

The biology of our best and worst selves | Robert Sapolsky | TED

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00:00:12 — So look, Robert spent the last few years thinking about how weird human behavior is, and how inadequate most of our language trying to explain it is. And it's very exciting to hear him explain some of the thinking behind it in public for the first time. Over to you now, Robert Sapolsky.

Robert Sapolsky

00:00:35 — Thank you. The fantasy always runs something like this: I've overpowered his elite guard, burst into his secret bunker with my machine gun ready. He lunges for his Luger. I knock it out of his hand. He lunges for his cyanide pill. I knock that out of his hand. He snarls, comes at me with otherworldly strength. We grapple, we fight. I manage to pin him down and put on handcuffs.

00:01:03 — "Adolf Hitler," I say. "I arrest you for crimes against humanity." Here's where the Medal of Honor version of the fantasy ends, and the imagery darkens. What would I do if I had Hitler? And it's not hard to imagine once I allow myself. Sever his spine at the neck, take out his eyes with a blunt instrument, puncture his eardrums, cut out his tongue, leave him alive on a respirator, tube-fed, not able to speak or move or see or hear, just to feel. And then inject him with something cancerous that's going to fester and pustulate until every cell in his body is screaming in agony, until every second feels like an eternity in hell. That's what I would do to Hitler. I've had this fantasy since I was a kid, still do sometimes, and when I do, my heart speeds up.

00:01:59 — All these plans for the most evil, wicked soul in history. But there's a problem, which is, I don't actually believe in souls or evil, and I think wicked belongs in a musical. But there's some people I would like to see killed. But I'm against the death penalty. But I like schlocky, violent movies. But I'm for strict gun control. But then there was a time I was at a laser tag place, and I had such a good time hiding in a corner shooting at people.

00:02:27 — In other words, I'm your basic confused human when it comes to violence. Now as a species, we obviously have problems with violence. We use shower heads to deliver poison gas, letters with anthrax, airplanes as weapons, mass rape as a military strategy. We're a miserably violent species. But there's a complication, which is we don't hate violence. We hate the wrong kind. And when it's the right kind, we cheer it on, we hand out medals, we vote for, we mate with our champions of it.

00:03:00 — When it's the right kind of violence, we love it. And there's another complication, which is, in addition to us being this miserably violent species,

we're also this extraordinarily altruistic, compassionate one. So how do you make sense of the biology of our best behaviors, our worst ones, and all of those ambiguously in between. Now for starters, what's totally boring is understanding the motoric aspects of the behavior.

00:03:28 — Your brain tells your spine, tells your muscles to do something or other and hooray you've behaved. What's hard is understanding the meaning of the behavior, because in some settings pulling a trigger is an appalling act, in others it's heroically self-sacrificial, in some settings putting your hand on someone else's is deeply compassionate, it and others, it's a deep betrayal. The challenge is to understand the biology of the context of our behaviors.

00:03:56 — And that's real tough. One thing that's clear, though, is you're not going to get anywhere if you think there's going to be the brain region, or the hormone, or the gene, or the childhood experience, or the evolutionary mechanism that explains everything. Instead, every bit of behavior has multiple levels of causality. Let's look at an example. You have a gun. There's a crisis going on, rioting, violence, people running around.

00:04:27 — A stranger is running at you in an agitated state. You can't quite tell if the expression is frightened, threatening, angry, holding something that kind of looks like a handgun. You're not sure. The stranger comes running at you, and you pull the trigger. And it turns out that thing in this person's hand was a cell phone. So, we ask this biological question: What was going on that caused this behavior?

00:04:53 — What caused this behavior? And this is a multitude of questions. We start, what was going on in your brain one second before you pulled that trigger? And this brings us into the realm of a brain region called the amygdala. The amygdala, which is central to violence, central to fear, initiates volleys of cascades that produce pulling of a trigger. What was the level of activity in your amygdala one second before.

00:05:20 — But to understand that, we have to step back a little bit. What was going on in the environment seconds to minutes before that impacted the amygdala? Now, obviously, the sights, the sounds of the rioting, that was pertinent. But in addition, you're more likely to mistake a cell phone for a handgun if that stranger was male, and large, and of a different race. Furthermore, if you're in pain, if you're hungry, if you're exhausted, your frontal cortex is not going to work as well.

00:05:51 — The part of the brain whose job it is to get to the amygdala in time saying, "Are you really sure that's a gun there?" But we need to step further back. Now we have to look at hours to days before. And with this, we have entered the realm of hormones. For example, testosterone, where regardless of your sex, if you have elevated testosterone levels in your blood, you're more likely to think a face with a neutral expression is instead looking threatening.

00:06:18 — Elevated testosterone levels, elevated levels of stress hormones, and your amygdala is going to be more active, and your frontal cortex will be more sluggish. Pushing back further, weeks to months before, where's the relevance there? This

is the realm of neuroplasticity, the fact that your brain can change in response to experience.

00:06:39 — And if your previous months have been filled with stress and trauma, your amygdala will have enlarged, the neurons will have become more excitable, your frontal cortex would have atrophied, all relevant to what happens in that one second. But we push back even more, back years, back, for example, to your adolescence. Now the central fact of the adolescent brain is all of it is going full blast except the frontal cortex, which is still half-baked. In fact, it doesn't fully mature until you're around 25.

00:07:11 — And thus, adolescence and early adulthood are the years where environment and experience sculpt your frontal cortex into the version you're going to have as an adult in that critical moment. But pushing back even further, even further back to childhood and fetal life and all the different versions that that could come in. Now, obviously, that's the time that your brain is being constructed, and that's important.

00:07:36 — But in addition, experience during those times produced what are called epigenetic changes. Permanent in some cases, permanently activating certain genes, turning off others. And as an example of this, if as a fetus, you were exposed to a lot of stress hormones from your mother, epigenetics is going to produce your amygdala in adulthood as a more excitable form, and you're going to have elevated stress hormone levels.

00:08:04 — But pushing even further back, back to when you were just a fetus, back to when all you were a collection of genes. Now genes are really important to all of this, but critically genes don't determine anything, because genes work differently in different environments. Key example here, there's a variant of a gene called MAO-alpha, and if you have that variant, you are far more likely to commit antisocial violence, if and only if you were abused as a child.

00:08:35 — Genes and environment interact. And what's happening in that one second before you pull that trigger reflects your lifetime of those gene-environment interactions. Now, remarkably enough, we've got to push even further back now, back centuries. What were your ancestors up to? And if, for example, they were nomadic pastoralists, they were pastoralists — people living in the deserts or grasslands with their herds of camels, cows, goats.

00:09:03 — Odds are they would have invented what's called a culture of honor, filled with warrior classes, retributive violence, clan vendettas. And amazingly, centuries later, that would still be influencing the values with which you were raised. But we've got to push even further back, back millions of years. Because if we're talking about genes, implicitly we're now talking about the evolution of genes.

00:09:29 — And what you see is, for example, patterns across different primate species. Some of them have evolved for extremely low levels of aggression. Others have evolved in the opposite direction. And floating there in between by every

measure are humans. Once again, this confused, barely defined species that has all these potentials to go one way or the other. Behavior.

00:09:52 — So what has this gotten us to? Basically, what we're seeing here is, if you want to understand a behavior, whether it's an appalling one, a wondrous one, or confusedly in between, if you want to understand that, you've got to take into account what happened a second before to a million years before, everything in between. So what can we conclude at this point? Officially, it's complicated. Wow, that's really helpful. It's complicated, and you You better be real careful, real cautious before you conclude you know what causes a behavior, especially if it's a behavior you're judging harshly.

00:10:30 — Now to me, the single most important point about all of this is one having to do with change. Every bit of biology I have mentioned here can change in different circumstances. For example, ecosystems change. Thousands of years ago, the Sahara was a lush grassland. Cultures change.

00:10:52 — In the 17th century, the most terrifying people in Europe were the Swedes, rampaging all over the place. This is what the Swedish military does now. They haven't had a war in 200 years. Most importantly, brains change. Neurons grow new processes, circuits disconnect, everything in the brain changes, and out of this come extraordinary examples of human change. First one.

00:11:18 — This is a man named John Newton, a British theologian who played a central role in the abolition of slavery from the British Empire in the early 1800s. And amazingly, this man spent decades as a younger man as the captain of a slave ship, and then as an investor in slavery, growing rich from this. And then, something changed.

00:11:43 — Something changed in him, something that Newton himself celebrated in the thing that he's most famous for, a hymn that he wrote, Amazing Grace. This is a man named Zenji Abe on the morning of December 6th, 1941, about to lead a squadron of Japanese bombers to attack Pearl Harbor. And this is the same man 50 years later to the day hugging a man who survived the attack on the ground.

00:12:12 — And as an old man, Zenji Abe came to a collection of Pearl Harbor survivors at a ceremony there, and in halting English, apologized for what he had done as a young man. Now it doesn't always require decades. Sometimes extraordinary change could happen in just hours. Consider the World War I Christmas Truce of 1914. Powers that he had negotiated a brief truce so that soldiers could go out, collect bodies from no man's land in between the trench lines.

00:12:43 — And, soon, British and German soldiers were doing that. And then helping each other carry bodies. And then helping each other dig graves in the frozen ground. And then praying together, and then having Christmas together, and exchanging gifts, and by the next day, they were playing soccer together, and exchanging addresses so they could meet after the war.

00:13:04 — That truce kept going until the officers had to arrive and said, "We will shoot you unless you go back to trying to kill each other." And all it took here was

hours for these men to develop a completely new category of "us." All of us in the trenches here, on both sides, dying for no damn reason, and who were "them"? Those faceless powers behind the lines who were using them as pawns.

00:13:30 — And sometimes, change can occur in seconds. Events. Probably the most horrifying event in the Vietnam War was the My Lai Massacre. A brigade of American soldiers went into an undefended village full of civilians and killed between 350 and 500 of them. Mass-raped women and children, mutilated bodies. It was appalling. It was appalling because it occurred, because the government denied it, because the U.S.

00:13:59 — Government eventually did nothing more than a slap on the wrist, and appalling because it almost certainly was not a singular event. This man, Hugh Thompson, this is the man who stopped the My Lai Massacre. He was piloting a helicopter gunship, landed there, got out, and saw American soldiers shooting babies, shooting old women, figured out what was going on. And he then took his helicopter and did something that undid his lifetime of conditioning as to who was "us" and who was "them."

00:14:32 — He landed his helicopter in between some surviving villagers and American soldiers, and he trained his machine guns on his fellow Americans and said, "If you don't stop the killing, I will mow you down." Now, these people are no more special than any of us. Same neurons, same neurochemicals, same biology.

00:14:54 — What we're left with here is this inevitable cliché those who don't study history are destined to repeat it. What we have here is the opposite of it. Those who don't study the history of extraordinary human change, those who don't study the biology of what can transform us from our worst to our best behaviors, those who don't do this are destined not to be able to repeat these incandescent, magnificent moments.

00:15:20 — So thank you.

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00:15:32 — Talks that really give you a new mental model about something. Those are some of my favorite TED Talks, and we just got one. Robert, thank you so much for that. Good luck with the book, that was amazing. And we're going to try and get you to come here in person one year. Thank you so much.

Robert Sapolsky

00:15:48 — Thank you. Thank you all.