

Does Bias Stack the Deck When It Comes to Data?

Author, cognitive scientist, and former poker champion Annie Duke says removing bias and emotion from data analysis is the key to better decision-making.

Michelle Dennedy: If data makes for good decisions, then a lot of data must make for even better ones, right? Don't bet on it. Decision strategist, author, and World Series of Poker Champion, I kid you not, Annie Duke stops by to tell us why when it comes to analyzing data, humans just love to stack the deck in their favor. And I'm sure she's not heard any card playing-puns in her introductions and many appearances, so I am super, super excited and star-struck to have Annie Duke on the episode.

Annie Duke: You know, I don't mind the puns. I'm just glad that you didn't play any Kenny Rogers as part of the intro. I've heard that a lot.

Michelle Dennedy: You know, really you had to go there? Now I've got him like, holding and folding and falling asleep on the train.

Annie Duke: Exactly, so I appreciate that, and thanks for having me on, I'm excited to talk a little data.

Michelle Dennedy: Yeah, this is gonna be awesome.

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Michelle Dennedy Hello, hello, hello. Michelle Dennedy with you once again. I am super, super excited as I said, to introduce our next guest. She's an expert in decision science, parlaying her background in cognitive psychology and a high emotional quotient into massive success in the world of business and at the poker table. In 2004, she won the World Series of Poker Gold Bracelet, and was once the top female moneymaker in the history of the WSOP. She's now retired from the game but has brought her expertise to all of us in a new book, *Thinking in Bets*. The one and only Annie Duke.

Annie Duke: Thanks for having me.

Michelle Dennedy: It's a safe bet most of our listeners will know you as the superstar poker champion. But they may not know Annie Duke, the business decision-making consultant, and an expert in the tell of the data itself. Can you tell us how you went from one very high profile information-based career into what you're doing now?

Annie Duke: Sure. I think the answer is for most of the time, I was actually doing both things. It's just one of them wasn't as public facing. So I started off my life studying cognitive psychology, working towards a PhD at the University of Pennsylvania. And right at the end of that, I actually got sick and had to take a year off before going out for professorships. And it was during that year that I started playing poker. And I think that at the time, I thought that I had taken this super sharp

left turn into something very, very different than the study of cognitive science, but I figured out pretty quickly that poker's just a really interesting and different natural lab for studying the way that people learn from really the data that comes their way. What are the outcomes they're getting and how good are they at aggregating it, and figuring out what to attribute to luck and skill.

Annie Duke: And so that was like around '90, between '92 and '94 that I found my way into poker and by 2002, I was starting to speak more formally on the subject of kind of this collision of cognitive science and poker playing, and the decision process that poker playing presents that had become my life. And so 2002 to 2012, my careers were completely overlapping between poker and the decision science.

Michelle Dennedy So I am absolutely fascinated, and you know you kind of glossed over it like, "Of course, I got sick and then I started playing professional poker." Were you studying behavioral science and cognitive psychology? What was your PhD thesis? Was it part of this luck and skill and perception study?

Annie Duke: Well, I wouldn't say it was so much part of this luck and skill. It was certainly part of perception. I was actually studying First Language Acquisition, how did children learn their first language, and again I know that that sounds really far afield. But if you think about it, the problem is very, very, similar to the problem that a poker player is presented. There's a child. There's all these noises, kind of flying around. She has to figure out which ones are part of natural language. Which ones are the things that are words and, which things are just other noises. Like a cat's meow, or even a person going "aaaaah" right?

So you have, and then there's the sound of the creaking floorboards or whatever it might be, so you have to first of all figure out what in the sound stream is language, but then even harder is you have to now apply that to the things out in the world. What do these things mean? If you can narrow it down to a noun versus a verb for example then, which nouns does it apply to when the mom just said some unknown word like "dax", there's so many things that, that could apply to. What part of speech is it?

And then you get into the really hard problem of, what is a state of being? Things that you can't even see, like how does someone learn the word think? 'Cause that's a really hard one. So children are actually really, really good at this, despite the fact that it's very, very noisy. The feedback is very noisy, and yet they seem to learn very well in it. It really has to do with the way that nature has sort of figured out how to narrow down the problem through providing the child with a centrally grammatical constraints, but some words must be things, and some words must be, you know verbs that are action verbs or being verbs or, that kind of thing, depending on what the grammar is telling you.

Annie Duke: So that's a pretty similar problem actually to the way that you deal with poker. Noisy environment, you have to learn from this noisy feedback, and how do you actually narrow down the set of choices that you're making.

Michelle Dennedy So, so many things in the back of my brain. So one side of my brain is saying to me, noises, patterns; deciding what is noise and what is actionable; what is language. We suffer from the exact same thing of course in cybersecurity, and national security and privacy, right? What is

context, what is choice, what is acceptable, what is proportional, and yet we're trying to figure out, and I think we probably have maybe a one to two years old's grasp on that particular very challenging compute problem compared to, your average toddler trying to pick up language.

Michelle Dennedy: So we still haven't quite got-- I wanna build that bridge. So now you know about language acquisition, patterns, pattern matching, learning from other people's cues, probably a lot about early caregivers and, so professional poker.

Annie Duke: Well, it totally makes sense right?

Michelle Dennedy: As one does.

Annie Duke: So yeah, I mean I started playing poker really to make money, but my brother had already played, had already been playing rather for about 10 years and so he and his sort of tight group of friends became my mentors, and it's really kind of sweet--

Michelle Dennedy: And your guinea pigs, too, I bet.

Annie Duke: Yeah, so I realize kind of the problem is sort of the same. You have all of this feedback coming in, but it's very, very noisy. You know no pun intended because obviously in language you're talking about sounds, ha ha.

Michelle Dennedy: And Vegas is pretty noisy too.

Annie Duke: Vegas is pretty noisy. So here's really the problem that you're presented, that nobody's giving you an answer key. Whether you're a child trying to learn your first language or whether you're trying to learn from your poker outcomes. It's not like chess. In chess, if I make a bad move, it's there for everybody to see, because there really isn't a whole lot of luck in chess. There's a tiny bit but not in the sense that somebody might roll the dice and take your bishop off the board. And there isn't any hidden information, you can see where all the pieces are.

And therefore it becomes really a problem, it's a computing power problem because it's a calculation that you're making. You just have to calculate out all the possible moves and all the possible responses and what the equity in each of those lines are. So with enough computing power, you should be able to get to the end of the game. We know that for example, if you take a very, very simplified version of chess, which would be, say tic tac toe, that any 10 year old can kind of calculate out to the end of the game pretty well and everybody ties. So we know that there's a really--

Michelle Dennedy: Even Joshua Falcon figured it out eventually.

Annie Duke: Yeah, it's a super different type of problem than poker. Because in poker there's tons of hidden information. The cards go face down and in fact, most hands, the majority of hands in poker end up with the cards not being revealed. So you don't even kind of get the answer in the end as to what the other person was holding. And then, even if you did know that, like even if you eliminated the hidden information, you have this problem with the best hand sometimes loses, and the worst hand sometimes wins. And not only that, but you could play the best hand

perfectly, and still lose. And you can play the worst hand, quite well, quite badly rather, and still win.

So now the question is this. You can't sort of see into the decision process. You can't see into all of what the underlying factors are that would allow you to figure out, not only what the best choice is but what the obvious worst choice is. So all you have is, I won the hand or I lost the hand, and now you have to figure out what's luck and what's skill. And that's just such a really hard problem, and it's very similar to the problem that a child faces when they're learning their language. What does this word apply to? And nobody's really gonna tell me, I'm just gonna sort of have to figure it out by trying to say it, and see if it kinda works.

So it's interesting once you start sort of adding this uncertainty, these two levels of uncertainty, the luck and the hidden information part. What happens is that people sort of become very untethered from rationality, and that really causes a lot of problems with people's progress and being able to process this very data rich environment.

Michelle Dennedy: Yeah, so, I can totally see the next progression here of, you live in this environment, you study this at very, very high stakes, and there's a lot of actual cash money on the table. When we get into the world of business, and I think there's so much to be said and of course you've written several books on poker and strategy, but I think everyone needs to read your most recent book, *Thinking in Bets: Making Smarter Decisions When You Don't Have All The Facts*. I mean I think it's such a fascinating thing that some facts are never revealed. You may never know why you did or didn't get a deal. You may never know why the compute power is saying X and yet someone has done Y.

Can you talk a little bit more about how have you taken all of this stuff and sort of put it into your new book?

Annie Duke: Sure, I think that what I've done is, I've said look when there's lots and lots of hidden information in particular, and in particular hidden information that doesn't ever get revealed, that what ends up happening is that we have to end up doing something kind of counterintuitive, which is as much as possible, start divorcing ourselves from outcomes. So and what I mean by that obviously is, we tend to field outcomes. We tend to encode them sequentially. We don't generally step back and say, "Let me wait until I have 10,000 coin flips to decide whether this coin is fair."

Michelle Dennedy Right.

Annie Duke: Right. Instead, we do one flip and we sort of think, we decide something about it, and we do the second flip and we decide something about it, and each decision that we make in turn changes the way that we process the next decision. And I think that one of the best ways to really feel this, like super intuitively, what the problem is, what the weight of a result does in terms of trying to get down into rationally processing the decision process, is actually the thing that I open my book with.

Which is, you know it's 2015, it's the Seahawks against the Patriots in the Super Bowl. They're on the one-yard line with 26 seconds left in the fourth quarter. So this is the end of the game. They're down by four. It's second down and they have one time out and Pete Carroll very

famously calls a pass play. And Russell Wilson passes the ball. Malcolm Butler intercepts the ball in the end zone. And of course, the game is over. And it was just, you can hear Chris Collinsworth on the tape saying, "I can't believe he made this call. This is such a horrible decision."

And then the next day, the newspapers tended to agree. And it was just, it was generally an argument, not about whether it was a bad decision or a reasonable decision, it was, was it the worst call in Super Bowl history or the worst call in football history period. And what I thought was very interesting about that, you can see very simply how big a shadow that bad result cast on the way that people processed that decision. If all you do is say, imagine, just close your eyes and imagine that Russell Wilson passes that ball and it's caught in the end zone for the game winning touchdown. What do the headlines look like the next day?

And it's very clear, like you can feel this very deeply that the headlines would have said, Out Belichicked Belichick. That he out coached one of the greatest coaches of all time. And I think that, that's where you can see that knowing the outcome, whether you won or lost, it's so powerful. It's like a gravity well that makes it so that you can't, you almost have blinders on to the decision process itself.

I invite people to read my book or to go onto, say, fivethirtyeight.com and look for Benjamin Morris' analysis of the play. But the play is actually mathematically incredibly sound. And this is the problem, is that people couldn't see into the mathematical soundness of the play because of the shadow that the bad result was casting.

Michelle Dennedy: Right. You already know that there's gonna be someone who's able to intercept, and intercepting a pass at a yard in professional football is not an easy task. There's a lot of defenders on the line. Everyone's crouched around. It really wasn't mathematically a bad call.

Annie Duke: No, and in fact, I think we can think about it in terms of what were they paying for this option. Remember they only had one time out so they really have a choice here. They can run two-pass plays, but if Marshawn Lynch doesn't get into the end zone, they can't stop the clock without burning a time out, and a lot of clock is gonna run off. So they're only gonna get two plays if they choose to hand off first. If they pass the ball, and it's dropped, then the clock stops automatically and they can actually get these two running plays anyway.

So the question is, for this option to be able to run three plays instead of two, what's the cost? And of course it's just the cost of the interception, which in that season, the interception rate in that particular situation was actually zero, and over the last 15 years in the NFL, it ran between one and two percent. So it was a pretty cheap price in order to get a full, an extra chance. Like they were gonna get three chances instead of two at the end zone. And that's aside from Belichick has defended the play because of the formation that the New England Patriots are running, so we have some conciliation there.

But just mathematically speaking, it was just such a low percentage chance, but we can't see it. The outcome is so powerful, in changing the way that we look at it, that just knowing the outcome completely distorts everything. So what I really suggest in my book is that honestly, the only way to get around this is to analyze this decision as much as possible in the absence of the

outcome. That means either before the outcome has actually occurred or in some way blinding yourself to the outcome.

And there's just kind of two ways to do that. One is to do sort of what I just did, which is imagine the counterfactual, and now think about the decision process, right, so what if they had caught the ball? Or you can also think about, what if the ball had just been dropped, right, so that can get you there. Or the other thing is, as you're going in to get advice from people who you think are gonna be able to give you some high fidelity advice, don't tell them the way it turned out.

Michelle Dennedy: Right, exactly. And I think the other side of this is really fascinating to me because outcomes is sort of the business buzzword of the day, right, and so everything that we're doing is, is your outcome aligned to, and I'll use what's becoming a dirty word, a strategy because rarely are we seeing real strategies in business. We're hearing a lot about tactics that are dressed up as strategy, but I mean truly strategy, like so how are we transitioning markets, companies, brands, et cetera, and we think about internally to businesses as what is the outcome we want, and then we try to add up things in the future to add up to the outcome.

But what I'm hearing from you Annie is like, we are assuming that from our experience of similar outcomes in the past, that we may be having a very strong bias that is preventing all of this data that we have from our experience, and from our computing, and all these other things. We think we have all the facts. We think we know what we're doing because we've experienced an outcome, but there's a bunch more hidden facts that probably could help us a lot.

Annie Duke: I think that, that's absolutely true. I think that you're more likely to judge whatever the decisions are that got you to a good outcome as things you wanna repeat, and discount the luck that may have gotten you there. And obviously on the flip side, you're less likely to repeat decisions that got you to a bad outcome, even though those may have been quite sound. If we simplify the problem, we can see this really easily.

If you run a red light, and you happen not to get in an accident, that doesn't mean should do it again. And if you run a green light, and you happen to get in an accident, that doesn't mean that you should not do that again. And then on top of that, we have this really big problem, which is that when we start to become sort of results oriented or outcome oriented, we can really start to crush innovation in a way that I think is really interesting.

So I'll give you a different thought experiment for the Pete Carroll situation, which I'll just ask you. Imagine that Pete Carroll had called a hand off to Marshawn Lynch. That he had actually called the running play. And Marshawn Lynch failed to get in the end zone. And then he has another down now, so they stopped the clock. And he calls another hand off to Marshawn Lynch. And Marshawn Lynch again fails to get it into the end zone. What do you think the reaction to Pete Carroll's coaching decision there would have been?

Michelle Dennedy: Yeah, it's interesting, I mean they'd still lose the game, right? They'd say, why didn't you pass? It was so close, why didn't you pass?

Annie Duke: Well I would actually put to you I think a different thing would have happened. I think that if he had handed off to Marshawn Lynch twice, you can tell me if your instincts line up with this, the people would have said, "Oh, the Patriots defensive line was so good."

- Michelle Dennedy: Right, right, right. It wasn't our failure to run the right play, it was a third-party intervention, or a second-party intervention in that case.
- Annie Duke: Right, and the reason why I think would be because he was going with conventional wisdom. In that case he would have been choosing status quo.
- Michelle Dennedy: Right. The safe choice.
- Annie Duke: The safe choice. And I think that in general, when we choose innovative choices, that's where we were exposing ourselves to these kind of criticisms that Pete Carroll got when things don't work out. And when we choose safe choices, people sort of say, well what could you have done?
- Michelle Dennedy: Right, this is your data as a shield concept.
- Annie Duke: Exactly. And so there are different ways to shield yourself from outcomes. And one of them is to choose the status quo choice or the consensus choice. Another thing that you can do is actually use data in order to get yourself to a place where a bad outcome is no longer on you, but you can take credit for a good outcome. And that is not using data in order to find the truth, in order to find what the best solution is, or maybe what the innovation is that other people are missing. But to use it as a way to say, "Well what could I do? This is what the data said I was supposed to do."
- So, you have some sort of conclusion that you already want to get to. You go and you look at the data, and you come up with a way that the data supports the answer that you're looking for, and then you go and you say, "Look, here the data support what I wanna do." You do it and when it doesn't work out, you say, "Well what could I do, that's what the data said."
- Michelle Dennedy: Right. So this kind of to me is reminiscent of how Einstein would always go on his thought journeys, and thought-imagined use cases if you will. So what does the data say, and what if I was in this train speeding at the speed of light and then what would happen? And then look at the data, look at the math behind all of that. So using the data, is that what you mean, like to support different scenario plays?
- Annie Duke: Yeah, so this is what I think. You know I think that people, people generally sort of forget that data doesn't exist in absence of human beings, right, 'cause human beings have to be collecting it. They have to be deciding their methods for collecting it, right, how are they collecting it, what kind of questions are they asking, what kind of data are they collecting. And then on top of that, if you have different data sets, what are they aggregating together, because sometimes certainly, more data isn't necessarily better so, you might be aggregating across markets for example, so that might be market conditions that shouldn't be aggregated together. Or data sets that were collected for completely different purposes probably shouldn't be aggregated together in general.
- So that's a problem. And then a human being has to choose what kind of analysis to do on the data, and there's all sorts of, if you're doing a regression, what variables are you putting into the regression? Right, I mean what are the coefficients that you're choosing? Because we're just modeling things, we're just trying to capture as much of the outcomes as possible. So as much of

the data as possible, so somebody has to model it, and then once you do that and you chose what kind of analysis that you're gonna run on it, then somebody has to interpret that.

So the question is, are you using data in a way that's meant to find innovative solutions, or are you using it to fend off people saying that you did something wrong, if in case things don't work out? And those are two really different ways to approach data. And what I would suggest is that people are using it as a shield way too often.

Michelle Dennedy: Oh I could, I mean we could go on and talk about that in corporate life, and government life, and social life a million times over for sure. So any-

Annie Duke: I guess the example, like a very simple example would be, look if you think that gun control lowers crime, I can go find you the data to support your position. And if you think gun control increases crime, believe me I can also go find that data.

Michelle Dennedy: Exactly.

Annie Duke: And a lot of it has to do with how is the data collected, what are the questions that you're asking, where are you looking, right, what slices of the data are you actually presenting. You know and so-

Michelle Dennedy: And it's kind of an accountability-free argument, right? It's like at the end of day, it's not like are you gonna win and get the prize money or are you gonna acquire this language, it's like look at this data, it means I'm right and you kind of waggle your tongue and fingers and say, "Nanny, nanny, poo poo." And then what's the real consequence of being wrong?

Annie Duke: Right. Exactly. And actually it's not even ... it's even worse than what's the real consequence of being wrong. Up front, you're actually essentially guaranteeing that there isn't a consequence to be wrong.

Michelle Dennedy: Exactly, exactly. And if you're righteous about it--

Annie Duke: See you're actually setting that up in advance. That isn't the purpose of the data.

Michelle Dennedy: Yeah, yeah, and by doing so, you prevent even having a good dialogue much less creative solutioning and innovation. I think to me that's the most amazing thing about your work, is we're talking about maximizing human potential and creativity and innovation, and we're cutting ourselves off using a tool, data, that feels so scientific, it feels so safe. But it's really, you gotta do some stuff to safety proof your problem of bias, don't you?

Annie Duke: That's exactly right. And I think that one of the big problems is that one of the issues that we have once we have uncertainty and hidden information, is that we have so much kind of cognitive rope, that there's just a lot of leeway there for us to reason toward what it is that we want to reason toward, and the problem is that we're not even going to know that we're doing it. And I think that, that's really the big issue, is that particularly when we're talking about using data and we're smart, it sort of aids and abets these very, very convincing rational sounding stories that we're really telling ourselves in order to be able to tell other people.

And we're really unaware that we're doing this. We all have this really big blind spot bias, right, and one of the big issues that they found with blind spot bias, confirmation bias, and in general this whole problem with motivated reasoning, which is reasoning toward a conclusion, is that it's actually much worse when you're smart. And that's because one of the core things, and we know this from work at from 1990, about motivated reasoning, is that we wanna be able to tell ourselves, we want the story to sound reasonable. So we don't want to say, "Oh, I was late to dinner because aliens captured me." What we wanna say is--

Michelle Dennedy: Sometimes I do wanna say that, to be fair.

Annie Duke: Well that's right, that's true. Some people would, but let's say that we're reasonable human beings. What we wanna be able to tell a story is like, even though we left too late, we wanna be able to tell a story, like what could I do, I couldn't anticipate the traffic. So we want it to sound pretty good. And the more mentally agile we are, the better we are at processing information, or slicing and dicing data, or statistically agile. The better we are at really spinning stories to kind of support the narrative that we wanna support and we'll be completely unaware that we're doing it. We could have, really the best intentions, and not know that this is what we're doing.

So without other people to check you, without a really open dialogue kind of poking at the kinds of questions that we need to ask each other with an accountability to accuracy, as opposed to what I sort of think about is the difference and being right, which sound like the same thing but they're not. Being right is just affirming your prior. Being accurate is trying to find out what ... get as close to the objective truth as possible. Have our mental models improve. And I think that without a commitment to accuracy and a good group of people around you that are willing to poke at you, and you're willing to have them poke at you, and you're willing to poke at them, and ask those kind of Einstein like questions. Which is, well what if you are on a train, moving at the speed of light, and you're willing to tolerate that, I think it's very, very hard to sort of fend these things off on your own.

Michelle Dennedy: Yeah, I think that's right and I mean I think, the scary thing for me about this conversation Annie is, that my whole staff is like, "We always like to tell you how you're wrong and why you're wrong," and now they're gonna be like laughing at me and saying, "See, Annie says that's what we should be doing." Which I think they're actually, I will confirm my bias that they are correct. They should be. I wanna close with your--

Annie Duke: Yeah, I think that one of the best things to do is actually in that kind of case to think about it as a game with a different goal, like change what the goal of the game is. I think that our natural goal is to be right, is to not feel like we did anything wrong. That bad things aren't our fault. That good things are to our credit. So on and so forth. And that's kind of naturally the goal of the game, in order to support a narrative about ourselves that feels good.

Michelle Dennedy: I think that's why we have kids isn't it?

Annie Duke: It is.

Michelle Dennedy: I'm pretty much confronted on a daily basis that I'm a complete idiot.

Annie Duke: It's so true. So yeah, just change the rule of the game to, the rule of the game is I wanna be the best credit giver, I wanna be the best mistake admitter. And this is why my culture is gonna support when I say, "You know what, I'm thinking about this a different way now. And I realized that maybe I was missing this in the data. And maybe I was thinking about this the wrong way, or I aggregated things together that shouldn't be aggregated together." Or, I was, I had the wrong coefficient or whatever it might be. That when you're willing to sort of poke at yourself, everybody's going, "Wow, that's really amazing that this is so helpful."

Annie Duke: And when somebody tells you a place where they think that you need to recalibrate, that you thank them for it. And that, that feels really good and you're supported for it. And I think that if you can start to sort of change what that social reinforcement is, where you become less, and it goes back to what I said in the beginning, their weird thing about the answers to start to divorce yourself from the results. Where what you're getting credit for is not, "Oh I had a good outcome," it's, "Oh you had a really good process."

Michelle Dennedy: Yeah, I love this. I love this. And Annie I could talk to you all day. The people in the booth right now are like standing on each other's heads and acting out, Michelle with a gag on her face. So unfortunately, I'm gonna beg for you to come back and talk some more about this, and-

Annie Duke: I would love to.

Michelle Dennedy: Yeah, 'cause I have so many more questions about how do we do this better, and I'm so fascinated, 'cause of course my bias is, I studied psychology and self-efficacy was my thesis, which is basically the belief that you can do something you really shouldn't be able to do, right? In many cases, that you can, and I think it's also fascinating to me when you're in the Bronx and you see a two-year-old and she's like, "Mom, where are we going? To the Bodega?"

Like that pattern and that way of talking, and being, and gesturing. We have heavily accented large data sets in our compute power in front of us. And we don't even, we can't hear the bias. We can't hear the accent, and we haven't really done knowledge acquisition yet, so I'm gonna beg you to come back again, and let's end on a high note of, what gives you hope, Annie Duke? Who tells you, you're the best mistake-maker, credit-giver?

Annie Duke: You know, I think that what gives me hope is, when I look at the top poker players in the world and the way that they talk to each other. And you just see these people who are just begging for people to tell them they were wrong. And they delight in the ability to do that. And you do see real changes in people's ability to handle the uncertainty and to learn from their outcomes, and to figure out what properly goes in the skill bucket and what properly goes in the luck bucket.

And you know, their attitude toward uncertainty completely transform. And what I feel like is, if you can see that in that type of setting, where the cards are really never revealed, so there isn't ... it's interesting because knowing what the right answer is, is powerful, but knowing what the definitely wrong answers are is actually more powerful, and that's one of the problems with poker is because the cards are never revealed, there's no clear wrong answer. It's never revealed.

Michelle Dennedy: Right. You never really know.

- Annie Duke: You never really know, and so when you see the top player's ability to handle that and figure out a way to learn, and de-bias, and become open-minded to other solutions, that's what gives me hope that maybe there is some way to replicate that. Not just in terms of the way that we deal with that in business, but also for example, the way that we deal with that in political discourse.
- Michelle Dennedy: Absolutely.
- Annie Duke: So I would say that I'm pretty optimistic, despite the fact that I say, "Oh, we're all very biased and we have a lot of cognitive rope that we can hang yourself with." You know I also think we're more powerful in a well formed group, but it has to be well formed.
- Michelle Dennedy: Yeah, I love that and I think you're absolutely right. That's what I was thinking as you were explaining this, is knowing what the definitely wrong answer and being okay with a little uncertainty, and being okay with a little risk, and allowing for a little, dare I say, magic in there. Where you just kind of accept and you learn how to be wrong well, and you learn how to keep yourself open to those possibilities. I think that is where the innovation, that is where the train takes off at the speed of light, and you find black holes, and dark matter, and all sorts of crazy things out there.
- Annie Duke: I completely agree, and it's like redefining what it means to be wrong, right? If you tell me that I'm wrong about something, it means I'm gonna be more right for the rest of my life. I'm gonna get so much more right out of you telling me I'm wrong. I'm gonna have a little bit of pain right now, but it means I'm gonna calibrate and my model of what the objective truth is, is going to get better and better. I'm gonna get closer and closer, and that means that everything I get going forward, all the decisions I make going forward are gonna be better because my beliefs are gonna be better. And my beliefs are gonna inform all of the decisions that I make. So, like when I hear that I was mistaken about something, I really do try to approach that as a joyful moment.
- Michelle Dennedy: Yeah, I love that and I think it actually, it brings it all the way back down to where we started the conversation with these little kids, right? They learn, they adapt, they make mistakes. They're not mad that they called a shoe, they thought it was the same as a dog. It's, you just learn how to, I don't know, be joyful in the wrong. I think that's a good way to close us out. Let's be joyful in the wrong, Annie.
- Annie Duke: Everybody watch a child learn to walk. When they fall down, they're not embarrassed. They just get back up and they try again.
- Michelle Dennedy: That's good 'cause I'm pretty much that every day. Thank you so much, Annie. This is like, I could go on. I seriously think, I think Susan Borton our producer is having a heart attack as we speak, so the data suggests that I should get in there, give her some CPR, and let you go.
- Annie Duke: We'll have to do it again.
- Michelle Dennedy: Yes, definitely. Thank you, thank you, thank you, Annie, and you are our biggest celebrity to date, so thank you.
- Annie Duke: Oh well, I don't really think of myself as that, but thank you, thank you.

Michelle Dennedy: You're wrong, be joyful. Have a great one Annie, thank you so much.

Annie Duke: Alright, thank you.

Michelle Dennedy: You've been listening to Privacy Sigma Riders brought to you by the Cisco Security and Trust Organization. Special thanks to Kory Westerhold for our original theme music. Our producers are Susan Borton and David Ball. You can find all our episodes on trust.cisco.com or subscribe wherever you listen to podcasts. Then please take a moment to review and rate us on iTunes. To stay ahead of the curve between episodes, consider following us on Facebook, LinkedIn, and Twitter. You can find me, Michelle Dennedy on Twitter, @mdennedy. Until next time.