**How Language Transformed Humanity**

Select language

00:11 Each of you possesses the most powerful, dangerous and subversive trait that natural selection has ever devised. It's a piece of neural audio technology for rewiring other people's minds. I'm talking about your language, of course, because it allows you to implant a thought from your mind directly into someone else's mind, and they can attempt to do the same to you, without either of you having to perform surgery. Instead, when you speak, you're actually using a form of telemetry not so different from the remote control device for your television. It's just that, whereas that device relies on pulses of infrared light, your language relies on pulses, discrete pulses, of sound.

00:55 And just as you use the remote control device to alter the internal settings of your television to suit your mood, you use your language to alter the settings inside someone else's brain to suit your interests. Languages are genes talking, getting things that they want. And just imagine the sense of wonder in a baby when it first discovers that, merely by uttering a sound, it can get objects to move across a room as if by magic, and maybe even into its mouth.

01:25 Now language's subversive power has been recognized throughout the ages in censorship, in books you can't read, phrases you can't use and words you can't say. In fact, the Tower of Babel story in the Bible is a fable and warning about the power of language. According to that story, early humans developed the conceit that, by using their language to work together, they could build a tower that would take them all the way to heaven. Now God, angered at this attempt to usurp his power, destroyed the tower, and then to ensure that it would never be rebuilt, he scattered the people by giving them different languages -- confused them by giving them different languages. And this leads to the wonderful irony that our languages exist to prevent us from communicating. Even today, we know that there are words we cannot use, phrases we cannot say, because if we do so, we might be accosted, jailed, or even killed. And all of this from a puff of air emanating from our mouths.

02:29 Now all this fuss about a single one of our traits tells us there's something worth explaining. And that is how and why did this remarkable trait evolve, and why did it evolve only in our species? Now it's a little bit of a surprise that to get an answer to that question, we have to go to tool use in the chimpanzees. Now these chimpanzees are using tools, and we take that as a sign of their intelligence. But if they really were intelligent, why would they use a stick to extract termites from the ground rather than a shovel? And if they really were intelligent, why would they crack open nuts with a rock? Why wouldn't they just go to a shop and buy a bag of nuts that somebody else had already cracked open for them? Why not? I mean, that's what we do.

03:15 Now the reason the chimpanzees don't do that is that they lack what psychologists and anthropologists call social learning. They seem to lack the ability to learn from others by copying or imitating or simply watching. As a result, they can't improve on others' ideas or learn from others' mistakes -- benefit from others' wisdom. And so they just do the same thing over and over and over again. In fact, we could go away for a million years and come back and these chimpanzees would be doing the same thing with the same sticks for the termites and the same rocks to crack open the nuts.

03:54 Now this may sound arrogant, or even full of hubris. How do we know this? Because this is exactly what our ancestors, the Homo erectus, did. These upright apes evolved on the African savanna about two million years ago, and they made these splendid hand axes that fit wonderfully into your hands. But if we look at the fossil record, we see that they made the same hand axe over and over and over again for one million years. You can follow it through the fossil record. Now if we make some guesses about how long Homo erectus lived, what their generation time was, that's about 40,000 generations of parents to offspring, and other individuals watching, in which that hand axe didn't change. It's not even clear that our very close genetic relatives, the Neanderthals, had social learning. Sure enough, their tools were more complicated than those of Homo erectus, but they too showed very little change over the 300,000 years or so that those species, the Neanderthals, lived in Eurasia.

04:55 Okay, so what this tells us is that, contrary to the old adage, "monkey see, monkey do," the surprise really is that all of the other animals really cannot do that -- at least not very much. And even this picture has the suspicious taint of being rigged about it -- something from a Barnum & Bailey circus.

05:17 But by comparison, we can learn. We can learn by watching other people and copying or imitating what they can do. We can then choose, from among a range of options, the best one. We can benefit from others' ideas. We can build on their wisdom. And as a result, our ideas do accumulate, and our technology progresses. And this cumulative cultural adaptation, as anthropologists call this accumulation of ideas, is responsible for everything around you in your bustling and teeming everyday lives. I mean the world has changed out of all proportion to what we would recognize even 1,000 or 2,000 years ago. And all of this because of cumulative cultural adaptation. The chairs you're sitting in, the lights in this auditorium, my microphone, the iPads and iPods that you carry around with you -- all are a result of cumulative cultural adaptation.

06:16 Now to many commentators, cumulative cultural adaptation, or social learning, is job done, end of story. Our species can make stuff, therefore we prospered in a way that no other species has. In fact, we can even make the "stuff of life" -- as I just said, all the stuff around us. But in fact, it turns out that some time around 200,000 years ago, when our species first arose and acquired social learning, that this was really the beginning of our story, not the end of our story. Because our acquisition of social learning would create a social and evolutionary dilemma, the resolution of which, it's fair to say, would determine not only the future course of our psychology, but the future course of the entire world. And most importantly for this, it'll tell us why we have language.

07:11 And the reason that dilemma arose is, it turns out, that social learning is visual theft. If I can learn by watching you, I can steal your best ideas, and I can benefit from your efforts, without having to put in the time and energy that you did into developing them. If I can watch which lure you use to catch a fish, or I can watch how you flake your hand axe to make it better, or if I follow you secretly to your mushroom patch, I can benefit from your knowledge and wisdom and skills, and maybe even catch that fish before you do. Social learning really is visual theft. And in any species that acquired it, it would behoove you to hide your best ideas, lest somebody steal them from you.

07:58 And so some time around 200,000 years ago, our species confronted this crisis. And we really had only two options for dealing with the conflicts that visual theft would bring. One of those options was that we could have retreated into small family groups. Because then the benefits of our ideas and knowledge would flow just to our relatives. Had we chosen this option, sometime around 200,000 years ago, we would probably still be living like the Neanderthals were when we first entered Europe 40,000 years ago. And this is because in small groups there are fewer ideas, there are fewer innovations. And small groups are more prone to accidents and bad luck. So if we'd chosen that path, our evolutionary path would have led into the forest -- and been a short one indeed.

08:49 The other option we could choose was to develop the systems of communication that would allow us to share ideas and to cooperate amongst others. Choosing this option would mean that a vastly greater fund of accumulated knowledge and wisdom would become available to any one individual than would ever arise from within an individual family or an individual person on their own. Well, we chose the second option, and language is the result.

09:20 Language evolved to solve the crisis of visual theft. Language is a piece of social technology for enhancing the benefits of cooperation -- for reaching agreements, for striking deals and for coordinating our activities. And you can see that, in a developing society that was beginning to acquire language, not having language would be a like a bird without wings. Just as wings open up this sphere of air for birds to exploit, language opened up the sphere of cooperation for humans to exploit. And we take this utterly for granted, because we're a species that is so at home with language,

09:59 but you have to realize that even the simplest acts of exchange that we engage in are utterly dependent upon language. And to see why, consider two scenarios from early in our evolution. Let's imagine that you are really good at making arrowheads, but you're hopeless at making the wooden shafts with the flight feathers attached. Two other people you know are very good at making the wooden shafts, but they're hopeless at making the arrowheads. So what you do is -- one of those people has not really acquired language yet. And let's pretend the other one is good at language skills.

10:34 So what you do one day is you take a pile of arrowheads, and you walk up to the one that can't speak very well, and you put the arrowheads down in front of him, hoping that he'll get the idea that you want to trade your arrowheads for finished arrows. But he looks at the pile of arrowheads, thinks they're a gift, picks them up, smiles and walks off. Now you pursue this guy, gesticulating. A scuffle ensues and you get stabbed with one of your own arrowheads. Okay, now replay this scene now, and you're approaching the one who has language. You put down your arrowheads and say, "I'd like to trade these arrowheads for finished arrows. I'll split you 50/50." The other one says, "Fine. Looks good to me. We'll do that." Now the job is done.

11:14 Once we have language, we can put our ideas together and cooperate to have a prosperity that we couldn't have before we acquired it. And this is why our species has prospered around the world while the rest of the animals sit behind bars in zoos, languishing. That's why we build space shuttles and cathedrals while the rest of the world sticks sticks into the ground to extract termites. All right, if this view of language and its value in solving the crisis of visual theft is true, any species that acquires it should show an explosion of creativity and prosperity. And this is exactly what the archeological record shows.

11:55 If you look at our ancestors, the Neanderthals and the Homo erectus, our immediate ancestors, they're confined to small regions of the world. But when our species arose about 200,000 years ago, sometime after that we quickly walked out of Africa and spread around the entire world, occupying nearly every habitat on Earth. Now whereas other species are confined to places that their genes adapt them to, with social learning and language, we could transform the environment to suit our needs. And so we prospered in a way that no other animal has. Language really is the most potent trait that has ever evolved. It is the most valuable trait we have for converting new lands and resources into more people and their genes that natural selection has ever devised.

12:49 Language really is the voice of our genes. Now having evolved language, though, we did something peculiar, even bizarre. As we spread out around the world, we developed thousands of different languages. Currently, there are about seven or 8,000 different languages spoken on Earth. Now you might say, well, this is just natural. As we diverge, our languages are naturally going to diverge. But the real puzzle and irony is that the greatest density of different languages on Earth is found where people are most tightly packed together.

13:23 If we go to the island of Papua New Guinea, we can find about 800 to 1,000 distinct human languages, different human languages, spoken on that island alone. There are places on that island where you can encounter a new language every two or three miles. Now, incredible as this sounds, I once met a Papuan man, and I asked him if this could possibly be true. And he said to me, "Oh no. They're far closer together than that." And it's true; there are places on that island where you can encounter a new language in under a mile. And this is also true of some remote oceanic islands.

13:59 And so it seems that we use our language, not just to cooperate, but to draw rings around our cooperative groups and to establish identities, and perhaps to protect our knowledge and wisdom and skills from eavesdropping from outside. And we know this because when we study different language groups and associate them with their cultures, we see that different languages slow the flow of ideas between groups. They slow the flow of technologies. And they even slow the flow of genes. Now I can't speak for you, but it seems to be the case that we don't have sex with people we can't talk to. (Laughter) Now we have to counter that, though, against the evidence we've heard that we might have had some rather distasteful genetic dalliances with the Neanderthals and the Denisovans.

14:50 (Laughter)

14:52 Okay, this tendency we have, this seemingly natural tendency we have, towards isolation, towards keeping to ourselves, crashes head first into our modern world. This remarkable image is not a map of the world. In fact, it's a map of Facebook friendship links. And when you plot those friendship links by their latitude and longitude, it literally draws a map of the world. Our modern world is communicating with itself and with each other more than it has at any time in its past. And that communication, that connectivity around the world, that globalization now raises a burden. Because these different languages impose a barrier, as we've just seen, to the transfer of goods and ideas and technologies and wisdom. And they impose a barrier to cooperation.

15:44 And nowhere do we see that more clearly than in the European Union, whose 27 member countries speak 23 official languages. The European Union is now spending over one billion euros annually translating among their 23 official languages. That's something on the order of 1.45 billion U.S. dollars on translation costs alone. Now think of the absurdity of this situation. If 27 individuals from those 27 member states sat around table, speaking their 23 languages, some very simple mathematics will tell you that you need an army of 253 translators to anticipate all the pairwise possibilities. The European Union employs a permanent staff of about 2,500 translators. And in 2007 alone -- and I'm sure there are more recent figures -- something on the order of 1.3 million pages were translated into English alone.

16:45 And so if language really is the solution to the crisis of visual theft, if language really is the conduit of our cooperation, the technology that our species derived to promote the free flow and exchange of ideas, in our modern world, we confront a question. And that question is whether in this modern, globalized world we can really afford to have all these different languages.

17:13 To put it this way, nature knows no other circumstance in which functionally equivalent traits coexist. One of them always drives the other extinct. And we see this in the inexorable march towards standardization. There are lots and lots of ways of measuring things -- weighing them and measuring their length -- but the metric system is winning. There are lots and lots of ways of measuring time, but a really bizarre base 60 system known as hours and minutes and seconds is nearly universal around the world. There are many, many ways of imprinting CDs or DVDs, but those are all being standardized as well. And you can probably think of many, many more in your own everyday lives.

17:58 And so our modern world now is confronting us with a dilemma. And it's the dilemma that this Chinese man faces, who's language is spoken by more people in the world than any other single language, and yet he is sitting at his blackboard, converting Chinese phrases into English language phrases. And what this does is it raises the possibility to us that in a world in which we want to promote cooperation and exchange, and in a world that might be dependent more than ever before on cooperation to maintain and enhance our levels of prosperity, his actions suggest to us it might be inevitable that we have to confront the idea that our destiny is to be one world with one language.

18:47 Thank you.

18:49 (Applause)

18:57 Matt Ridley: Mark, one question. Svante found that the FOXP2 gene, which seems to be associated with language, was also shared in the same form in Neanderthals as us. Do we have any idea how we could have defeated Neanderthals if they also had language?

19:14 Mark Pagel: This is a very good question. So many of you will be familiar with the idea that there's this gene called FOXP2 that seems to be implicated in some ways in the fine motor control that's associated with language. The reason why I don't believe that tells us that the Neanderthals had language is -- here's a simple analogy: Ferraris are cars that have engines. My car has an engine, but it's not a Ferrari. Now the simple answer then is that genes alone don't, all by themselves, determine the outcome of very complicated things like language. What we know about this FOXP2 and Neanderthals is that they may have had fine motor control of their mouths -- who knows. But that doesn't tell us they necessarily had language.

19:55 MR: Thank you very much indeed.

19:57 (Applause)