Disrupt Yourself Podcast

EPISODE 261: AMY WEBB

Welcome back to the Disrupt Yourself podcast, where we provide strategies and advice on how to climb the S-curve of learning in your professional and personal life. Stepping back from who you are to slingshot into who you want to be. I'm your host to Whitney Johnson. This week, we break out our crystal balls to peer into the future, not just our personal future, what we or our careers might look like in five or ten years. But what will the world look like in ten, 20, or even 100 years from now? If you feel like the world is speeding up technologically and culturally, you're not alone. Future shock is a real phenomenon, and it makes planning your life, career, and business rather hard. Our guest today can help with that. Amy Webb is a quantitative futurist. Put simply, she uses data to imagine the unimaginable meaning. We don't yet know how to imagine it. Her work is not about predicting the future, but planning for it, understanding every possible outcome so you or your company can be well prepared for the real thing. Right now, Amy is fascinated with one major disruption, which is synthetic biology. This is the merging of computer science and genetics. The idea that we can program cells like computers to cure diseases or grow food in more sustainable ways.

Whitney Johnson: But as with most new technologies, when science is filtered through the lens of politics, media, and social media, healthy skepticism can morph into fear and misunderstanding. Amy goes deep on all this and more in her latest book, co-authored with geneticist Andrew Hessel called *The Genesis Machine Our Quest to Rewrite Life in the Age of Synthetic Biology*. This is one of those media episodes where I'm learning as much about the topic as you are. So, sit back and get ready to just absorb. I know you'll enjoy my conversation with Amy. All right. So, Amy, let me set the stage by saying that my husband is a college professor. He teaches chemistry to liberal arts students who have absolutely no interest in the topic. They just care that the technology, that the chemistry works. And so because they're not very interested and because technology and science have become so complicated, it's very easy for them to disengage. So now what I'm hoping that you and I can do today is have a conversation that his freshmen students or first-year students, we will say, can listen to this and understand synthetic biology and feel like, oh, this is interesting. I want to know more. So that's my goal for our conversation today.

Amy Webb: I love that goal. Absolutely. Because I should just, I guess, be very transparent upfront. My academic background is economics. So, and game theory. So, I am not a biologist. I took like a handful of biology classes in high school, you know, so I am not I'm not a scientist either. I just got really interested in this topic. And once I learned more about it, thought other people should know.

Whitney Johnson: Perfect. So, what I'd like to do is have you share with us a crucible experience and quite likely the experience, if it's the one I hope it is, that got you interested in this topic in the first place.

Amy Webb: There's probably three experiences, two that are related and one that's sort of not related. The two overarching experiences are that my mom was diagnosed with a rare form of cancer a while ago, years and years ago, actually, when she was younger and she was seen by some of the best doctors in the United States, and they just didn't have any answer. And it's interesting, you know, we tend to name cancer. The names that we give for cancer have to do with where the cancer is located, not what the cancer is. So, liver cancer, pancreatic cancer. I was curious about that, obviously, because I am somebody who does a lot of research for a living, and I build models for a living out of that research. And I just kept thinking, why can't we get more granular about what this is? Because if we can't get more granular, then we're not going to figure out a solution. And in fact, at that point, there was no solution. She had a rare form of what's called neuroendocrine cancer. They didn't quite know where it was coming from, and it impacted her endocrine system and her pancreas. And, you know, they, they didn't quite know what it was. They didn't quite know what to do. And I think that's, you know, for a lot of unfortunately for a lot of people that have cancer, that's the reality. And so, they put her on this cocktail of two different types of chemotherapy. And, you know, it was it was really rough. And she died. She, she died about a year and a half later. And the whole time I kept thinking, why are we approaching the science in this way? Isn't there a possibility that if we could understand what was happening inside of a cell, that we could reprogram that cell or reprogram organic material, living things in order to rather than target the entire body with something like acute chemotherapy, which is, listen, I'm happy we have something right, but isn't there another way to do it? So that got me investigating.

Whitney Johnson: How old were you when this all happened with your mom?

Amy Webb: I was I was 30.

Whitney Johnson: 30.

Amy Webb: So, my mom. Yeah. So, my mom was in her early fifties. Yeah.

Whitney Johnson: So, yeah. Okay.

Amy Webb: Yeah. And again, I, listen she, I was grateful for the care that she did have. But the whole time, I just kept thinking. You know, isn't there some other way out-of-the-box way that we could be approaching this problem? And I know that there's amazing scientists who are very talented working all around the world. But I also know that I've come to understand that sometimes the scientific community becomes very entrenched in what they know, and they suffer from a lot of the same innovation problems. The blockages that you talk about on this show all the time and it Whitney the lessons that you have for business. To me, I wish every scientist on the planet listen to your show because the same thing that you teach others in these innovation and business spaces totally apply to the sciences. Anyway, so I. I just remember thinking like, I, you know, there's got to be some other way to be thinking about this. And there probably were pockets of people somewhere. So that, that got me thinking. The other thing was that my husband and I were desperately trying to start a family and the first time I was pregnant, I had a miscarriage.

Amy Webb: And the first time that it happens, this is unfortunately not something we talk about openly. And the first time it happened to me, it was horrific and a shock. And I felt like I was a failure. And it was both physically really painful and mentally really painful. By the third time, I had had a miscarriage, you know, I sort of knew what to expect and thought, what is what is wrong? We were seeing fertility specialists. I was young enough at that point and there was nothing wrong with me. So, the standard courses of action didn't make any sense. And what I was told at the time was maybe I was stressed out if I had a nickel for that. And a lot of people, when they have an ailment or

there's something wrong, that's what they're told. You must just be stressed out. Try to just do some meditation. Right. And I was like, I don't think that's a good answer.

Whitney Johnson: Can I pause for just a nanosecond? Because I think this is really important, is this idea of miscarriages. And it sounds like I had one miscarriage and I was only six weeks along and it was still devastating. And it sounds like you were further along and even if you weren't and I just want to make a point to everybody listening and just acknowledge for a moment the tremendous grief that comes with having a child inside of you and then losing it. It is it's just it's just devastating. There's something alive and then it's not. And it's so difficult.

Amy Webb: I'm so happy you pointed that out because and also, I want to mention that this is not something that women go through alone. So, it's also devastating for your partner. And you're absolutely you're absolutely right. And the first, the first two times it happened, I was probably around the six-week mark, but I've actually been pregnant nine times and I have one child. And the, the last time that I was pregnant, I was in my second trimester and just something went wrong. And what went wrong was that my body continued to think that it was pregnant, even though obviously the fetus at some point had had had passed. So, it was awful. And all I could think that entire time was why am I so successful in every other area of my life and biology? Like with my mom, I couldn't do anything. I couldn't help. And my, my own body, you know, I, I keep very good care of myself. I've got all the fitness trackers, I've got all the data, right? I, you know, I get good sleep. I don't smoke. I don't do drugs like I've done; I take good care of myself. And why couldn't I do something that seemed both natural and something that should have been simple was to just have a child. So, this is what took me down the deepest rabbit hole.

Amy Webb: I started investigating at the beginning cancer and then IVF, and that led me to research about genetic selection through embryos and IPS and just eventually led to this these profound questions about what is life? Where does life come from and what will it eventually mean when we have the ability to program life the way that we program tiny computers? And the reason that that was on my mind leads to the third reason. That was the genesis for the book, and that is that I most of the time focus on artificial intelligence. That's another really heady area I know. But it turns out that there's a lot of overlap between designing computers that can think or algorithms. Right. Or the systems that, that use AI and RAI and biology. And so, all of this together sort of led me to to really think about are there ways to optimize and improve our futures? What are the risks that are on the horizon? Are there power structures that are going to change? Like what could life look like if we had more control over it? And that's really what the book is about. It's a, it's a book about science, but it's not a science book. It's a book about humanity, what it means to be human and how we're going to continue to express our humanity.

Whitney Johnson: Thank you, Amy, for sharing several crucible experiences because I love how that tied in to the title of your book, which is The Genesis Machine. How did you come up with that title? It's fantastic.

Amy Webb: Oh, my gosh. So, well, you've written books. Titles are rough. I'm not good with the titles. They're really hard for me at least. The title comes from the collection of scientists and policymakers and DIY researchers and academics. This and biotech companies and venture capitalists and early days business ventures. It's this group of people and companies that are trying to exert more influence over how life and every form evolves. So, if humanity and our existence began with the Genesis story, the what I'm trying to express in this book is that there's a sort of machine that is attempting to reboot or boot up the second genesis, and that's really what it's what it signifies.

Whitney Johnson: Again, we're, we're having this class of first-years who are taking chemistry that want to understand why this matters. Let's talk about synthetic biology. How are you defining it? And talk a little bit about insulin as a way to introduce this topic of what does synthetic biology mean at its simplest?

Amy Webb: Sure. So, the best way to think about synthetic biology or if you want to sound like an insider syn-bio, is that it's just an attempt to take the building blocks of life and program or reprogram them to enhance, improve or otherwise control outcomes. With the caveat that biology inherently is often totally uncontrollable. So basically, what we mean is the field kind of combines engineering and design and computer science with biology. And researchers use computers to design or redesign organisms on a molecular level to have new purposes, and that can make them adaptable to new environments. It can give them different abilities, things like that. And these techniques make it easier to engineer biology. So, I can give you kind of a weird but super interesting example. So, there's something called four-dimensional printing. So, I think most people by now know about 3D printing. Four-dimensional

printing is when the organism is programmed to change based on something like increasing heat or introducing light or some other element. And the application would be for something like a package like packaging. So cold chains take up. That's how you ship frozen products around the world or fresh fish that might be caught, something like that. They're really environmentally challenging. It takes up a lot of resources.

Amy Webb: It's complex and introduces a lot of potential challenges and complexity into global supply chains. It's expensive. So, what if, instead of enormous, refrigerated trucks and warehouses, we just made better packages and the packages would respond in real-time if it got too cold or too hot. So, a lot of times we think of biology, we think about designer babies, and that's actually not the entirety of what this is about. In fact, that's just a small thread. Now onto your question about insulin. So, one of the first stories in the book is about my friend Bill, who you actually know. I won't say his last name, but you know him through Spark Camp. That's what I thought. Yeah, yeah, yeah. That's him. And Bill was diagnosed with juvenile diabetes when he was young, and he's got a terrific support system and an amazing family. And they were able to provide him all the resources he needed to learn how to manage and mitigate his diabetes. But a lot of people don't have access to all of that. And as we have come to learn, insulin is really expensive. Part of the challenge was that pre-1978, that insulin had to come from somewhere and there were 100 years ago people were there's crazy stories about how they figured out what diabetes even was and how to treat it.

Amy Webb: But suffice it to say, at some point, it turns out that a couple of scientists discovered, well, maybe we can, we can get secrete get secretions out of the pancreas of dogs or animals and sort of synthesize it in that way, create some type of sterile insulin. Well, that's great. But the problem was the math didn't work out. And a lot of people had diabetes by the fifties and sixties, and there just weren't enough animal pancreases to go around. Eli Lilly, the founder of Lilly Company as a result of this, launched a grand plan and said, you know, we've got to figure out a way to manufacture this hormone which can regulate the amount of glucose in blood. But there's no possible way that we can get enough animals, 56 million animals per year to meet the demand at that point with of insulin. So, academics started working on this. Universities, researchers, all these different teams started working on it. And there was this band of scientists who went to different direction. So, everybody else was trying to figure out, could we secrete from a different like, what about rats? Rats are pretty good. Nobody likes rats. I don't think anybody would miss 100 million rats going missing every year.

Amy Webb: And these guys were like, isn't there a like, can't we do this in a different way? So, what they did was they used something called recombinant DNA technology, which I know is like, what is that? Basically, the question they were asking is, is there a way for them to just use bacteria and like make the bacteria squeeze out and produce minuscule insulin molecules? And, and could they just do that a little bit to see if it worked? And then could they do it at scale so that they didn't have to have truckloads of pancreas moved in? And the answer was yes. And it's a terrific story because these guys were doing something that at the time everybody thought was nuts. They staked their careers on it, and in the end, they figured out a way to coax bacteria to produce insulin from synthetic DNA, and they were able to do it so that it was economical and that today is the synthetic insulin that now everybody is able to use. Now, the affordability piece is another issue that but sort of that's what sort of gets us to now. It really is a remarkable story of some very brave scientists who went against the grain.

Whitney Johnson: Thank you for sharing that, because I think it, it introduces this, this topic, what it is, and how all the people who now have insulin, and like you said, there's affordability issues right now. But it just this is the power of science. This is the power of synthetic biology, the book that you've written. You make an interesting statement, Amy, in the book that I had never heard before, it's page 187, and you don't need to look it up, but it's basically this that, we trust scientists, but not science itself. Tell us more.

Amy Webb: You know, I started working on this book, which most publishers would not advise. While I was writing the last book on artificial intelligence, I was just kind of gathering information and putting it aside. When COVID hit, I was really shocked. At first, I'm no longer shocked, but I was really shocked at how much people were calling into question some of the basic science that led us to understanding what SARS-CoV-2 even was. And it is to some degree, a miracle that the genome was sequenced so quickly. And if genome sequences like I don't I don't grok that because here's all you need to know. This is just like source code. So maybe I'm going in a different direction. That's worse. This is just the sort of basic instructions for how the plants, the building.

Whitney Johnson: Yeah. How to assemble the Lego set.

Amy Webb: Right, right, right. So, it's actually not a miracle at all that the genome was sequenced as quickly as it was. The technology has been around for a long time. It was just a matter of getting a sample and running it. And the fact that that happened quickly enabled synthesis to happen next. And that is, if we know this is the thing that's bad, is there a way for us to start working on a vaccine because we know what the problem is? Right. So, can we synthesize something new to combat that? That all happened very fast. And it was because there was so much there were so many papers that had been published. There was so much work. The vaccine itself took a long time to come into the marketplace because of regulation. But here's what happened in the middle of all of this. People distrusted the speed with which the vaccine became available, I think, because they didn't understand the process that it took to get there, and nobody took the time to explain it in a way that made any sense. And I think between that and just this was something new. It was different. It was a change. People wanted affirmation that, that life was going to return to normal. And I think a big mistake that was made by everybody early on was in not saying, you know, life is, is not going to be the same for the foreseeable future and we don't have an end date. So, what we saw, therefore, was people distrusting the science. They were at that point trusting in scientists. And there was a Pew study showing that scientists ranked up there with religious leaders you know, and, and parents. Yet, the there was the scientists, but science itself ranked very lowly or low. And that, that delta explains a little bit, I think, of the problems that we're facing as a society.

Whitney Johnson: I just think that's so fascinating, this idea of and I'm looking it up, 88% of scientists said they thought genetically modified foods were perfectly safe to cultivate and eat. Only 37% of the public thought the same. But just this idea of we trust scientists. What did you say? We trust scientists. Oh, military first, scientist second, even more than religious leaders and kindergarten teachers. And yet the science itself, we don't trust. So, let's actually go to something that I think is very important right now. I, I believe in technology. I believe it can solve problems. And I have friends and colleagues who are smart and sincere who will not get vaccinated because they are concerned about the unintended consequences. So, if you were having a conversation with and I'm sure some of our listeners are in that camp, how would you talk them through this to say, no, let me explain this to you and why I do think it is safe for you to get vaccinated. What would you say?

Amy Webb: Well, the first thing that I would say is, generally speaking, I think we've done something really bad, which is to malign people for their curiosity. And, I think, I think that's that doesn't respect the place that they're coming from. We are living through a shocking amount of volatility, ambiguity, a complexity, and deep uncertainty. And that has like if there's anybody out there that says, no, I'm totally fine, that's a lie. All of us, myself included. And my job is to investigate uncertainty for a living. And I've had a rough couple of years. So, with that in mind, if somebody has expressed curiosity, which I think is gets expressed in different ways, you know, we have to be humble and we have to respond with curiosity rather than chastising them. So, I've actually got a bunch of people that I know, too, who, you know, either still have not been vaccinated or waited for a while. It's terrible that we've politicized this. You know, I didn't, I didn't, I didn't chastise them or yell at them or whatever else, you know, or think they're dumb. That's another part of the problem. You know, I won't get a vaccine is equivalent to your dumb and therefore you probably fit this political profile on top of that. That's ridiculous. Everybody, before they put anything in their body, should be curious. So that's a good thing, now.

Whitney Johnson: So, I just, I just want to underscore that for a second, because I think that's a really powerful statement that you just made, is that if someone is hesitant to do it, they're asking questions of, does this make sense for me to do it? And that's a curiosity that you're saying is important that we honor. So, thank you for saying that.

Amy Webb: Well, let me just drive a further point home, because it relates to the genetically modified data that you cited. You know, a lot of the people who are, I think, approaching people who are curious or they just like more information about the vaccine are the same people who will not eat something unless it has a non-GMO label on it. Most of what is around us at this point is genetically modified, and genetically modified is not tantamount to evil or bad. It just means that, you know, sometimes genetically modified means we introduce something benign into the genome of like a tomato so that we don't have to use chemical fertilizers. But it's the same thing, I think, and I get why I'm also not a neuroscientist, so I'm totally talking out of my field. But my observation is that we, we just want to use as little our brains want to use as little energy as possible, so we seek out patterns and it's easier to find patterns when there are labels for things. So, I think you're an anti-vaxxer or you're an anti-GMO or whatever.

Amy Webb: Yes. GMO. Anti-GMO. Yeah. It's how we organize the information that we have to deal with in a very complex society. Now, with all this being said, how would I have a conversation with those people? I think listening is a good thing to do, and I don't think we do enough of that. And I have I, I won't name her name, but somebody had mentioned that she wasn't vaccinated. And my response was, Yeah, I got it. I you want to talk about it? If so, great. If not, that's okay too. And because we have a level of trust, we talked about why and I said, well, I totally get it. And you're right, we cannot know the exact outcomes 30 years down the road, but we also don't know our outcomes three months down the road. Right. And here's how I, I made the choice, but here's why the speed was not the concern for me. And the you know, I know that this like I understand how the messenger RNA works and that it's not making any permanent changes.

Whitney Johnson: So, when you said this speed for me, what do you mean when you're saying that?

Amy Webb: Oh, sorry. Yeah, the speed. I know that one of the common concerns with the vaccine and I think, frankly, with a lot of emerging technologies and sciences. Well, it happened so fast. We, we got the vaccine so fast. Right. When normally it would take ten years to get to a new medication. And the reason that we were able to do it quickly was because the genome got sequenced quickly, because we have the technology now to do that. And the reason that a vaccine happened quickly was because the companies that had been working on messenger RNA technologies for other things where we're like, Oh, you know what? We could probably just apply this to, to that. So, so that was not a surprise at all. But I also think we did a terrible job explaining why this happened quickly. And let's not forget, at the time we had a lot of political rancor and unfortunately, all of these things became intertwined.

Whitney Johnson: So, just to clarify, so part of the challenge for many people was if you did it that fast, it's like slap dashing you. You built a house too fast; the quality must not be there. And so that's one concern. You would say, well, they didn't do it quickly. They've actually been researching this topic for 20, 40 years and they just reapplied what they already knew into a different problem.

Amy Webb: That's right. And I'm happy we're actually talking about this because this whole story is really a great analogy for a place that we've been before and unfortunately, a place that I think we're going to wind up again. Do you remember Dolly the Sheep in the nineties? This was the cloned sheep.

Whitney Johnson: Vaguely, vaguely.

Amy Webb: So, the fact that you vaguely remember it, I think is meaningful because a lot has happened. Seemingly out of nowhere, a scientist had cloned a sheep and the sheep's name was Dolly, and an announcement was made to the scientific community, and it was heralded as we've made some forward momentum, some forward progress, but it got outside of the scientific community. And the story was we are creating demon, hell spawn of, of animals and your child will be next. You will be cloning children. And it's set off this again, like global sensation. The Pope had to make a, Bill Clinton, who was president at the time, had to make a press release, and the Pope had to, like, calm people down. And don't worry, we're not cloning humans next. And none of this was for the purpose of really cloning anything. It was about trying to get to a different type of medication, different type of therapeutics. I think the challenge is that science and technology are evolving much faster than our understanding, like our ability to make sense of it, which like, of course, you're talking about your husband's chemistry class. I mean, we're all very busy people. I don't, thank God, we're not talking about chemistry because I don't remember chemistry stuff.

Amy Webb: Organic chemistry and I were friends for about 5 minutes and then that didn't happen after that. We live in complex worlds. I, you've got a family. I've got a family. The last thing I want to do is try to, like, understand some wonky, weird area of science. So, I get all of that. Therefore, when there's an announcement made, 'Hey, we cloned a sheep', by the way, here's why this is good. Here's why this is good part. You had me at. Wait, we did what? And we got a vaccine for this. For this horrible virus that uses a brand new, untested technology. And it involves letters that you have not heard of together before. And it's going to be available soon. Of course, people are hesitant and skeptical. I would hope that they would be, but I would also hope that we could get beyond that and have an opportunity to have a conversation. But, Whitney, I, I am concerned that in an age of social media and algorithmic determinism and the ways in which our attention is captured, that it's becoming increasingly hard to have those conversations, which is unfortunate because there are obviously societal implications. But for business, the business

community, I would love to tell you about the enormous ecosystem that's about to be born, but you're going to have to get beyond some of the initial snap judgments, which again means leaning in with curiosity and making room for other people to be heard.

Whitney Johnson: So, you, in your brain, you, can explain that the speed piece that makes sense. You understand that you're not going to understand all of the implications. What are one or two other things that you would, or in your brain, your analytical brain, that you walked through to get yourself comfortable?

Amy Webb: With the vaccine or with syn-bio?

Whitney Johnson: With the vaccine specifically? Yes, I think that that helps people focus their brains.

Amy Webb: So, part of this is just me. I am skeptical of literally everything you want to tell me. When I tell me this is the law of physics, I'll be like, Great. That's what it is. Right now, but I don't think that's necessarily what it's going to be tomorrow. So, I am typically the type of person. Who other people really dislike because often I won't take a stand on anything because I'm I don't know. Right. Could be maybe it depends on what the data are today. So, I think that is increasingly hard to do because that, especially in the business world, like people want leaders who have definitive answers. Interestingly, because most of the time I'm not writing books, most of the time I'm running a company that advises other companies. And all the smartest executives that I deal with are the people who have a strong vision but may not have as strong of a know they're willing to, to change their mind on things. And pivot is usually the word that's associated with that. And it's kind of a bad word in business right now. I don't see that as a bad word at all. I see that as great. So, how did I approach this? So, so, messenger RNA. I mean, one way to think about this is it's a, it's a little set of instructions. And part of the instructions are like looking for a wanted, like an old-style, old-timey Western poster, you know, it's like wanted this guy with a crazy handlebar, handlebar mustache and like ammunition across his chest.

Amy Webb: And, you know, the, the messenger RNA is just going in and it's, it's looking for that. And once it finds it, you know, it goes bang, bang, and then it goes away. So, I know it sounds like a silly analogy, but I understand it. That's what this.

I love it.

That's what it is. It's not, it's not something else called germline editing or somatic editing or gene drive, which is where a change is made to a cell, like the code, and then that perpetuates. So, the flip side of this is CRISPR on mosquitoes. So let me give you an example. There's pretty cool. There's a guy named Kevin Esvelt and there are some others who have been working on What do we do on mosquitoes? Mosquitoes spread malaria. Millions of people die every year. Up until very recently, there was no vaccine. It's a terrible, it's terrible. And the way that you deal with malaria is, is very, very expensive. And it's hard to get the ingredients that you need anyways. The problem is if you just get rid of all the mosquitoes, the mosquito, by the way, most people don't know this. The mosquito is the deadliest animal or the deadliest organism on the planet. It's not like a viper snake or a cheetah. Obviously, I've spent a lot of times indoors, anyways. I'm trying to think of other deadly animals, but I can't think of any because I live inside of an office building, I guess. Anyways, so.

Amy Webb: So, the mosquito is like the most deadly organism. The problem is you can't take away all the mosquitoes because it would cause their food. So, this would cause other ecosystems to collapse. So, what they did was they said, "Well, what if we edited the genome of a mosquito because it's the females that bite?" What if we, I know it's not called a proboscis, or maybe it is their little sucker sticker part. What? What if we just dented it a little bit so that they, they wouldn't be able to, to insert that as easily and some of them would die off and it would reduce the population? Or what if they could edit part of the male population so that it didn't reproduce as easily? Anyhow, they start asking all these questions and the answer is what if they could just edit the mosquitoes so that there's less of a spread of malaria? And this way they don't have to kill all the mosquitoes. Not that you'd be, even be able to do that. So that's what happened. And there's a trial right now in Key West, and there are some other trials happening where they've introduced these edited mosquitoes, where the, the next subsequent generation that that edit is heritable. So, it carries through and over time it doesn't destroy the ecosystem and potentially fewer people die from

malaria. Now, that's pretty great. That is not what messenger RNA is doing. It just impacts you and that's it. And it's not changing any part of your genome permanently.

Whitney Johnson: Hmm. Okay. Let me just recap quickly. So, first of all, that mosquito story is very interesting. And secondly, if I understand correctly, as you're describing it, with a vaccine, it's there's like a bounty on the head of the virus and someone's killing it and then it's gone. They're not editing or changing the genes.

Amy Webb: Right. There's no if, if we. Let's perpetuate this weird metaphor. Yes. So, there's like.

Whitney Johnson: No, love it. I love it by the way.

Amy Webb: There's no like old-timey jail with like a guy in a metal cup, you know, like clanking it against the, the metal bars of the jail and then eventually they get free again. It's not that. It's, it's more like wanted poster bang, bang. Now it's dead. You're dead. Yeah.

Whitney Johnson: That's great. Love it. So, so recapping you would say number one is someone who's trying to get comfortable or not with it. Is, first of all, thank you for being curious because that's an important attribute and let's, let's honor that. Secondly, you would say I'm actually reasonably comfortable because I know understanding the science enough that this process by which they got to the vaccine wasn't six months, it was actually decades. So it's not slapdash. In fact, it was very thoughtful and probably billions of dollars have gone into the ability to create this vaccine. And then the third thing you're saying is, from a gene standpoint, they just killed this one gene, the bounty on its head, the bang, bang, you're dead, which I love. That's awesome. It's not like with the mosquitoes. And so that that is how you would basically pack a parachute for someone to jump to the new S-curve of getting a vaccine. That would be your case.

Amy Webb: Yeah. And I would add one tiny little extra parachute on there for, for people.

Whitney Johnson: Please, do.

Amy Webb: And that is, that is that it's so I'm a quantitative futurist, right? My job is to build models using data that explore plausible futures. And this is something that you do without emotion or feelings. We try to remove the emotion and feelings so that intentionally we can sort of imagine the unimaginable. And sometimes that means trying to figure out the worst possible risks, the worst possible outcomes. Sometimes we're looking at the best possible outcomes. A lot of times we're just being pragmatic. We're looking for new opportunity spaces, new growth spaces. But I have a lot of training in this, and I've been doing it for 20 years. Most people, when they imagine the future, they have a very hard time putting themselves in that future. And often when you're dealing with something that's new, like a new science or a new technology, the stories that we've been told from wonderful books that we've read or from great movies or whatever else it might be, it biases us a little bit, and especially in times of deep uncertainty, where we feel like we have less and less control, we catastrophize. So, the extra little parachute that I would, I would put on you is one that as it as that parachute opens, it sort of puffs out and pushes out the catastrophizing piece, try to be as pragmatic and as objective, as objective with this as you would be as pragmatic and objective with your taxes as any other thing that you would be evaluating in your life.

Whitney Johnson: Although taxes can be kind of emotional. So, what I would love for you to do now, Amy, is and you just introduced this idea as when we think about the future, it's so easy for us to go to this apocalyptic place. And as you said, you, your business is the Future Today Institute. You think about futures that could be apocalyptic, but you also think about futures that could be very, very bright. And so what I thought could be fun and I was thinking food but you can choose your topic is, imagine a future for us that involves synthetic biology what we've been talking about today and just take us forward of something that is not yet imaginable but really quite wonderful. Paint a little bit of that scenario for us.

Amy Webb: I would love to. So, I'd love to talk. I love talking about food. I love to eat food, and I am a human who would like to continue to eat food. And I think that that may be, believe it or not, a bit of a challenge going forward, because we've got these weird climate and weather events that are happening without a lot of predictability. My, my growing up, my dad's family were farmers. And it's, it's really that's like super hard work to begin with, but you've got

a lot of variables outside of your control. So, one interesting thing that this field allows for is some more control and precision when it comes to growing and that what we need to nourish ourselves. So, imagine rather than a huge field. I grew up around corn, I grew up on the South Side, so I didn't grow up around corn, but like I grew up just outside of Chicago, but just outside of outside of Chicago, there's a lot of corn. So, imagine editing corn so that instead of on one stalk, you've got three ears that take a very long time to grow like months and months. What if instead on one stalk you were able to get, I don't know, ten times the yield. One stalk was taller and maybe had 50 years of corn. And rather than needing acres and acres and acres of land, you instead could grow all of the corn that you needed inside of a like a warehouse somewhere in north of Minneapolis, where there's a lot of space.

Amy Webb: And, you know, because of climate and other things, like sometimes people don't want to live in, in where it's super cold, that challenges our current mental models of, of corn and where we get it from. But it opens up optionality that we should explore because of, of sometimes how challenging it can be. That's in the US. Outside of the US, I think of Singapore. People in Singapore eat a lot of chicken, like a crazy amount of chicken. And Singapore is this amazing, amazing place that is really thinking about the future critically. And I think part of that calculus was we need a lot of chicken. We're going to have to get it from somewhere. So rather than continuing to import chicken, one of the things they've done is change regulations to allow for cellular-based chicken. And here's what I mean by that. If you had the stem cells of a chicken, a good chicken, like a heritage chicken. Not the crazy fat chickens that exist today that are they don't have a lot of flavor, and whatever else. But if you started with a heritage chicken stem cell and you were able to coax that correctly and put it inside of a bioreactor, think of a giant metal tube like a huge metal pressure cooker. And inside of that, you had your heritage chicken stem cells and you had nutrients and warmth, basically all the stuff that would have been found inside of a mother hen.

Amy Webb: And you allowed it to grow, and you fed it and you kept it warm for a couple of weeks. At the end of that, you would have chicken meat that was molecularly identical to what you might have harvested off of a chicken, but you never actually grew a chicken with a heartbeat that clucked or that needed space or feed or to be put on a ship and moved between countries. I mean, if you play that forward in time with that technically means is that Singapore, a metropolis, could become a major epicenter, producer of cellular-based chicken meat, not just for Singapore, but also Malaysia, Vietnam, Philippines, surrounding countries. And, and they've actually already done that. So, they're not producing chicken at scale in this way. But there's a restaurant in Singapore called 1880 that on its menu had and it may still have this type of chicken. And it was grown in a bioreactor, not on a chicken farm. It still gives people the meat they need. You don't need the hormones or any of the chemicals that would have gone into growing chicken in other ways. And it can scale. It's affordable, you know. So, if, if this is on our horizon, we owe it to ourselves at least to explore this before chastising it or condemning it as weird science, which really it's not. It's just different from our existing mental models.

Whitney Johnson: Does it taste good, yet, or are they still not quite to the, it tastes good yet?

Amy Webb: No, it tastes good. And I had the bourbon version of that. So, I like whiskey and bourbon and there's a group. And if anybody drinks whiskey or bourbon, I mean, I don't drink a lot of it, but you know that you need it. You need certain types of barrels. They have to be burned. There's a whole process and it takes a very long time to age. Well, I had a barrel-aged, in theory, whiskey the other day that tasted pretty good. It didn't have a ton of depth, but it tasted, it tasted pretty good that was made inside of a lab in San Francisco, not in a Kentucky distillery. It took a fraction of a fraction of a fraction of the amount of time under controlled circumstances, which meant that you didn't have things that could go wrong. And on top of that, they got regulatory approval. I mean, it's, it's, it's alcohol, right? It's spirits. So that that process takes a lot. So, I mean, this stuff exists. Is it the greatest whiskey in the world? No,

Whitney Johnson: Not yet.

Amy Webb: Not yet. That's and that's the point. It's this. They have a business model for it. That's right.

Whitney Johnson: That's right. Yeah. I mean, that's what disruption is. It's a silly little thing that everybody thinks is a toy, but over time, the quality improves. What is one thing that you would like people to do differently or think differently? Maybe we'll even start with thinking differently as a consequence of this book that you've written, you spent several years of your life writing. How do you want people to be different because of this work?

Amy Webb: So, I would just love to go back to the sort of one of your capstone ideas and, and your thesis about the S-curve. Right. We, I think we get into the habit of applying some of this knowledge and this thinking we have when it comes to business. And we forget sometimes, I mean, you talk about disrupting yourself, but if you're really willing to disrupt yourself, you have to like apply that broadly. I think part of disrupting yourself and being an innovative thinker is in asking yourself questions, you know, what? What would it take for you to lean in with curiosity? And I think that that's very important going forward because we have entered a biological age and that was already in progress. But because of COVID, there's just a ton of investment flowing. Things are changing. Just there's an acceleration. This is promising. There are going to be risks, as there always would be. But there is a big risk around misinformation and just acceptance. So, it's going to be harder than ever, but also more important than ever to keep an open mind and to be willing to challenge your mental models over and over and over again. And it's okay not to have the answers. I don't have the answers half the time. It's the pursuit of the answer that matters.

Amy Webb: So, like, if somebody gives you a, a glass of whiskey made in a lab in San Francisco and a plate of chicken nuggets made in a bioreactor before, you're like, I would never put that in my body. I would ask yourself, you know, what if you did and is this better or worse than a fast-food, food meal that you would put in your body? From my point of view, and this makes sense for me, the engineered version is better than the fast-food version. But I guess that leads me to my last point, which is we got to stop judging everybody so much. I mean, this is like this is crazy. It's crazy. And there's so much opportunity staring us at the face, but we have to get out of our own ways. Yeah, that means embracing people who are asking questions because they're uncomfortable. Why would you? I don't know. I just. I don't mean to harp on the vaccine thing, but, yes, it would be wonderful if everybody was vaccinated. But I also totally get why people are hesitant and like, why was everybody yelling at each other? I would much rather that we embrace, embrace each other and like figure out ways to, to have a conversation.

Whitney Johnson: What you're saying is allow people to ask those questions, because when we do, that's where the innovation comes from and give people the grace when they do ask the question.

Amy Webb: That's right. Can I give you a super short example of that in business? Please give time to do so. There's a company that we've been working with for the past year called Schibsted. This is totally unrelated to biology, but it's a great case study. So, Schibsted, most people don't know, is based in Norway. They're one of the most innovative, most, most profitable media organizations in the world. They publish often Posten and many, many other newspapers at any rate. So, they're at the top of their game in like the 1980s. And newspapers and especially like in addition to just like newspapers are still a big important thing at that point. Norway per capita has the is the highest they're the most read group of people on the planet. So, these are people who care deeply about news at any rate. There are some executives at the company that are looking around and see this, this thing called the Internet taking off and it's moving away from academia into the commercial space. And they're like, they have the, the bravery to say, you know, we've got a great model. We're in a pretty controlled market. But what if things in the future are different than they are today? And that willingness to lean I mean, that's the whole disruptive innovation thesis, right? So, the willingness to do that.

Amy Webb: So, what they do at that point is they hatch a plan to create a digital ad sales program, which really angered people in the company because that would cannibalize their primary revenue source. Right. Advertising. But because they did that and they were so far ahead of the game, they did not get it. They disrupted themselves rather than somebody else defining the future and dragging them into it. And I think there's actually an HBS case study that you can if anybody's interested, you can Google and download. It's a terrific case study. But I also think it's it's always just a good reminder. It takes very little effort, time, energy to just stop and ask what if like if you want to think like a futurist, that's all you have to do. Just ask, what if, and allow yourself to, to really explore that without any bias and just see where, where you get. And again, remind yourself not to catastrophize. Right. But you know. But, but do push yourself to go right up to the edge of plausibility.

Whitney Johnson: Hmm. I love that. And this idea of pack your parachute of non-catastrophizing and then ask yourself what if what could the future look like? All right. So, Amy, what was useful for you today?

Amy Webb: As I've been saying, some of these things out loud, it's been a reminder to me that. I you keep. You use the word grace really often and it's hard. You know, I'm busy. I'm sometimes not in a good mood. And I think it's a

good reminder that when we're talking about complicated things, sometimes I get frustrated when I'm just like, just, just agree with what I'm saying so we can move on. Let's take it for granted that this is it and it's on. I have to remember that this is all this stuff. Futures for 20 years and synthetic biology for several years. These are old concepts to me, but new concepts to other people. And I think I have to stop. And it's a good reminder to like stop and ask people to jump on the train with me rather than running them over with the train kind of thing. Yeah. And I think that's a good, that's something I, I learned and will take with me. It's my goodie bag.

Whitney Johnson: Yeah, I love that. The goodie bag. And it's a reminder of that's when you know something is your superpower is when you find yourself impatient around something that's an indicator to you of, oh, I'm really good at this. And so that's helpful to know and like you said, to also recognize if I'm really good at this, that may mean that not everybody else is. And how are we able to bring them along and to evangelize as you're doing? So, I hope that my husband's class, I don't know if they'll actually listen to this, but maybe they will. I'll tell them, give them extra credit if they listen. I hope that they will have found this useful, and I certainly have as well. And so, I would like to just share one quote that you use in the epilog of the book and give you an opportunity to, to share some final thoughts. And this was the line that I really, really love is that biotechnology gave us our families. Any final thoughts?

Amy Webb: I am grateful that I have a daughter who I love and my husband who I love. My co-author on the book, Andrew, also struggled a lot with fertility. We're really grateful that we live in a time and in a place where we have options. And ultimately this book is not about editing crazy designer whatever baby is. It's, it's not that the promise of this technology that we're writing about is that it gives us optionality, and I think we've always needed that. But I'm really grateful that we were in a position to exercise those options and, you know, as we were becoming the people that we are now.

Whitney Johnson: Amy, thank you so much.

Amy Webb: Thanks, Whitney.

There is so much to think about from this conversation with Amy, but I want to leave you with two overarching takeaways. Number one, it takes work to not be afraid of different. Humans are great adapters, but psychologically we don't love change and we definitely don't like rapid changes we don't understand. They make us emotional and lead us to catastrophizing. I like Amy's advice here. When confronting something unfamiliar, try to be as pragmatic and objective as you would be with your taxes. It's not weird science. It's just different.

Number two. Curiosity is not the same as ignorance. I really like what Amy had to say about curiosity. It's natural to be skeptical of things we don't yet understand. We want to see patterns and organize information. But when we label people as ignorant, or worse, then the battle lines are drawn, and our differences can become intractable. Amy said, if someone has expressed curiosity, respond with curiosity. Start with listening. Do you want to talk about it? Then explain the details. You may not change their mind in that moment. You may never change their mind. But a good faith conversation about what we know and don't know is a better starting point.

We're exploring, as you've noticed, more topics on the show that we just want to learn more about. If you'd like a crash course on another disruptive technology that most people don't quite understand, including me. Listen to Episode 251 about blockchain and cryptocurrency with Adam B. Levine. And before I leave you, a fun little bit of trivia. As Amy said, mosquitoes are the deadliest animal to humans, and scientists are working on that problem with synthetic biology. You may or may not be surprised that the second deadliest animal to humans are other humans,

followed by snakes. The fourth most deadly animal is dogs. Consider that the next time you take a Spot out for a walk. Thank you again to Amy Webb for joining us. Thank you for listening. Thank you to our producer, Matt Silverman, audio engineer and editor Whitney Jobe, and production assistant Cassidy Simpson.

I'm Whitney Johnson

And this is Disrupt Yourself.