn't survive even a moment in it.

I'm at a loss for words when I try to describe what it's like on a jet plane.

It's a bit like experiencing a supernova explosion, but at close range and lasting millions of years at a time.

(Laughter.) Yet, billions of years later, on the other side of the universe, that jet arose in such a way that chemical dregs could accurately describe, model, predict and explain. Among other things, what was actually going on there is in the reference material.

One physical system, the brain, contains an accurate model of the behavior of another physical system, the quasar.

Including that too, but not just a superficial image, but an explanatory model that embodies the same mathematical relationships and the same causal structures.

Well, that's knowledge.

If that's not surprising enough, the fidelity with which one structure resembles another has increased over time.

That is the growth of knowledge.

The laws of physics therefore have the special property that physical objects, as different as possible from each other, can embody the same mathematical and causal structure, and become more and more so over time.

In other words, we are the scum of different chemicals.

This chemical waste has universality.

Its structure contains the structure of everything with increasing precision.

This place, no other place in the universe, is the hub that contains within it the structural and causal essence of all the rest of physical reality.

So the fact that the laws of physics allow this or oblige it to happen is not important, it is one of the most important things about the physical world.

Now, how does the solar system, our environment in our shape, acquire this special relationship with the rest of the universe?

Well, there's one thing that's true about what Dr. Stephen Hawking said -- that's true, but that's the wrong emphasis -- and one thing that's true about it is that it wasn't done using any particular physics, and it didn't involve any particular dispensation or miracles.

It's easy to do with three things in abundance here.

One of them is matter, because knowledge augmentation is a form of information processing.

Information processing is computation, and computation requires a computer, but there is no known way to make a computer without matter.

Also, building a computer requires energy. And most importantly, it also takes energy to create media that virtually record the knowledge we discover.

And third, less concrete, but equally essential to the unlimited creation of knowledge and explanations, is evidence.

Our environment is now full of evidence.

About 300 years ago we had the opportunity to test Newton's law of gravity, for example.

But evidence that we once did was raining down on every square meter of the Earth billions of years before that and will continue to rain billions of years after.

And the same applies to all other sciences.

As far as we know, the evidence to discover the most basic truths of all science exists on this planet just for sampling.

The place we are in is filled not only with evidence, but also matter and energy.

In the intergalactic universe, these three prerequisites for unlimited creation of knowledge are in the least possible supply. As I said earlier, it's empty, cold, and dark.

or is it?

Actually, it's just a narrow misconception.

(Laughter) Imagine a cube in intergalactic space the size of our solar system.

Well, that cube is pretty empty by human standards, but that still means it contains over a million tons of matter.

And one million tons is enough to build, say, a self-contained space station populated with a colony of scientists dedicated to creating an endless stream of knowledge.

Even collecting hydrogen from intergalactic space and forming it into other elements, etc. is now far beyond current technology.

But the question is, if something isn't forbidden by the laws of physics in the comprehensible universe, what could prevent us from doing it other than knowing how to do it?

In other words, it's a matter of knowledge, not resources.

If it can be done, this nuclear transmutation will become a nuclear fusion reactor, so energy will be supplied automatically.

And the proof?

Well, again, it's dark outside to our senses, but if you just look out with a telescope, even if it's modern in design, you'll see the same galaxy we see from here.

And with more powerful telescopes, we will be able to see the stars and planets of those galaxies and do astrophysics to learn the laws of physics.

And there you can build a particle accelerator, learn particle physics, chemistry, and more.

Perhaps the hardest part of science is biology fieldwork -- (Laughter) because it takes hundreds of millions of years to get to the nearest life-bearing planet and back.

But I have to say -- I'm sorry, Richard -- but I've never really been a big fan of biology field trips -- (Laughter), and I think we'll make do once in a few hundred million years or so.

(Laughter.) So, indeed, intergalactic space contains all the prerequisites for the unlimited creation of knowledge.

If the knowledge of how to do so is out there, such a cube anywhere in the universe could become a hub of our kind.

So we're not in a particularly kind place.

If intergalactic space can produce an unlimited stream of explanations, so can almost every other environment, and so does Earth.

So is the polluted earth.

And here, too, the limiting factor is not the resource, for it is abundant, but the scarcity of knowledge.

Now, this informed view of the universe may and I think should make us feel very special.

But it should also make us feel vulnerable. Because it means that we cannot survive the ongoing challenges of the universe without the special knowledge necessary to survive them.

Just a few light-years away, a supernova explodes and we're all dead.

Martin Reese recently wrote a book about our vulnerability to all sorts of things from astrophysics to failed scientific experiments and most importantly to terrorism with weapons of mass destruction.

And he thinks civilization has only a 50% chance of surviving this century.

I think he will talk about it at a later conference.

Now, I agree with him on this point, though I don't think the concept of probability is the right category to discuss this issue with. In other words, we may survive, or we may not.

But it's not a coincidence, it's a matter of producing the right knowledge in time.

This danger is by no means unprecedented.

Species always go extinct.

Civilization ends.

The vast majority of all species and all civilizations that have ever existed are now history.

And if we want to be the exception, then, logically speaking, our only hope is to exploit the one thing that distinguishes our species and civilization from others: our special relationship to the laws of physics, our ability to create new explanations and new knowledge, to be central to existence.

So let's apply this to the current controversy. This is not because I want to advocate a specific solution, just to explain the kind of thing I mean.

And the controversy is global warming.

Well, I'm a physicist, but not the right kind of physicist.

I'm just an amateur when it comes to global warming.

And the reasonable thing for a layman to do is to take prevailing scientific theories seriously.

And according to that theory, it's already too late to avoid disaster. Because if it's true that our best option at the moment is to prevent CO2 emissions with constraints on economic activity and huge costs of hundreds of billions of dollars, or whatever it is, something like the Kyoto Protocol, then by any reasonable measure, it's already a disaster.

And the action being advocated is not aimed at solving the problem, it simply postpones it a little.

So it was already too late to avoid it, perhaps too late to avoid it before anyone realized the danger.

By the 1970s, it was probably already too late, and the best available scientific theory was telling us that industrial emissions would usher in a new ice age and kill billions of people.

Now, the lesson is clear to me, but I don't see why it hasn't informed the public debate.

It's just that we can't always know.

Knowing the impending disaster and how to solve it at a cost lower than the cost of the disaster itself is really not very controversial.

But no precautionary measure or principle can prevent problems that have not yet been foreseen.

Therefore, it is necessary to have an attitude of not only avoiding problems, but also of solving problems.

And it is true that an ounce of prevention equals a pound of cure, but only if you know what to prevent.

If you get punched in the nose, medicine isn't about telling you how to avoid getting punched.

(Laughter) If medicine were to stop pursuing cures and focus only on prevention, it would achieve little of either.

The world is currently swarming with plans to force emissions reductions at all costs.

Plans to lower temperatures, or to live in warmer temperatures, should be planned efficiently and cheaply, not at all costs.

And there are several such plans, such as placing swarms of mirrors in space to deflect sunlight and encourage aquatic life to take up more carbon dioxide.

At the moment, these things are peripheral studies. They are not central to humanity's efforts to face this problem or problems in general.

And for those problems we haven't yet realized, our only hope for not only solving them, but surviving, is the ability to right them, not sheer luck that can be avoided indefinitely.

So take two slabs of stone and engrave on them.

Engrave on one of them, "The problem can be solved."

And on the other, inscribe "problems are inevitable."

thank you.

(applause)

Let's talk trash.

As you know, we had to be taught to abandon the strong conservation ethics we cultivated during the Great Depression and World War II.

After the war, we had to devote our enormous production capacity to manufacturing products for peacetime.

Life magazine supported the effort by announcing the introduction of disposable products that free housewives from the tedious task of washing dishes.

Mental note to Liberators: Single-use plastics take up a lot of space and don't biodegrade.

We humans are the only ones that produce waste that nature cannot digest.

Plastic is also difficult to recycle.

A teacher taught me how to express less than 5 percent of plastic recovered from a waste stream.

Diddley point squat.

That's the percentage we recycle.

Well, this has a lot to do with the melting point.

Plastic is not refined by a remelting process like glass or metal.

It begins to melt below the boiling point of water, but does not expel oily contaminants that act as a sponge.

Half of the 100 billion pounds of thermoplastic pellets each year will be prioritized.

A large amount of uncontrollable garbage ends up flowing down rivers and into the ocean.

This is an agglomeration at Viona Creek next to Los Angeles Airport.

And here's the flotsam near California State University, Long Beach, and the diesel plant we visited yesterday.

Despite the deposit fee, most of the garbage that ends up in the ocean is plastic bottles.

Every 5 minutes in the US, 2 million power consumption units are used. The photo, taken by TED presenter Chris Jordan, deftly documents mass consumption and magnifies the details.

This is a remote island vault of bottles off the coast of Baja California.

San Roque Island is an uninhabited bird colony off the sparsely populated central coast of Baja.

Note that the bottles here have caps.

Bottles made of polyethylene terephthalate (PET) do not become far from civilization even when submerged in seawater.

Also, the cap is produced in a separate factory from another plastic, polypropylene.

These float in seawater, but unfortunately they are not recycled on the bottle bill.

Follow the journey of millions of Caps who made it to the ocean alone.

A year from now, ships from Japan will cross the Pacific straight, but our ship will be caught in the California Current and will first descend to Cabo San Lucas in latitude.

Ten years later, most Japanese hats are in what is called the Eastern Garbage Zone, and our hats are littered in the Philippines.

Twenty years later, we can see the emergence of the North Pacific Gyre debris accumulation zone.

Coincidentally, the millions of albatrosses that nest on the Kure and Midway Atolls of the Northwestern Hawaiian Islands National Monument forage here and scavenge whatever they find to regurgitate their chicks.

A 4-month-old Laysan Albatross chick died with this in her belly.

Hundreds of thousands of goose-sized chicks are dying with stomachs full of bottle caps, lighters and other trash...

But most of them are bottle caps.

Sadly, their parents mistake the bottle caps for food being thrown at the surface.

The fixing ring of the cap also affects aquatic animals.

Here is Mae West, still alive in the New Orleans zookeeper's home.

I wanted to see how my hometown of Long Beach contributed to this issue, so on a beach cleanup day in 2005, I went to the Long Beach peninsula at the eastern end of Long Beach.

We have cleaned the beach area shown.

I offered 5 cents for each bottle cap.

Many takers have come.

Here are the 1,100 bottle caps they collected.

I was thinking of paying $20.

I ended up using nearly 60 that day.

I separated them by color and put them on display at the Cabrillo Marine Aquarium in San Pedro next Earth Day.

Governor Schwarzenegger and his wife Maria stopped by to discuss the exhibit.

They shook my hand even though I was wearing a 'girly' hat crocheted from a plastic bag. (Laughter.) I showed him and Maria a zooplankton trawler from the Northern Hawaiian Gyre where there was more plastic than plankton.

This is what a trawl sample looks like where our oceans have turned into plastic soup.

Trawling a web of zooplankton over a mile on the surface of the earth yields such a sample.

this.

Well, here's what the debris washed up on the coast of Hawaii looks like.

And this particular beach is Kailua Beach. This is the beach where the president and his family vacationed before moving to Washington.

So how do you analyze a sample like this that contains more plastic than plankton?

Plastic debris falls into various size classes ranging from 5mm to 1/3mm.

Small pieces of plastic concentrate persistent organic pollutants up to a million times higher than the level of the surrounding seawater.

We wanted to see if the most common deep-sea fish at the base of the food chain were ingesting these poisons.

We performed hundreds of autopsies and found contaminated plastic debris in the stomachs of more than a third.

The record holder was just 2.5 inches long and had 84 shards in his tiny stomach.

You can now buy certified organic produce.

However, no fishmonger on earth can sell certified organic, wild-caught fish.

This is the legacy we want to leave for future generations.

A throwaway society cannot be contained and it is spreading globally.

We cannot store, maintain and recycle everything.

you have to throw it away.

Well, the market does a lot for us, but it can't fix the natural systems of the ocean that we've broken.

All the king's horses and all the king's men...

You can never collect all the plastic and put the ocean back together.

NARRATOR (VIDEO): Levels are rising, packaging is increasing, the concept of "disposable" life is prevalent, and it's showing up in our oceans.

Anchor: He has no chance of wiping it out.

Polluting the oceans to remove plastic is beyond the budget of any country and could kill countless marine species in the process.

According to Moore, the solution is to stop the source of the plastic—stopping it on land before it ends up in the ocean.

And in a world wrapped and packaged in plastic, he doesn't hold out much hope for that either.

This is Brian Rooney of Nightline in Long Beach, CA.

Charles Moore: Thank you.

This is the first of two quirky pictures to show you today.

I was 19 at the time.

At the time, I had just returned from one of the deepest dives I had ever done, a dive of just over 200 feet.

And then I caught this little fish.

That particular individual turned out to be the first time it had been captured alive.

And for fish geeks, this is a pretty exciting one.

Even more interesting was the fact that the person who took this photo was Jack Randall, the greatest living ichthyologist on the planet, a fish-nerd grand poover.

So I was really excited to have this moment.

It set the direction for the rest of my life.

But really, the most important and deepest thing about this photo is that it was taken two days before I became completely paralyzed from the neck down.

I made a really stupid mistake that many 19-year-olds who think they're immortal make. Then I suffered a bad bend, became paralyzed and had to fly back for treatment.

I learned two really important things that day.

The first thing I learned was that I was destined to die. That's really big.

And the second thing I learned was that I knew with deep conviction that this was exactly what I was going to do for the rest of my life.

I had to focus all my energies on going deep into the reef to look for new species.

When most people think of coral reefs, what comes to mind is large, hard, elaborate corals and lots of brightly colored fish and objects.

But this is really just the tip of the iceberg.

Looking at this diagram of the reef, we know a lot about the parts near the top.

The reason we know so much about this place is that scuba divers can dive in and access it very easily.

The problem with scuba, however, is that there is a limit to how deep you can dive.

We found it to be about 200 feet deep.

I'll explain why in a moment, but the point is that scuba divers typically stay below 100 feet, and it's very rare to dive much deeper than this, at least under normal conditions.

So, to explore deeper, most biologists turned to submersibles.

Well, submersibles are great, great things, but if you spend $30,000 a day using one and you can go 2,000 feet, you're not going to fart here a few hundred feet, you're going much deeper.

This means that almost all research using submersibles is done at depths well below 500 feet.

Well, at this point it's clear that there's a zone in the middle here.

It is a zone centered around my own personal pursuit of happiness.

I would like to know what is in this zone. We know almost nothing about it.

Scuba divers cannot reach it, but submarines pass by it.

It took me a year to walk again after my diving accident in Palau.

That year I spent a lot of time learning about the physics and physiology of diving and how to overcome these limitations.

I will only introduce the basic idea.

Air is a mixture of oxygen and nitrogen, 20 percent oxygen and 80 percent nitrogen.

it's in our lungs.

And there is a phenomenon called Henry's Law, which states that a gas will dissolve in a liquid in proportion to the partial pressure to which it is exposed.

Oxygen is bound through metabolism and we use it for energy.

Nitrogen is like floating in our blood and tissues.

All right, we're designed that way.

The problem comes when going underwater.

This pressure effect occurs when you dive to a depth of about 130 feet, which is recommended for most scuba divers.

The effect of that pressure is to increase the density of the gas molecules with each breath.

Over time, those gas molecules dissolve into your blood and tissues and begin to fill your body.

Now, if you go down to an altitude of, say, 300 feet, you don't have 5 times as many gas molecules in your lungs, but 10 times as many gas molecules.

And if you go to 15x, the deeper you go, the worse the problem becomes.

The limits for diving with air are all points in the body, all nitrogen and all oxygen.

Scuba diving has three basic limitations.

The first limitation is oxygen, or oxygen toxicity.

Well, we all know the song "Love Is Like Oxygen".

Too good, too expensive. If you don't have enough, you will die. ”

Well, in the context of diving, there is too much to gain, but there are also deaths.

They cramp in water, but it's not a good thing to do in water.

It is caused by too much oxygen in the body.

Nitrogen has two problems.

One of them is what Jacques Cousteau called "The Delight of the Abyss".

Nitrogen sickness, isn't it?

it drives you crazy. The deeper you go, the more loops you will make.

You don't want to drink and drive, and you don't want to drink and drive.

That's a really big problem.

And of course the third problem, which I found the hard way in Palau, is the bend.

One thing I forgot to mention is that to avoid the problem of nitrogen sickness (all the blue dots in your body), remove the nitrogen and replace it with helium.

Helium is a gas. There are many reasons why helium is good. Because helium is a small molecule, it is inert and does not cause anesthesia.

That's the basic concept we use.

But the theory is relatively simple.

The hard part is the implementation.

So I started like this about 15 years ago.

To be honest, this wasn't the smartest start, but you have to start somewhere.

(Laughs) I wasn't the only one who didn't know what he was doing at the time.

Almost no one did.

This rig was actually used for a 300ft dive.

But over time we got better at it and came up with this very sleek looking rig with all the good stuff: 4 scuba tanks, 5 regulators and all the right gas mixtures.

The weather was nice and we were able to go down and spot some new species.

This photo was taken at an altitude of 300 feet while catching a new species of fish.

The problem was that we didn't have much time.

Despite its size and magnitude, this kind of depth only took about 15 minutes at most.

I needed more time. There should have been a better way.

And indeed there is a better way.

In 1994 I was fortunate enough to acquire these prototype closed circuit rebreathers.

Closed-circuit rebreathers: what makes them different from scuba and why they're better?

Rebreathers have three main advantages.

One is quiet, no noise.

Second, it allows you to stay underwater longer.

Third, you can go deeper.

To really understand how they do it, you have to look under the hood and see what's going on.

Closed circuit rebreathers have three basic systems.

The most basic one is called the breathing loop.

It's a breathing loop. Because you breathe out of it. It's a closed loop and you end up breathing the same gas over and over.

There's a mouthpiece that you put in your mouth, and there's an anti-lung, in this case, two anti-lungs.

The Counter Lung isn't high tech, it's just a flexible bag.

It can be mechanically breathed or mechanically ventilated.

When you exhale, the breath enters the lungs on the expiratory side. When you breathe in, it comes from the lungs on the inspiratory side.

It's pure mechanics, allowing air to circulate through this breathing loop.

Another component of the breathing loop is the carbon dioxide absorption canister.

Now, we produce carbon dioxide when we breathe, and that carbon dioxide needs to be removed from our system.

There is a chemical filter out there that removes the carbon dioxide from the breathing gas, making it safe to breathe again when the carbon dioxide returns.

In a nutshell, that's the breathing loop.

The second major component of the closed circuit rebreather is the gas system.

The main purpose of the gas system is to supply oxygen and replenish the oxygen consumed by the body.

The main tank, the most important one, is this oxygen gas supply cylinder right here.

However, if you only have an oxygen gas supply, you can't dive too deep, as you'll quickly run into oxygen poisoning.

And it is aptly called a diluent gas supply.

For our application, we usually have air in this diluent gas supply as it is a very cheap and easy source of nitrogen.

That's where you get nitrogen from.

But if you want to go deeper, you need another gas supply of course, and what you really need to go deeper is helium.

We usually have a slightly larger cylinder on the outside of the rebreather like this.

This is what I use to inject when I start my further investigation.

There is also a second oxygen cylinder as a spare. Even if we had problems with our initial oxygen supply, we can continue to breathe.

The way you manage all of these different gases and different gas supplies is an easily accessible, very high tech and sleek gas block right out front here.

It has valves, knobs and everything you need to inject the right gas at the right time.

Normally you don't need to do that. Everything is done automatically by the rebreather's third system, the electronics.

The most important part of the rebreather is the oxygen sensor.

You need three, so if one fails, you'll know which one.

There are also three microprocessors.

One of these computers can run the entire system, so if you lose two, you have backup power.

There are multiple displays to convey information to the diver.

This is a high-tech device that allows us to do what we do in deep dives.

I could talk about this all day long, but ask my wife. But I want to move on to something more interesting.

I'll dig you in and show you what it's like.

We start boarding the boat. Despite all this high-tech and expensive equipment, this is the best way to get into the water. Just flap from the side of the boat.

As shown in the previous diagram, the reef we dive in starts near the surface and descends almost vertically, perfectly straight down.

So we fall into the water, over the edge of this cliff, and start falling, falling, falling.

People ask if it will take a long time to get there.

No; it only takes a few minutes to descend to 300 or 400 feet altitude. This is our goal.

It's like you're skydiving in slow motion. really very interesting.

Have you ever seen the "Abyss" where Ed Harris sank along the side of the wall?

That's how it is. wonderful.

And it turns out that the water is very clear, very clear, because there are very few plankton there.

Turn on the lights and look around the caves, and you'll be confronted with an enormous amount of diversity that no one has ever believed.

Now, not all of them are new. The white-striped fish is a known species.

But if you look closely at the cracks and crevices, you can see little things running all over the place.

There is incredible variety.

Not just fish.

These are crinoids, sponges and black corals. I have other fish.

Those fish you see now are new species.

I had a video camera instead of a net, so they're still a new species, still waiting below for someone to go find them.

But it looks like this.

And this kind of habitat stretches on and on for miles.

This is Papua, New Guinea.

Today, it's not just small fish and invertebrates that can be found there.

I also see sharks more often than I expected.

I'm not sure why.

What I want you to do now is imagine yourself in 400 feet of water, with all your high-tech equipment on your back, on a remote reef off the coast of Papua, New Guinea, thousands of miles from the nearest recompression chamber, completely surrounded by sharks.

(Video) Diver 1: (squeaky) Look at that...

Diver 2: Oh, oh...

Uh oh!

Richard Pyle: There is no situation in the world that looks tense when you start talking like Donald Duck.

(Laughter.) So there we are - 400 feet here.

By the way, this is the one looking straight up to figure out the distance to the ground.

And if you're a biologist and know about sharks and want to assess how endangered I am here, there's one question that immediately comes to mind. It is -- (video) Diver 1: What type of shark?

Diver 2: Silvertip Shark.

Diver 1: Oh.

RP: There are actually three kinds of sharks here.

Silvertips have white fin edges, and in the distance you can also find gray reef sharks and hammerhead sharks.

And yes, it gets a little nerve-wracking.

(Video) Diver 2: Cheeks!

AUDIENCE: (Laughter) I've seen videos like this on TV a lot, and it's very intimidating.

I think it gives the wrong impression of sharks. They are actually not that dangerous animals.

So we weren't too worried and just joking around.

More people are dying in England from pigs and lightning strikes, and more people are dying from soccer games.

There are many other ways to die.

And I'm not making up such things.

coconut! You are more likely to be killed by a coconut than by a shark.

Therefore, sharks are not as dangerous as most people think.

Well, I don't know if any of you got US News and World Report, but I got the latest issue.

There is a cover story about the great explorers of our time.

I wonder if there really are new frontiers out there, if there are any truly hardcore discoveries still achievable.

My favorite line from this article: [..."finding" can mean finding guppies with extra spines on their dorsal fins. ’] I can’t help but laugh. They don't call us fish geeks for no reason.

In fact, we are thrilled to find new dorsal spines for our guppies.

But that's not all.

I would like to show you some of the guppies we have found over the years.

(Laughter) Even if you ignore the scientific value of this thing, look at the monetary value of this thing.

Some of these were sold to Japan through Aquarium Trade and sold for $15,000 each.

That's $500,000 per pound.

This is another newly discovered angelfish.

Our first discovery of this dates back to the days of aviation. Back in the good old days of aviation, when we used to do this kind of diving in the air.

We were at 360 feet.

I remember coming up from one of the deep dives and it was foggy. It took a while for the sobriety to dissipate, and it was kind of sobering up.

I have a vague memory of seeing this yellow fish with black spots and thinking, "Damn, I should have caught one. I think it's a new species."

Sure enough, I caught one, but I completely forgot.

This is the official scientific name for its deep-dwelling habits.

When I first found this fish, I didn't even know what family it belonged to. So we simply called it Dr. Seuss' Fish because it looked like one from the book.

Okay, this is pretty cool.

Go to Papua, New Guinea and go down 300 feet and you'll see these big mounds.

It may be hard to see, but it's several meters in diameter.

If you look closely, you can see small white and gray fish hanging out nearby.

It turns out that this little white fish builds a huge mound, one pebble at a time.

It's unusual to find something like this.

It's not just a new species, it's new behaviors, new ecology, new things of all kinds.

I'll show you in a moment a sample of the new species we discovered.

It's not just the number of species we're discovering that's staggering. As you can see, this is pretty amazing. This is only half of what we found. What's amazing is how quickly we can find them.

Up to seven new species are born for every hour we spend at that depth.

If you go to the Amazon jungle and mist the trees, you might find a lot of bugs, but when it comes to fish, nowhere else in the world can you get 7 new species per hour.

Now, after doing some back math, we predict that there are probably about 2,000 to 2,500 new species in the Indo-Pacific alone.

With only 5 to 6,000 known species, a very large portion of what exists is actually unknown.

We thought we had all the diversity of reef fish, but clearly we didn't.

I would like to end with a very dark story.

This is the second great photo I present to you.

This was taken just 300 feet above my head.

What makes this photo special is that it captures the final moments of a person's life.

When I recovered his body, I knew what the problem was.

He made a very simple mistake. He turned the wrong valve when filling the cylinder.

His tank had 80% oxygen when it should have been 40%.

He had a seizure of oxygen poisoning and drowned.

My reason for introducing this is not to deny everything, but just to use it to conclude my general philosophy of life. We all have two goals.

The first goal we share with all other creatures on this planet is to survive.

I call it permanent. The survival of the species and the survival of ourselves. And they're both involved in perpetuating the genome.

The second goal, for those who achieve the first, can be called spiritual fulfillment, financial success, or anything else.

I call it the pursuit of pleasure, the pursuit of happiness.

So, I think my theme is that this guy lived his life to the fullest, and he definitely did.

You have to balance these two goals.

If you live your life in fear, your life will be an STD with a 100% mortality rate.

So you cannot live your life in fear.

(laughs) I thought it was old!

(Applause.) But at the same time, we don't want you to focus so much on Rule 2 and Goal 2 that you neglect Goal 1.

Because once you die, you won't be able to enjoy anything after that.

Therefore, I wish you all the best in maintaining that balance in your future endeavors.

thank you.

I grew up in Seoul, South Korea and moved to New York City in 1999 to attend college.

At the time, I was preparing for medicine, but I was interested in anatomy and I was really intrigued by animal anatomy, so I decided to become a surgeon.

At the same time, I fell in love with the city of New York.

I began to realize that I could see the whole city as one living entity.

I wanted to dissect it and examine the invisible layers.

And for me, the way there was by artistic means.

So in the end I decided to do a master's degree instead of a medical doctorate.

In graduate school, I became interested in creatures living in the hidden corners of the city.

In New York City, rats are part of the daily routine of commuters.

Most people either ignore them or fear them.

But I like them because they live on the fringes of society.

And even though they are used in laboratories to facilitate human life, they are also considered pests.

I also searched around town and took pictures.

One day on the subway, I was taking pictures of the tracks, hoping to catch a mouse or two, when a man approached me and said, "You can't take pictures here."

The MTA will confiscate your camera. ”

I was pretty shocked by that, and I was like, "Well, that's fine."

I'm chasing mice. ”

Then I started going into the tunnels and it dawned on me that there was a whole new dimension in this city that I had never seen before and most people could not see.

Around the same time, I met like-minded people who called themselves urban explorers, adventurers, cavers, guerrilla historians, and so on.

I was welcomed by this loose internet-based network of people who regularly explore the ruins of cities: abandoned subway stations, tunnels, sewers, aqueducts, factories, hospitals, shipyards.

When I took pictures in these places, I felt that the pictures were missing something.

Merely documenting these soon to be demolished structures was not enough for me.

So I wanted to create fictional characters and animals that live in these underground spaces. At the time, the easiest way to do that was to model yourself.

The reason I chose not to wear clothes was because I wanted to create a look that completely eliminated cultural connotations and era-specific elements.

I wanted an easy way to represent the living organisms that inhabit these decaying, ruined spaces.

This was taken at the Riviera Sugar Mill in Red Hook, Brooklyn.

It is now a vacant lot on six acres until a shopping mall is built across from the new IKEA.

I loved this space because it was the first large abandoned industrial park that I found on my own.

When I first entered, I heard a dog barking and thought it was a guard dog and was scared.

But they were wild dogs who happened to live there, and being so close to the water, swans and ducks swam, trees were growing everywhere, and bees were nesting in sugar barrels.

Nature has really brought back this entire complex.

And in a way, I wanted the human figure in the picture to be part of that nature.

Once I got comfortable, it felt like a big playground.

I climbed chariots and jumped over exposed beams as if I had stepped back in time and become a child again.

This was taken at the old Croton Aqueduct, which supplied New York City with fresh water for the first time.

Construction began in 1837.

It lasted for about 5 years.

Abandoned when the new Croton Aqueduct opened in 1890.

Entering a space like this gives you direct access to the past, as it has been left untouched for decades.

I love feeling the aura of historic spaces.

Rather than watching a reenactment of it at home, you actually feel the hand-laid bricks, get wet and muddy as you sway up and down a narrow crack, and walk through a dark tunnel with a flashlight.

This is a tunnel under Riverside Park.

Built by Robert Moses in the 1930s.

This mural was painted by a graffiti artist to commemorate the hundreds of homeless people displaced from the tunnel when it was reopened for railroad use in 1991.

Walking through this tunnel is very peaceful.

There is no one around and you can hear the sounds of children playing in the park above, completely unaware of what lies below.

When I used to go to these places, I felt great anxiety and loneliness because I was in a lonely period in my life. That's why I decided to title my series that mentions Charles Baudelaire "The Spleen of the Naked City".

"Naked City" is New York's nickname, and "Spleen" embodies the melancholy and inertia of alienation in an urban environment.

It's the same tunnel.

You can see the sunlight coming through the ventilation ducts and the approaching train.

This is an abandoned tunnel in Hell's Kitchen.

I was alone there getting ready when a homeless man approached me.

I basically invaded his living space.

I was really scared at first, but when I calmly explained to him that I was working on an art project, he didn't seem to care, so I set my camera on self-timer and ran back and forth.

And when I finished my work, he actually handed me his shirt to wipe my feet and kindly took me home.

It must have been a very unusual day for him.

(Laughs) What struck me after this incident is that such spaces hold a lot of erased memories of the city.

To me, that homeless man really represented an unconscious element of the city.

He said he had been tortured on earth and was once on Rikers Island, but finally found peace and quiet in that space.

Once built for the prosperity of the city, this tunnel is now a sanctuary for outcasts, completely forgotten from the daily life of the average city dweller.

It's in the basement of my alma mater, Columbia University.

This tunnel is famous for being used during the development of the Manhattan Project.

This particular tunnel is interesting because it marks the original foundations of the Bloomingdale Mental Asylum, which was demolished when Columbia moved in in 1890.

This is a New York City farm colony that was a Staten Island workhouse from the 1890s to the 1930s.

Most of my photography is set in places that have been neglected for decades, but this one is an exception.

This children's hospital closed in 1997. Located in Newark.

When I went there three years ago, the windows were broken and the walls were peeling off, but they were left as they were.

Dissecting tables, morgue trays, X-ray machines and even used instruments are placed on the dissecting table.

After exploring recently abandoned buildings, I felt that all the man-made structures around us, including homes, offices, shopping malls, and churches, could quickly become ruins.

It was a reminder of how fragile our sense of security is and how vulnerable people really are.

I love to travel and Berlin has become one of my favorite cities.

It's full of history, with many bunkers and war relics.

This photo was taken in a homeless shelter built in 1885 to house 1,100 people.

I saw the structure while on the train, and when I got off at the next station, I met people there who gave me access to the catacomb-like basement. The cellar was used during the war as an ammunition store and at one point was also used to hide groups of Jewish refugees.

This is a real catacomb in Paris.

I explored the restricted area extensively and fell in love instantly.

There are over 300 kilometers of tunnels, but only about a mile is open to the public as a museum.

The history of the first tunnels dates back to 60 BC.

They were consistently mined as limestone quarries, and by the 18th century some of these quarries had caved in and posed a security threat, so the government ordered the reinforcement of the existing quarries and dug new observation tunnels to monitor and map the entire site.

As you can see, the system is very complex and vast.

Getting lost there is very dangerous.

At the same time, there was also the problem of overflowing cemeteries in the city.

There the bones were removed from the cemetery to a quarry and turned into a catacomb.

More than 6 million bodies are buried there, some more than 1,300 years old.

This was taken under Montparnasse Cemetery, where most of the ossuary is located.

There are also telephone cables from the 50's and many WWII-era bunkers.

This is a German bunker.

There were French bunkers nearby, and the whole tunnel was so complicated that the two never met.

This tunnel is famous for being used by the Resistance written by Victor Hugo in Les Miserables.

And I saw a lot of 1800s graffiti like this.

After exploring the underground of Paris, I decided to climb it, so I climbed a Gothic monument in the middle of Paris.

This is the Tower of Saint-Jacques.

Built in the early 1500s.

Sitting naked on a gargoyle in mid-January is not recommended.

It wasn't very comfortable. (Laughter.) And I had never seen a rat in any of these places until recently, when I was in the sewers of London.

This was probably the most difficult place to explore.

I had to wear a gas mask due to the toxic fumes. Except maybe this photo.

And when the waste wave rolls in, it sounds like a whole storm is coming.

This is a still from a movie I recently worked on called "Blind Doors".

I became more interested in capturing movement and texture.

The 16mm black and white film created a different atmosphere.

And this is the first theatrical project that I have been involved in.

Adapted from August Strindberg's "Dream Play".

It took place only once last September at the Atlantic Avenue Tunnel in Brooklyn, which was built in 1844 and is said to be the world's oldest subway tunnel.

Lately, I've been leaning towards collaborative projects like this.

But I'm still working on my series whenever I get the chance.

Our last stop was the Mayan Ruins in Copan, Honduras.

This was taken inside the archaeological tunnel of the main temple.

I like doing more than just exploring these spaces.

I feel obligated to continuously animate and humanize these spaces in order to preserve the memory in creative ways before they are lost forever.

thank you.

Four years ago, I presented on the TED stage about a company I was working with at the time called Odeo.

And because of that announcement, there was a big story in the New York Times, which led to more coverage, more attention, and I decided to become the CEO of the company, and I was just an advisor, raising venture capital and ramping up hiring.

One of the people I hired was an engineer named Jack Dorsey. A year later, when we were trying to decide where to go with Odeo, Jack pitched an idea he had been thinking about for years, based on sending a quick status update to a friend.

Odeo was also doing SMS at the time, so I combined two and two and launched Twitter as a side project of Odeo in early 2006.

Now, it's hard to justify doing a side project at a startup where focus is so important, but I actually started Blogger as a side project at my previous company and thought it was just a side hustle. After that, it took over not only the company, but my life for the next five or six years.

So I've learned to follow my intuition, even though I can't always justify it or know where the hunch is going.

And it's happened many times on Twitter as well.

So for those unfamiliar, Twitter is based on a very simple and seemingly trivial concept.

Say what you're doing in 140 characters or less, and people who are interested in you will receive updates.

If you're really interested, you'll receive updates as text messages on your phone.

For example, I might be on Twitter right now while I'm speaking at TED.

In my case, up to 60,000 people receive the message within seconds of hitting the send button.

The basic idea is that Twitter allows us to share moments in our lives whenever we want, whether they are important or mundane events.

By sharing moments as they happen, people can feel more connected and in touch in real time, regardless of distance.

This is the main use of Twitter that we've seen since the early days, and it's what got us excited.

What we didn't anticipate were the many other uses that would evolve from this very simple system.

One thing we noticed was how important Twitter was during real-time events.

When wildfires raged in San Diego in October 2007, people turned to Twitter to report what was happening and to ask neighbors for information about what was happening around them.

But it wasn't just individuals.

In fact, the LA Times also turned to Twitter for information, running a front-page Twitter feed. The LA Fire Department and Red Cross also used Twitter feeds to provide news and updates.

The event has dozens of people here on Twitter, and thousands of people around the world following, wanting to know what it's like to be here and what's going on.

Other interesting things popping up include many from businesses, from marketing and communications and predictability to the popular Korean BBQ taco truck that runs all over Los Angeles and stops in lines on Twitter to create lines around the block.

Recently, politicians have also started using Twitter.

In fact, there are currently 47 lawmakers with Twitter accounts.

And in some cases, he tweets from behind closed doors with the president.

In this case, this man doesn't like what he hears.

The president himself is the most popular Twitter user, but his tweets have declined recently, while Senator McCain's tweets have increased.

So was the case with this man.

Twitter was originally designed as a broadcast medium. Send one message and it will be sent to everyone and they will receive the messages they are interested in.

One of the many ways users shaped the evolution of Twitter was by inventing ways to reply to specific people or specific messages.

So this syntax, the "@username" that Shaquille O'Neal uses here to reply to one of his fans, was completely user-invented and we didn't put it into our system until it was already prevalent and we made it easy.

This is one of many ways users can shape the system.

The other is via API.

We built an application programming interface. This basically means that programmers can write software that interacts with Twitter.

We currently know of over 2,000 software (interfaces for Mac, Windows, iPhone and BlackBerry) that can send Twitter updates. There are also devices that can twitter when a fetus kicks in, or twitter a plant when it needs water, and more.

Perhaps the most significant third-party development comes from a small Virginia-based company called Summize.

Summize built the Twitter search engine.

And they took advantage of the fact that if millions of people around the world were discussing what they were doing and what was happening around them, there would be a great resource to learn about any topic or event going on.

This has changed the way we look at Twitter.

For example, here's what people are saying about TED:

This was another shift in our mindset, and Twitter wasn't what we thought it was.

We liked it so much that we actually bought the company and put it into our flagship product.

Not only does this allow you to view Twitter in many different ways, it also introduces new use cases.

One of my favorites happened a few months ago when there was a gas shortage in Atlanta.

Some users thought that when they found gas (where it was and how much it cost), they would post it on Twitter and add the keyword "#atlgas" so that other people could search for it and find gas themselves.

And this trend of people using this communication network to help each other goes far beyond the original idea of ​​simply staying in touch with family and friends.

Whether it's fundraising for homeless people, digging wells in Africa, or helping families in crisis, this is happening more and more these days.

There have been times when people have raised tens of thousands of dollars on Twitter in a matter of days.

Better things seem to happen when you give people an easy way to share information.

You never know what will happen next on Twitter.

I have learned to follow my hunch but never assume where it will go.

thank you.

(Applause) Chris Anderson: We're not done yet.

So what if you could view this screen live?

This is actually the most intimidating thing for any speaker at the event.

It's totally intimidating.

And this is the Twitter search screen.

So let's try typing some random words into Twitter.

For example: "Evan Williams".

“Evan Williams, give people a better way to share information and follow your gut at TED.”

"I'm listening to Evan Williams now." "I'm listening to Evan Williams now." "Evan Williams—" Oh.

"Evan Williams is dying here on the TED stage.

It sucks! (laughs) Evan Williams: Good, thank you.

CA: Just kidding.

But literally in the eight minutes he speaks, there have already been about 50 tweets about the story.

There he will see all facets of the reaction, including the fact that Barack Obama is the biggest Twitterer, the fact that it came out of TED.

I don't think there is any other way to get instant feedback like this.

You've built something very attractive, but it seems like its best is yet to come.

Thank you so much, Evan. EW: Thank you.

CA: It was very interesting.

In 1992 I started working for a company called Interval Research. The company was then just founded as a commercial research company in Silicon Valley by David Liddell and Paul Allen.

I met with David to discuss what we can do for his company.

I had just emerged from a failing virtual reality business and was supporting myself by giving talks and writing books. After 20 years in the computer game industry, I had an idea that people didn't think would sell.

And then David and I realized we had a common question that we really wanted answered. It was, "Why didn't anyone make a computer game for little girls?"

why is that?

It can't be just a huge sexist conspiracy.

These people aren't that smart.

$6 billion is on the table.

If they knew how, they would work on it.

So what's the deal here?

And when thinking about our goals, I must say that Interval is a truly humanistic institution. Humanism in the classical sense finds a way, at its best, to combine a clear eye-proven research with a set of core values ​​that fundamentally love and respect people.

A basic idea of ​​humanism is the quality of life that can be improved. We can do good, it's worth doing because it's good, and a clear empiricism helps us understand how to do it.

Thus, contrary to popular belief, there is no conflict of interest between empiricism and values.

And Interval Research is like a living example of how true that is.

So David and I decided to gather the best research we could find to find out what it takes to get a little girl to use a computer, and what it takes to get a little boy playing video games to a level where he's comfortable using technology.

We spent two and a half years researching. We spent another year and a half in pre-development.

After that, I set up a spin-off company.

During the research phase of the project at Interval, we partnered with a company called Cheskin Research. These guys, Davis Masten and Christopher Ireland, have completely changed my mind about what market research is and what it can look like.

They taught me how to see and see, and they didn't do the incredibly stupid thing to say to a kid, "Which one do you like best out of all the things we've already made?" -- This leaves zero possible answers.

So in the first two and a half years we did four things. We thoroughly reviewed the literature in related fields, including cognitive psychology, spatial cognition, gender studies, play theory, sociology, and primatology.

Thank you France de Waal, wherever you are, I love you, I would do anything to see you.

After we had done it with a fairly large team and discovered what seemed to be the salient issues with girls and boys and play, which, after all, were really the issues, we proceeded to the second phase of our work, where we interviewed some of the adult experts in academia, some of the people who produced the literature we found relevant.

We also did focus groups with people who were in the field with the kids every day, such as supervising playgrounds. We spoke with them, confirmed some hypotheses, and identified some serious questions about gender differences and play.

Then we did what I think was the crux of the job. It interviewed 1,100 children, ages 7 to 12, across the United States, excluding Silicon Valley, Boston, and Austin. Because they knew their small family had millions of computers, and it wasn't going to be a representative sample.

And then, at the end of a great conversation with kids and their best friends across the country, two years later, we gathered some survey data from another 10,000 kids, created a set of data that we believe were the key findings of the survey, and spent another year transforming it into design heuristics for designing computer-based products for girls aged 8 to 12, and indeed any kind of product.

And we spent that time designing interactive prototypes of computer software and testing them with little girls.

In November 1996, the company formed Purple Moon, Inc. as a spin-off from Interval Research. Principal investors were Interval Research, Vulcan Northwest, Institutional Venture Partners, and Allen & Company.

We launched our website on September 2nd and it now has 25 million pages and 42,000 young girls registered users.

They make an average of 1.5 visits per day, spend an average of 35 minutes per visit, and view 50 pages per visit.

Therefore, we feel that we have successfully formed an online community with the girls.

We launched two titles in October. The first in the series, "Rockett's New School," sees a character called Rocket start his first day of school with a clean slate in eighth grade in a brand new location, allowing girls to ask the question, "What will I be when I grow up?"

"What will it be like when you become a high school student or junior high school student?

Who are my friends?”; a love of social complexity and exercising the narrative intelligence that drives most of our play behavior;

Another title we launched is called "Secret Paths in the Forest" and is more fantasy oriented and focuses on the inner workings of girls.

Both of these titles made it into PC Data's top 50 entertainment titles. PC Data's entertainment titles in December, along with "John Madden Football," blew me to death.

I mean, we're real, and we've touched hundreds of thousands of little girls.

We have generated 500 million impressions in marketing and PR for our brand, Purple Moon.

Roughly 96% of them tested positive. Of those, 4 percent were “other.”

I would like to talk about the other. Because the politics of this company is in some ways the most fascinating part of this company to me.

There are actually two types of negative reviews we have received.

One type of reviewer is a male gamer who thinks he knows what a game should be like and won't let little girls see the product.

Another reviewer is some kind of feminist who thinks girls know what they should be like.

So what's interesting to me is that these funny and quirky bed buddies have something in common. It's that they don't listen to little girls.

They have never seen their children and show no affection for them.

I would like to replay some of the girls' voices from the two and a half years of research we did. Some voices are actually more recent.

And these voices are accompanied by photographs of their lives and the things they hold dear that they have taken for us.

These are pictures they have never seen themselves, but they have provided us with. This is something reviewers don't know and don't listen to, and this is the kind of research I recommend to those who want to do humanitarian research.

Girl 1: Yeah, my character is usually a tomboy.

She prefers boys.

Girl 2: Oh, yeah.

Girl 1: We always do this at the beginning of the whole game. We each have a piece of paper. We write down our name, age, rich, very rich, not rich, poor, medium, rich, boyfriend, dog, pet, whatever, sister, brother, and everything else.

Girl 2: Divorced -- Your parents may have divorced.

Girl 3: This is my pretend [unintelligible].

Girl 4: We make a school newspaper on the computer.

Girl 5: Even games for girls usually feature very pretty scenery with clouds and flowers.

Girl 6: For example, if you're a girl and you're really adventurous and really a tomboy, you might find games for girls a bit effeminate.

Girl 7: I do track and field, I play soccer, I play basketball, and I have a lot to do.

And sometimes, like on Mondays or when I have a long day off, I feel like I can't enjoy it unless it's like a vacation.

Girl 8: Well, I have music lessons and I'm on the swim team, so sometimes a lot can happen. Having to do all these different things can be overwhelming at times.

Girl 9: My friend Justin just stole my friend Kelly and now they are mean to me.

Girl 10: Well, sometimes it can be frustrating when your brothers and sisters imitate you and you come up with an idea first and they adopt your idea and implement it themselves.

Girl 11: Because my sister knows everything, for example, when I ask my mom something, she always says no

But she gives everything to her sister.

Brenda Laurel: I'd like to quickly show you a minute of 'Rockett's Tricky Decision', which went gold two days ago.

Let's hope it's really stable.

This is the second day of Rocket's life.

I'm showing you this because I hope that those of you who've heard the girls' voices will see and hear the scenes that I'm about to show you.

And you can see how we tried to incorporate the issues that mattered to them into the games we created.

Miko: Hey, Rocket! here we go!

Rocket: Hello, Miko! what happened?

Miko: Did you hear about Nakiria's big Halloween party this weekend?

She asked me to see if you knew about it.

Nakiria invited Reuben over -- Lockett: But what?

Miko: I don't think so.

So, I heard that his band is playing another party on the same night.

Rocket: Really? what is your opponent?

Girl: Max's party is going to be great, Whitney.

He invited all the best people.

BL: We don't have a lot of time, so we're going to fast-forward to a decision point.

After this terrible event happened, Rocket will decide what to think about it.

Rocket: Who would want to show up at the party anyway?

You will be invited to the party whenever you feel like it.

Oh, I doubt I'll make it onto Max's list of top talent.

BL: Okay. Now navigate emotionally.

If we were playing games, we would.

Whenever you want to learn more about your character during the game, you can go to this hidden corridor. I'll show you just the interface in a moment.

For example, you can go find Miko's locker and get more information about her.

Oops, I took a wrong turn.

But the product overview is understandable.

It may seem harmless, but I wanted to show you how to incorporate what we have learned about girls: their desire to experience greater emotional flexibility and play with the social complexities of their lives.

I think what we are giving girls through this initiative is a kind of recognition, a feeling that they are being watched.

and a sense of the choices available in their lives.

we love them

we see them

We're not trying to tell them what they should be.

But we're really, really happy for who they are.

They turned out to be really great.

Finally, we present a videotape version of a future game in the Rockett series, created in collaboration with our graphic artists and designers. This seems to satisfy 4 percent of reviewers.

"Rocket 28!"

Rocket: It's like I just woke up, you know?

BL: Thank you.

One day when I was walking with my wife through the market, someone stuck a cage in my face.

And between those slits were the saddest eyes I've ever seen.

My first encounter was with a seriously ill baby orangutan.

That evening, when I returned to the dark mid-market, I heard a “hmm, hmm” sound and, sure enough, found a dying baby orangutan in a pile of garbage.

Of course the cage was recovered.

I picked up the little baby, massaged it, and forced it to drink water until it finally started breathing normally.

It's bullshit.

She now lives in Sungai Wein jungle. This is her second son Mata Hari. By the way, Mata Hari is also the son of Dodoi, the second orangutan I saved.

It changed my life and today I am raising nearly 1,000 babies at my two centers.

(Applause.) No, no, no.

It's terrible. That's proof that we couldn't save them from the wild.

that's not good.

This is just proof that everyone isn't doing it right.

There are more orangutans than all orangutans in all zoos in the world, and six have just disappeared from the forest, like all baby victims.

Deforestation of oil palms, in particular, to supply biofuels to the West contributes to these problems.

And they are peat swamp forests, over 20 meters of peat, the largest accumulation of organic matter in the world.

Opening it up for oil palm cultivation resulted in the formation of a CO2 volcano that emits massive amounts of CO2, making our country now the third largest emitter of greenhouse gases in the world after China and the United States.

And we have no industry at all. It's all because of deforestation.

And these are terrifying images.

I'm not going to talk about it too long, but there are a lot of youth families who aren't so lucky to live in the woods who still have to go through that process.

And I don't know where to put it anymore.

So I decided that I needed to come up with a solution for her, but at the same time I needed to come up with a solution that would also benefit those who are exploiting the forest for the last timber, and thus causing habitat loss and all the victims.

So I created a place called Samboja Lestari. The idea was that if we could do this in the worst possible place where there really was nothing left, there would be no excuse for anyone to say "yeah, but...".

No, everyone should be able to follow this.

So we are in East Borneo. This is my starting point.

As you can see, there is only yellow terrain.

There is nothing left, only a little grass left.

In 2002, about 50 percent of the people there were unemployed.

There was a huge amount of crime.

People spent a lot of money on health issues and drinking water.

There was no agricultural productivity left.

This was the poorest neighborhood in the entire state and the wildlife was completely extinct.

It was like a biological desert here.

When I'm standing there in the grass, I can't even hear the insects, only the rippling grass is hot.

Yet, four years later, we have created about 3,000 jobs.

The climate has changed. I'll tell you, no more floods and no more fires.

It is no longer one of the poorest districts, and biodiversity is highly developed.

We have more than 1,000 types. There are currently 137 species of birds.

We have 30 species of reptiles.

So what happened here? We have caused a massive economic failure in this forest.

So basically the whole process of destruction was a little slower than what's happening with oil palms today.

But we also saw the same.

We were doing slash-and-burn farming. People can't afford fertilizer, so they burn wood to get minerals from it. Fires will become more frequent, and after a while there will be no more fertile land.

There are no more trees left.

And yet, in this place, in this meadow where you can see our first office on the hill, four years later, on the surface of the earth, there is this green blob...

(Applause.) And there are all these animals, all these people are happy, and there is this economic value.

So how is that possible?

It was very simple. If you look at the steps, we bought the land, dealt with the fires, and then started planting trees using a combination of agriculture and forestry.

Only then set up infrastructure, management and money.

But we have ensured that the local people are fully involved every step of the way so that no outside force can interfere with it.

People will be the guardians of the forest.

We therefore practice the principle of “People, Profit, Planet”, but in addition to our sound legal status. Because when the forest belongs to the state, people say, "It's mine, it's everyone's."

And we apply all the other principles such as transparency, professional control, measurable results, scalability and [unclear].

What we did was formulate a recipe, a way to get from a starting situation with nothing to a goal situation.

Create recipes based on factors you control, such as skill, fertilizer, and plant selection.

Then look at the output and start measuring what you get.

This recipe also includes a cost.

You can also see how much manpower you need.

If you can drop this recipe onto sandy, clay, steep, and flat maps, you've placed those different recipes. Combining them, out of which comes a business plan, a work plan, which can be optimized for the amount of labor and fertilizer available and can be executed.

Actually doing it is like this. I have grass that I want to remove.

A compound like [Opaque] oozes out from the roots.

Acacia trees are of very low value, but they are necessary for restoring the microclimate, protecting the soil and removing grass.

And eight years later, we might actually be able to harvest the timber—that is, even the bamboo bark, if preserved properly.

This is an old Japanese temple construction technique, but bamboo is very vulnerable to fire.

So if you plant it first, the risk of losing everything again is very high.

So we later plant along the waterways to filter the water and provide the raw product when the wood is available.

So the idea is, over time, using limited means, how do we integrate these currents in space?

So we plant trees and in between we plant pineapples, beans and ginger to reduce competition for trees and crops. Organic material not only benefits crops and people, it also benefits trees. Farmers have free land, the system provides early income, orangutans have access to healthy food, and it can also speed up ecosystem regeneration while saving money.

so beautiful. What a theory!

But is it really that easy?

it's not. Because if you look at what happened in 1998, there was a fire.

This is an area of ​​about 50 million hectares.

January.

February.

March.

April.

May.

We lost 5.5 million hectares in just a few months.

Because there are 10,000 underground fires here in Pennsylvania that are happening here in the United States.

And when the soil dries out, we enter the dry season. Cracks come in, oxygen comes in, flames come out, and the problem starts again.

So how do you break that cycle?

Fire is the biggest problem.

It was like this for 3 months.

It was so dark that the automatic lights outside didn't turn off for 3 months.

We lost all our crops. No child gained weight for more than 1 year. They lost 12 IQ points. It was a disaster for the orangutans and the people.

So those fires are really the first thing to tackle.

That's why I put it there as one point.

And for that we need locals. Because once these grasslands begin to burn... they pass like a storm, and the first rainfall loses the last ash and nutrients again, and flows into the sea, destroying the reefs there.

That's why we have to work with the locals.

This is a short-term solution, but we also need a long-term solution.

So what we did is create a ring of sugar palms around that area.

These sugar palms have been found to be fire resistant and, by the way, flood tolerant, and bring a great deal of income to the local people.

Here's how it looks. People have to hit just 1-millimeter slices twice a day. And all you can harvest is sugar water, carbon dioxide, rainfall, and a little sun.

In principle, make these trees biological solar cells.

And so much energy can be produced from it. It is available every day and produces three times more energy per hectare per year.

No need to harvest [Unintelligible] or any other crop.

This is a combination that has all the untapped genetic potential of the tropics and does it with technology.

But the legal aspects also need to be very well put in place.

So we bought the land and this is where the project started off the beaten path.

If you zoom in a bit, you can see that the entire area is divided into strips on top of different types of soil. We were actually monitoring and measuring all these 2,000 hectares, 5,000 acres of trees.

And this forest is completely different.

What I actually did was just follow nature, and nature knows no monoculture, but natural forests are multi-layered.

This means that we can make better use of the available light, store more carbon in the system, and provide more functionality, both above and below the surface.

But it's even more complicated. It's not that simple and you have to work with people.

So, just like nature, we grow fast-growing trees, under which we grow very diverse, slow-growing primary-grain trees that make optimal use of the light. Then, just as importantly, place the appropriate fungi growing on its leaves there to return nutrients to the roots of the tree that has just dropped its leaves within 24 hours.

And they become something of a nutrient pump.

Bacteria are required to fix nitrogen, and without these microbes there is no performance at all.

And we started planting trees - just 1,000 trees a day.

I could have planted more plants, but I wanted to stabilize the number of jobs, so I didn't.

We didn't want to lose the people who work on that plantation.

And we do a lot of work here.

We use indicator plants to find out what kind of soil we have here, what vegetables grow, and what trees grow.

And we've been monitoring those trees one by one from space.

Here's how it actually looks. Around this irregular ring is a 100-meter-wide strip of sugar palm trees that can provide income for 648 households.

It's just part of the area.

Nursery school here is very different.

If you look at the number of tree species in Europe, for example from the Urals to England, can you tell how many there are?

165.

This nursery increases the number of seeds tenfold.

Can you imagine?

You have to know what you're working on, and that diversity is what makes it work.

It is possible to recover from this zero situation by planting vegetables and trees in the grass there, directly planting trees, setting up buffer zones, producing compost, etc. so that there are crops available at every stage of the growing forest.

At first, it may be pineapple, beans and corn. The second phase features bananas and papaya. Then comes the chocolate and chillies.

And slowly, trees begin to take over, bringing crops from fruit, wood and firewood.

And finally, sugar palm forests take over, providing people with a permanent income.

Underneath the green streak on the top left you can see some white dots. These are actually individual pineapple plants visible from space.

And in that area they began to grow the acacia trees we saw earlier.

So this is one year later.

And this is two years later.

And it's green. From the tower, it's time to start attacking the grass.

We plant a mix of bananas, papaya, all the crops and seedlings made for the locals, while the trees in between are also growing rapidly.

And three years later, there are 137 species of birds here.

(Applause) So we lowered the temperature by 3 to 5 degrees.

The air humidity has increased by 10%.

Cloud cover is increasing. I'll show you.

It's raining more.

And all these seeds and income.

The ecolodge I built here three years ago was an empty yellow field.

This transponder, which we operate in cooperation with the European Space Agency, gives us the advantage of taking pictures of every satellite that comes in for calibration.

These photos are used to analyze the amount of carbon and how the forest is developing, and together we can monitor all the trees using satellite imagery.

With these data, we can now provide recipes and the same technology to other regions.

In fact, Google Earth already does that.

With a little bit of technology and a tracker on your truck, combined with Google Earth, you could directly see which palm oil is being sustainably produced, which companies are stealing the wood, and you could save far more carbon dioxide than any of the energy savings here.

This is the Samboja Lestari district.

Not only can we measure how trees grow back, but we can also measure how biodiversity comes back.

And biodiversity is an indicator of how much water is in balance and how many medicines can be stored here.

And finally, I was able to put it in the rain machine. Because this forest produces its own rain.

The nearby city of Balikpapan has big problems with water. It is 80 percent surrounded by seawater, and now there are many intruders there.

Now we looked at the clouds above this forest. We observed planted areas, semi-open areas, and open areas.

And look at these images.

I will try it soon.

In the tropics, raindrops do not form from ice crystals as they do in temperate zones. Requires a tree with an [opaque] chemical coming out of the leaves of the tree that produces raindrops.

In other words, it creates a cool place for clouds to accumulate, and produces trees that bring rain.

And look, the clouds have increased by 11.2% - it's been three years already.

If you look at the rainfall, it had already increased by 20 percent at that point.

Looking ahead to next year, we can see that trend continuing.

Initially, the upper limit of rainfall was small, but now the upper limit is wider and higher.

Rainfall patterns above Samboja Lestari show that what was once the driest place is now consistently forming rain peaks.

So you can actually change the climate.

Of course, that effect disappears when the trade winds are blowing, but then as soon as the wind stabilizes, we see the precipitation peaks returning over the region again.

Therefore, it is not correct to say that we are hopeless. Because integrating different technologies can really make the difference.

It's great to have science, but it still mostly depends on people and education.

We have a farm school.

But the real success, of course, is our band. When the baby is born, we perform, so everyone is our family and we don't have to make trouble with the family.

It looks like this.

There is this road that goes around the area and brings electricity and water from our area to people.

There is a zone planted with sugar palm trees and a fence surrounded by very prickly palm trees to protect the orangutans and we provide a place to live in the middle of it and separate people.

And inside that is this area for planting trees as a gene bank to keep all the material alive. This is because not a single tropical hardwood seedling has grown in the last 12 years because the climate factor has disappeared.

All the seeds are eaten.

So now we are doing surveillance inside towers, satellites, ultralights, etc.

Each family that sells the land gets it back.

And there are two nice tropical hardwood fences. Plant the shade trees in the first year, then underplant the sugar palms, and then this thorny fence.

And after a few years you can remove some of those shade trees.

People can get the acacia wood that we have preserved along with the bamboo bark so they can build houses on it and they have firewood to cook with.

And they can start producing from that tree as many times as they want.

They earn enough to support a family of three.

But whatever you do with that program, it has to be fully supported by people. That means we also need to align it with local cultural values.

There is no one simple recipe in one place.

We also need to make sure that it is very difficult to break, i.e. transparent.

Like here, Samboja Lestari divides its circle into groups of 20 families.

If one member violates the agreement and cuts down a tree, the other 19 members must decide what happens to that person.

If this group doesn't take action, the other 33 groups will have to decide what happens to those who don't follow the great deals we offer.

In North Sulawesi it is a cooperative. There is a democratic culture there, where they can use the local justice system to defend their system.

In summary, in the first year people can sell their land for income, but get back their jobs such as construction, planting trees, working with orangutans, and use scrap wood to make handicrafts.

They also get free land among the trees where they can grow crops.

They are now able to sell some of those fruits to the Orangutan Project.

They can get contracts to sell housing building materials and sugar, so we can produce a lot of ethanol and energy locally.

They benefit from everything else, including environmental, financial, and educational benefits. This is a very big deal.

And it's all based on that one thing. Let the forest remain there.

So if we want to help the orangutans, which I actually tried to do, we have to make sure that the local people benefit.

Now, I think the real key to making that happen is integration, the short answer.

If you want to know more, read on.

(applause)

As an actor, I receive a script, say the lines according to the script, and it's my job to bring characters written by others to life.

Throughout my career so far, I have had the great honor of playing the role model of the greatest man ever represented on television.

You may recognize me as "Male Escort #1".

(laughs) 'Photographer Date Rapist', 'Shirtless Date Rapist' from the award winning 'Spring Break Shark Attack'.

(Laughter) “Shirtless Medical Student,” “Shirtless Steroid Scammer,” and my most famous role, Raphael.

(Applause.) A brooding reformed playboy who, above all, falls in love with a virgin and only occasionally goes shirtless.

(Laughter) Now, these roles don't represent the type of man in my real life, but that's what I love about acting.

I end up living in a character that is completely different from myself.

But every time I was entrusted with these roles, I was amazed. Because most of the men I play exude masculinity, charisma and power. And when I look in the mirror, that's not how I see myself.

But that's how Hollywood sees me, and over time I've noticed similarities between the roles I play as a man on screen and off screen.

All my life I pretended I wasn't a man.

I have pretended to be strong when I felt weak, confident when I felt insecure, and tough when I was really hurt.

Most of the time I think I'm just putting on a show, but I got tired of performing.

And all I can say now is that it's exhausting trying to be good enough for everyone all the time.

Now -- right?

(laughs) My brother heard that.

Now, for as long as I can remember, I've been told this is how I should grow up.

As a boy, all I wanted was to be accepted and liked by other boys. But that acceptance meant I had to develop an almost repulsive view of femininity. And since I was taught that femininity was the opposite of masculinity, I had to either refuse to embody any of these qualities, or face rejection myself.

Here is the script given to us.

right? Girls are weak, boys are strong.

This is something that is subconsciously passed down to hundreds of millions of young boys and girls around the world, as I am.

Well, I'm here today to say, as a human being, that this is wrong, this is harmful, and this must end.

(Applause.) Now, I'm not here to give a history class.

We all probably know how we got here, okay?

But I am just a man who woke up 30 years later and found myself living in a state of conflict, in conflict with myself that I feel at my core, and with who the world is telling me, as a man, to be.

But I don't just want to be a good guy, so I don't want to fit the currently broken definition of masculinity.

I want to be a good person

And I believe the only way that can happen is if men learn not only to embrace the qualities they have been told are feminine in themselves, but also to stand up willingly and champion and learn from the women who embody them.

Now, men -- (laughter) I'm not saying that everything we learn is harmful. OK?

I'm not saying there's something inherently wrong with you or me and men, I'm not saying I have to stop being a man.

But you need balance, right?

We need a balance, and the only way things can change is to really honestly look at the scripts that have been passed down from generation to generation and the roles we, as men, choose to take on in our daily lives.

Speaking of scripts, the first script I got was from my father.

my dad is amazing

He is loving, kind, sensitive, caring and here to stay.

(Applause.) He's crying.

(Laughter) But I'm sorry, Dad, when I was a kid, I resented him for that. Because I thought it was my father's fault that made me soft. That was not welcome in the small Oregon town we moved to.

Because being kind meant being bullied.

My father was not traditionally masculine, so he never taught me how to use my hands.

He never taught me how to hunt, how to fight, or how to be human.

Instead he told me what he knew. Being a man means making sacrifices, taking care of your family, and doing everything you can to support your family.

But there was another role that I learned how to play from my father. I learned it from my father, who was a state senator and had to work night shifts as a janitor in his later years to support his family, but he never told anyone.

Its role was to suffer in secret.

And now, three generations later, I realize I'm in that role too.

So why couldn't my grandfather reach out to other men for help?

Why does my father still think he has to do everything himself?

I know a man who would rather die than tell other people how hurt he is.

But it's not because we're all just strong silence types.

it's not. Most of us men are very good at making friends and telling the truth.

(Laughter) I have no problem sharing my opinion if it's about work, sports, politics, women, but when it's about my insecurities, my struggles, my fear of failure, I almost feel paralyzed.

At least I think so.

So some of the ways I have practiced to get out of this behavior is to create experiences that force me to be vulnerable.

So if anything in my life is embarrassing, I practice diving straight in, no matter how scary it may be, sometimes even in public.

Because in doing so I take away that power, and in some cases my expression of weakness may give others permission to do the same.

As an example, not long ago I was dealing with an issue in my life and knew I needed to talk to my guys about it, but I knew I had to get my guys out of town for three days because they were judging me, seeing me as weak, and being paralyzed by fear that I would lose my position as leader — (laughter) just to open up. And what do you think?

It wasn't until the third day was over that I finally found the strength to tell them about what I was going through.

But when I did, something amazing happened.

My peers were also struggling, so I realized I wasn't alone.

And it disappeared as soon as I found the strength and courage to share my shame.

Now, I've learned over time that if you want to practice vulnerability, you have to build yourself a system of accountability.

So I'm really blessed as an actor.

I've built a really great fan base. Really, really kind and enthusiastic. So, I decided to use my social platform as a kind of Trojan horse that I could practice trust and vulnerability on a daily basis.

The reaction was incredible.

It was positive and heartwarming.

I receive a lot of love, press and positive messages every day.

But it's all from a specific stratum: women.

(Laughter) This is true.

Why are only women following me?

where are the men

(laughs) I posted this photo about a year ago.

Well, then I was scrolling through some comments and noticed that one of my female fans tagged her boyfriend in a photo, and her boyfriend said, "Stop tagging me on gay shit.

THX。"

(Laughter.) As if being gay degrades you as a man, right?

So I took a deep breath and replied.

I said very politely that I was just curious as I was on a quest for masculinity and wanted to know why my love for my wife was considered gay shit.

And I said, honestly, I just wanted to learn.

(Laughter) Well, he replied right away.

I thought he was going to take his anger out on me, but instead he apologized.

He told me how, as an adult, public displays of affection were despised.

He told me how he struggled and struggled with his ego, how much he loved his girlfriend, and how grateful she was for her patience.

And a few weeks later he messaged me again.

This time he sent me a picture of him proposing on one knee.

(Applause.) And all he said was, "Thank you."

I was this guy

have understood.

You see, in public he was just playing his part, rejecting his femininity, right?

But he secretly awaited permission to express himself, to be seen and heard. All he needed was another man to hold him accountable and create a safe place for him to feel. And the change happened instantly.

I loved this experience. It taught me that change is possible, even through direct messages.

So I thought about how I could reach more men, but of course no one followed me.

(Laughter) So I experimented.

I started posting more stereotypically masculine stuff -- (laughter) challenging workouts, meal plans, journeys to heal after injuries, and so on.

And what do you think happened?

Men started writing to me.

And then suddenly, for the first time in my career, a men's fitness magazine called me and said they wanted to honor me as one of the game changers.

(Laughter) Was it really game-changing?

Or is it just adapting?

And voila, that's the problem.

It's totally cool that men follow me when I'm talking about guys and when I conform to gender norms.

But when I talk about how much I love my wife or my daughter or my 10-day-old son, how I believe marriage is difficult but beautiful, how as a man I struggle with body dysmorphic disorder, or how I promote gender equality, only women show up.

where are the men

So men, men, men, men!

(Applause.) Okay.

As adults, we tend to challenge each other.

We must be the toughest, strongest, bravest men we can be.

And for many of us, myself included, our identity ultimately hinges on whether we feel like we're man enough.

But men love a challenge, so I have a challenge for all men.

(Laughter.) Let me see if you can tap into the same qualities that make you feel like a man and dig deeper into yourself.

Can you redefine your strength, your courage, your toughness, what they mean, and use them to search our hearts?

Are you brave enough to be vulnerable?

How to contact other men when you need help?

How to dig into your own shame first?

Are you strong enough to cry even when you look weak?

Are you confident enough to listen to the women in your life?

Want to hear their ideas and solutions?

Can you bear their pain and actually believe them, even if what they say is against you?

And are you man enough to stand up to other men when you hear stories of sexual harassment, when you hear "locker room stories"?

When you hear your sons talk about grabbing her butt or getting her drunk, would you actually stand up and do something so that one day we don't have to live in a world where women have to risk everything and come forward with the word "me too"?

(Applause.) This is a big deal.

I honestly had to face how I've unwittingly hurt women, and it's ugly.

My wife said I did something that hurt her and didn't correct it.

Basically, when she went to talk sometimes, whether at home or in public, I would cut her off and finish her thoughts.

It sucks.

The worst part was that I didn't even realize I was doing it.

it was unconscious.

So while I'm doing my part here, trying to spread the voices of women around the world to be feminist, at home I'm using my voice to silence the woman I love the most.

So I had to ask myself a tough question. Am I good enough to just shut up and listen?

(Laughter) (Applause) I have to be honest. I wish there had been no applause.

(Laughter) Guys, this is true.

And we've only scratched the surface here. Because the deeper you go, the uglier it gets, I assure you.

No time for porn, violence against women, housework sharing, or the gender pay gap.

But I believe it is time, as men, to step beyond our privileges and start recognizing that we are not only part of the problem.

Guys, we are the problem.

The glass ceiling exists because we put it there, and words are no longer enough if we want to be part of the solution.

There is a favorite quote I grew up reading from Bahá'í writings.

“There are two wings in the human world: male and female.

If the strength of these two wings are not equal, the bird cannot fly. ”

So ladies and gentlemen, on behalf of men all over the world who feel the same as I do, please forgive me for any points where we did not rely on your strength.

And this time, we would like to formally ask you to support us, as we cannot do this alone.

we are men It's going to be a mess.

we're going to say the wrong thing I'm tone deaf.

Perhaps we will piss you off.

But don't lose hope.

We are only here because of you guys. Like you, we as men need to stand up and stand by you as you fight just about anything.

We need your help to celebrate our weaknesses and be patient with us as we make this very long journey from head to heart.

And finally to parents: instead of teaching our children to be brave boys and pretty girls, can we teach them how to be good people?

So back to my father.

As I grew up, yes, like any boy, I had my share of problems, but now I realize that I am able to stand here and talk to you in part because of his sensitivity and heart intelligence.

I now know that the resentment I held against my father had nothing to do with him.

It was all about myself and my desire to be accepted and play roles that were never meant for me.

So my father may not have taught me how to use my hands, but he taught me how to use my mind. That's what makes him more manly to me than anything else.

thank you.

(applause)

Trees are a wonderful arena for discovery because of their tall stature, intricate structures, the biodiversity they foster, and the tranquil beauty they provide.

I used to always climb trees, but now as an adult I have made it my profession to understand trees and forests through science.

The most mysterious part of the forest is the upper canopy.