

Rationally Speaking #239 – Saloni Dattani on “The debate over whether male and female brains are different”

Julia Galef: Welcome to Rationally Speaking, the podcast where we explore the borderlands between reason and nonsense. I'm your host, Julia Galef, and my guest today is Saloni Dattani.

Saloni is a PhD in psychiatric genetics at King's College London and the University of Hong Kong. I enjoy following her on Twitter, so I've been looking for a good excuse to do an episode with her, and this week she provided me with one in the form of a book review of *The Gendered Brain* by Gina Rippon.

Actually, it wasn't just a review of that book, which just came out. It was more of a discussion of the cluster of books that have come out in the last decade or so, on whether there are innate differences in male and female brains. Like, for example, Cordelia Fine's *Delusions of Gender*, which Rationally Speaking actually covered in an old episode, like eight years ago now. It feels like a lifetime.

And I found Saloni's discussion of this whole debate really clarifying, so that's what we're going to talk about today. Saloni, welcome to Rationally Speaking.

Saloni Dattani: Thank you for having me.

Julia Galef: So, when I try to follow this debate on differences between male and female brains, I keep feeling like the claims are so slippery, and hard for me to pin down exactly what people are disagreeing about.

Sometimes, it seems like people are disagreeing about: are adult male and female brains different? Sometimes it seems like they're disagreeing about: are there differences that are hard coded in our genes, that make male and female brains come out differently?

What is your impression of the actual claims under dispute, here?

Saloni Dattani: Yeah, that's my impression, as well. I have the feeling that people are making contrasting claims that are not necessarily in contradiction with each other.

So, one claim that people make is that any sex differences that exist between males and females are the result of socialization, or gender roles and expectations that people have in society. And the opposing claim is that, no, instead, they are caused by genetic or sort of innate differences that emerge over time.

But, for some reason, sometimes people who claim the former, that gender differences in the brain are socialized, will also argue that there are no sex differences in the brain, or that there are very few of them. So, that's one thing that I find quite confusing...

Julia Galef: I'm sorry, the thing that you find confusing is that the people arguing that sex differences are socialized, or due to peer culture, will sometimes also allow that there are differences hard coded into the brain? Or --

Saloni Dattani: Oh, no -- sometimes people will say there are sex differences and they're caused by socialization. And other times, they will say, "Actually, there are no sex differences in the brain, or that they're so small that they're insignificant."

Julia Galef: Oh, got it, got it. I see. So, those are two different hypotheses, both of which, quote/unquote, "Blame culture."

But one of which is that the brains are the same, we just behave differently because we're responding to different incentives, you know, like what people reward socially or punish.

Saloni Dattani: Yeah, exactly.

Julia Galef: And then the other version of the hypothesis is we're socialized differently, which actually changes our brains. And now our brains are different, men and women, but that's the fault of culture and it didn't have to be that way.

Saloni Dattani: Right, yeah, yeah.

Julia Galef: Okay, great.

Saloni Dattani: And then, there're also different complaints about whether hormones affect our brain development. So, people will point to evidence about women [EDIT: She meant to say "men"] who have something called androgen insensitivity syndrome where they don't respond to the hormone of androgen, and therefore they don't develop genitalia in the same way that typically developing females [EDIT: males] do.

So, they'll talk about specific hormonal claims and how that relates to our biology. And, one thing to remember about that is that hormones are not necessarily a purely innate factor. They can be affected by our nutrition and medication as well. So there's not necessarily a reason to have so much dependence on that claim for the overall question of innateness to be true.

Julia Galef:

So what do you think our priors should be? How surprising would it be, a priori, if male and female brains were not different due to some innate factor?

Whenever people argue about one of the two hypotheses you were just describing -- that attribute all of the observed differences in one way or another to culture -- whenever people argue that, it always strikes me as kind of a priori unlikely, for various reasons.

Like all these other features we observe that differ between men and women are genetic. And yeah, the evolutionary pressures were different for men versus women.

... And so, that's not conclusive, but it just seems like, a priori we should be suspicious that there would be no differences between male and female brains.

What is your sense of what a reasonable prior would be?

Saloni Dattani:

Yeah, I agree. I think that we should have a prior that there will be some sex differences. I do think that sometimes they're exaggerated, but some of the reasons I think we should expect there to be differences, primarily, is the sort of existing sub-sexual selection in lots of organisms.

There are lots of sexually dimorphic traits that people will already agree with. So, physical traits, for example, are highly sexually dimorphic. Such as height or genitals or breast development or something like that.

But then, there are also other parts of hormonal changes that occur during our lives that people will agree, at least I think, are different between the sexes. So for example, the level of hormones across our menstrual cycle, for example, is influenced by our hypothalamus. The hypothalamus is in the brain. And so you would expect there to also be other differences in the brain that affect these levels of hormones.

Julia Galef:

The argument that sexual selection that we observe in the animal kingdom -- and that we assume humans faced as well -- should shape priors that we have, on what differences we would expect in male and female brains... How do the people arguing that there are no innate differences in male and female brains deal with that fact?

Do they claim that, "Yes, it would be surprising a priori -- but the evidence just is strong enough that we should conclude in the case of humans it didn't actually turn out that way?"

Or, do they dispute the fact that sexual selection exists, or that it should shape brains?

How do they deal with that?

Saloni Dattani: So, I think the primary argument against it is that culture plays so much of a role that a lot of our behavior is affected by the environment, and that's not something that other organisms have to face in the same way.

Julia Galef: But, how would that take ... it seems like the sexual selection causal arrow would still be feeding into the way human brains would develop.

And then you could lay culture on top of that, and expect to get a very different result in the end, but that doesn't eliminate the fact that we have this causal arrow from sexual selection that we would expect to have some influence, right?

Saloni Dattani: Right, yeah, I agree. I don't think they really tackle that question very much.

Julia Galef: Okay. So, in the review that you wrote of Gina Rippon's book, *The Gendered Brain*... if I'm understanding correctly, she's arguing against the claim that there are structural differences in the brains of male and female babies, that the brains come out differently from birth. So, she's tackling that version of, "The differences are hard coded," right?

Saloni Dattani: Right.

Julia Galef: Is that actually a central claim that the people who argue that male and female brains are different are relying on, or is that more of a straw man?

Saloni Dattani: Sometimes it is. Sometimes it is actually an argument that people who claim gender differences are innate will use.

A lot of brain development in humans takes place before birth. And so you would expect there to be sex differences present at birth if they were innate, for example.

But, you would also expect sex differences to emerge over age. So, if they do emerge over age, that doesn't necessarily mean that they're a result of socialization.

Julia Galef: Yeah, that was one of the central points of your review that had not occurred to me before, and that was sort of clearly true when I read it and was like, "I wish this was a more prominent part of the discussions."

Can you elaborate on why sex differences that we only see later aren't necessarily due to socialization?

Saloni Dattani: Yeah. So, just generally, when we think about innate causation ... if you think about, for example, somebody with Huntington's Disease, they will have a gene mutation in the Huntington Gene that doesn't emerge until they're in their mid 30s or so. But, just because it's happened later on in their lifespan doesn't mean that it's not something that they're innately predisposed to.

And in the same way, when we're talking about gender differences – like, puberty happens when kids are in their adolescence, and that clearly creates a divergence of physical traits. So, you would expect that there are certain traits that will emerge over time in a predictable innate way because of genetics.

And, I think that people might find that confusing because they have this impression that your DNA is sort of stable throughout your lifespan and that it doesn't change even in its expression. But the reality is that even though your DNA is pretty much fixed, the expression of those genes and the timing of the expression is kind of also partly predetermined.

Julia Galef: And how much of the model of innate sex differences would we expect to be structural? How much would we expect to emerge in the brains of babies and how much would we expect to be kind of dormant until puberty or other hormonal events?

Saloni Dattani: That's a good question. I'm not really sure. I do know that there are brain imaging studies of children and adults, and they both find sex differences. And, I know that, for example, most brain development occurs in infancy, but then also during puberty, and there's a lot of neuronal pruning that occurs. So, lots of neurons proliferate that are then pruned and not needed later on in life.

So you would kind of expect there to be some patterns that would emerge over time. But, I'm not really sure if there are any big studies that have looked at those predictable differences.

Julia Galef: Have any of the authors arguing against the sex differences hypothesis, like Rippon or Cordelia Fine ... have any of them

addressed the claim that we should expect some sex differences to emerge in puberty or other hormonal events?

Saloni Dattani: Actually, I didn't notice that from ... so, Gina Rippon and Cordelia Fine don't mention those as far as I know. But another writer that I read, Lise Eliot, she talks about this --

Julia Galef: *Pink Brain, Blue Brain?*

Saloni Dattani: Right, *Pink Brain, Blue Brain*. So, she talks about puberty, and also this mini puberty, that occurs when infants are about six months to 12 months of age, that involves a hormonal surge, that can then affect how they respond to different environments, because it changes their neural organization.

Julia Galef: And what does she say about it? I thought the thesis of that book, which I haven't read, was that there aren't sex differences between male and female brains. Is she rebutting the hormonal argument?

Saloni Dattani: I was quite surprised by that. Because I have noticed in a lot of public reviews and commentaries she's written, she seems to take a very strong view against any innate differences.

Julia Galef: Yeah, I actually have a quote from her that I was going to bring up in a *Nature* article she wrote. She said, "The brain is no more gendered than the liver or kidneys or heart."

That seems pretty strong to me.

Saloni Dattani: Yeah, exactly.

Julia Galef: So, yeah, what does she say about the hormones?

Saloni Dattani: But, in the book, she's actually very open to agreeing that there are lots of innate differences... she simply says that they've been exaggerated, or we're ignoring socialized differences.

Julia Galef: This is what I mean. This is why this debate is so slippery to me.

I read this claim, that seems very clear-cut, about the brain not being gendered just like the kidneys. And then, the actual details include all these allowances -- which seem like they're sort of treated as caveats or footnotes or something, but they seem extremely central.

Like... Didn't you just concede the main point we're debating?

Saloni Dattani: Yeah, I think it is a slippery debate. And that's one of the things that I mention in my review, that people seem to behave as though they have to take really strong positions on either side, for every single evidence in their argument.

Julia Galef: Yeah. I've been thinking about this just as a feature of disagreements and quote/unquote "discourse" in general. That one of the things that might make it so frustrating and unproductive is that maybe when people are giving their arguments or stating their position, what they're doing -- unconsciously, probably -- is not trying to state exactly what they think the truth is, but they're trying to state something that will move the overall consensus closer to what they think the truth is.

So, it's sort of like if everyone was voting on how they wanted money to be spent on something in the budget. And I actually thought that we should spend a quarter of the money on education, but everyone else thought we should spend only 10%. I know that my vote isn't going to count for much, so in order to get us to a quarter, I have to say that we should spend 90% on education or something.

And everyone's doing that. And so, when you listen to what people think the divide between innate and socialized differences is or something, they're not quite saying what they really think. Or, at least, their topic sentence, the "headline" of their position is not saying what they really think. It's saying the thing that they think will move the debate towards the right thing, according to them.

It makes things so confusing.

Saloni Dattani: Yeah, I agree. I think I've noticed that, as well.

Julia Galef: Okay, so, to go back to the "structural differences in babies' brains" part of the hypothesis space --

It's been a long time since my episode with Cordelia Fine, but I remember discussing a study, I think it was by Simon Baron-Cohen, on male and female babies showing differences in their brains. In terms of spacial perception, or the way male versus female infants respond to human faces, or something -- that female babies were more empathizing and less systematizing. I think this was it.

And Cordelia Fine talked about how that study was poorly conducted and we shouldn't update from it, basically. Do you agree with that? And are there other studies showing differences between

male and female baby brains that you *would* consider better evidence?

Saloni Dattani: I'm not actually sure of any big studies that look at babies' brains, apart from the one that you mentioned. And I think the difficulty with doing your imaging on babies is that they move their heads very often while they're in the neuroimaging machine, and that makes studies very difficult.

So it means that researchers have to add a lot of adjustments to the imaging that helps them to pull out signal from random noise or movement.

Julia Galef: What do you mean by adjustments to the imaging?

Saloni Dattani: So, for example, you might have to sort of decide on the thickness of the cortical region that you want to look at. You might have to decide on the timeframe that you want to repeat every image. You might have to decide on the size of the voxels, like the little pixels that you look at in the imaging that comes out. So there are a lot of things that researchers can do to find differences that didn't exist.

So I do think that, especially with neuroimaging on babies' brains, that becomes quite difficult. And I would probably agree with her that some of the research is not done ideally.

But, I think I remember in Gina Rippon's book, she actually mentions this as well, and she concludes that there are small differences in infants' responses to gaze and attention, I think, and spacial rotation. She just says that they're very small and that there aren't any other differences.

Julia Galef: Oh, which is what Baron-Cohen is measuring.

I guess it would be unclear to me how significant ... like, the literal size of the differences between, I don't know, how long female babies stare at a face versus male babies, or, I don't know exactly what they're measuring, but the literal size of those differences... It's unclear to me how significant we should think a difference of one-and-a-half seconds on average is? Because they're just babies. Maybe a differences in one-and-a-half seconds of staring at a face as babies translates into a 50% difference in empathy as adults. Or in preference for nurturing or whatever. So I don't know how we would measure that.

Saloni Dattani: Yeah, I'm not sure, either. I don't know very much about that study in particular.

Julia Galef: So, let me see if I correctly understand the different possible causes of the sex differences that we observe in adults, men and women.

And these are not mutually exclusive.

So, cause number one is: Brain structure is hard coded differently, in a way that you can see, just in an infant. So, the causal structure here would be: genes cause a difference in brain structure, which then causes a difference in observed sex differences. So, that's one.

Two would be: hormones that are hard-coded cause brains to develop differently over time between male and females. So that causal structure would be: genes cause different hormones, the hormones change the brain structure, and the brain structure changes or causes the observed sex differences that we see.

So, those two hypotheses are both ... they're both innate.

And then number three would be: Males and females are socialized differently, or they face different kind of cultural influences, and that causes their brains to develop differently over time. Maybe female children get more attention, and so the empathizing part of their brain or whatever gets stronger and bigger. And that causes the observed sex differences we see in adults. So, that would be: socialization causes a difference in brain structure, which causes a difference in observed sex behavior.

That's not ... there's no innate factor, there. That's just: same brain, same genes, but different cultural influences.

And then, the last one on my list is: Male and female brains are the same, but cultural influences just as adults cause people to behave differently. So, that's just like: socialization causes different observed sex differences; there's no difference in brain structural hormones, and that's ... I guess those last two are the two you were distinguishing between at the beginning of our conversation.

Saloni Dattani: Right, right, that's exactly right.

Julia Galef: So, that's four theories. The first two are innate. The second two are socialized. Does that seem like the whole space?

Saloni Dattani: I think so, yeah.

Julia Galef: I guess ... I'm just looking at it, now. Maybe one I didn't account for is: when you were earlier talking about, "It's tricky with hormones because environmental factors can affect hormones, too."

Saloni Dattani: Oh, right, yeah.

Julia Galef: Could that be ... could we also have a causal path that goes from: different socialization triggers different hormones, which changes the brain structure?

Saloni Dattani: Yeah, I think so. I haven't actually noticed any of the sort of feminist authors who argue against gender differences ... I don't think I've actually noticed them saying that, but that's definitely another causal pathway or it could be.

Julia Galef: If I was motivated to find an explanation for observed sex differences that didn't rely on anything innate, I feel like that would be a go-to. If that was scientifically plausible, I would lean on that. So, can you help me understand the role of hormones better? Why is it not straightforward to just be able to tell how hormones change the brain?

Saloni Dattani: So, basically, males and females diverge in the Y chromosome, which has a gene called the SRY gene, and this gene causes the production of testosterone in males, and also this other hormone called the Müllerian duct inhibitory factor. And both of those then cause a long pattern of development that causes boys to diverge from girls.

And I think the reason that it's difficult to tell how it acts on the brain is that many of these changes use the same hormones even though the organization is sort of determined very early on. So, you might have subtle differences in your anatomy when we're infants, but those subtle differences are then acted on by the same hormones and the same hormone receptors.

So it seems as though there isn't that much difference in men and women, but because the initial change in neural organization, they're kind of the large differences in what you observe afterwards.

Julia Galef: So, how would we distinguish between the hypotheses where hormones are hard-coded to change male and female brains, versus the hypotheses where environmental factors change hormones, which change the brain?

Saloni Dattani: That's a good question. I think one good way to look at that would be to look at individuals who don't produce those hormones, or who have hormonal receptors that are insensitive to the hormones. So, for example, some girls [EDIT: boys] have androgen insensitivity syndrome, which I mentioned before, and that means that even with the same hormones that they can receive from, let's say, the

environment, or from their hypothalamus, they still won't respond to that stimulus.

Julia Galef: But, they might be different in other ways, too, unfortunately.

Saloni Dattani: Right, right.

Julia Galef: Taking a step back for a moment: what's your take on our current best guess of what's going on?

Saloni Dattani: I sort of don't see a lot of the arguments as incompatible with each other. I kind of would expect there to be innate differences, especially in things like sexuality or sexual orientation. Those are large ones.

And then, things like physical traits, physical aggression, things like that. Maybe some other psychological differences, sort of taken as a whole, are often different in men and women.

But then you can also see lots of other cultural factors or environmental factors that men and women more similar or different from each other in different contexts.

So, I kind of agree with both of the views. I think that they can sort of affect the brain and sex differences at different times and at different levels.

Julia Galef: How much of that picture that you just painted is based on common sense priors, and how much of it is based on evidence that we've collected?

Saloni Dattani: So, I think most of it is based on sort of priors from other organisms, or looking at just predictable gender differences that occur universally, in different countries and things like that.

Julia Galef: Okay. And out of the evidence that we have collected, is there any that ... I guess one type of evidence that you mentioned that seems solid enough is some studies showing small differences in the structure of male and female baby brains. Or, I forget if it was the actual structure of the brains, or if it was their behaviors, like how long they look at a stimulus.

Saloni Dattani: I think it's the gaze behavior that's reliable.

Julia Galef: The gaze behavior, okay, yeah, got it. Are there any other studies that give us evidence that bears on this debate that you think is reasonable enough to update on?

Saloni Dattani: I'm actually ... that's a good question.

Julia Galef: It seems like it should be a vast amount -- there's so many studies, there's so many books written...

But, when you really narrow it down to stuff that helps you distinguish between these different hypotheses in a reliable way, it's pretty slim pickings.

Saloni Dattani: Yeah, so, there's a lot of cherry picking. There's a lot of very shallow evidence. One example of that is people looking at prenatal testosterone and how that is correlated with differences in adults.

Julia Galef: Like in the womb?

Saloni Dattani: Yeah. It's very difficult to measure prenatal testosterone accurately, firstly. But, also, people tend to use proxies to sort of catch those things out. So, for example, people will look at your digit ratio, which is the length of your ring finger to the length of your index finger, and that supposedly correlates with the level of testosterone you had in the prenatal environment.

But, it seems like a lot of that literature is very contradictory, and when you look at large meta analyses of the research, they don't find any differences, or they find very tiny effects. So, it's difficult to really know, I think.

Julia Galef: Why can't we just measure the amount of testosterone in the womb? Is that too hard to do medically?

Saloni Dattani: I can't remember. I think that it's something to do with that, but I'm not sure.

Julia Galef: And, the books that Cordelia Fines and Gina Rippons and these ... I forget her last name, Pink Brain, Blue Brain.

Saloni Dattani: Lise Eliot?

Julia Galef: Eliot, thank you. So, I know they're kind of trying to debunk studies that purport to prove any differences. Are they making a positive case as well? Or are they just arguing you can't prove there are any differences?

Saloni Dattani: Yeah, so, a lot of the claims that they make are for socialization, especially in Gina Rippon's book. She uses examples like stereotype threat or role models and she says that children respond differently to socialization and that's reflected in their brain activity, and that's

how we know that cultural effects are responsible for any sex differences that we see.

Julia Galef: There was a big leap in that last link... also, wasn't stereotype threat a victim of the replication crisis?

Saloni Dattani: Right. I don't think she noticed that, or she didn't pick up on it in her book.

Julia Galef: And, just for the listeners who haven't heard of it, what is stereotype threat supposed to be?

Saloni Dattani: So, stereotype threat is the idea that if you know that people have a negative stereotype of your performance on some task, then that makes you feel bad or, in some way, it makes you perform worse on the task that think you're supposed to perform badly at.

And the general claim is that there are stereotypes about women, for example, that girls are bad at maths or bad at science, and that when they hear these claims about their gender, they will then perform differently. And so, the reason that we see differences in, let's say, maths performance, if they exist, then those differences are because they've been told or conditioned to believe that they're going to perform worse on those tests.

Julia Galef: Right, right, yeah.

You know, even though I do ... I would be shocked if cultural differences and socialization and so on wasn't a huge part of the picture. But if you try to pin down any one piece of the cultural effect, I wouldn't be confident that you could pick that up in a study, or that it would be significant at all.

Like, stereotype threat is one tiny piece of this potential cluster of cultural effects. Like, messaging, the way women versus men are portrayed in movies or TV, you know. The way teachers treat their students. It's just so many different things.

And it seems like that makes it really hard to test. Because if you want to isolate something enough to be able to vary it, then you've isolated it down to the point where you no longer think that particular piece is all that important, right?

Saloni Dattani: Right, exactly. And, it's really strange because many of these authors argue that the effects of these individual things are really large...

Julia Galef: Because they have to, if you only have evidence on-

Saloni Dattani: ... and all of these things together would make a massive aggregate difference.

Julia Galef: Yeah, no, that's a good point, when you carry that to its logical conclusion.

What study would you do? Let's say you had an unlimited budget, or functionally unlimited budget. Let's say you had to abide by normal ethical standards and research; like, you can't take a bunch of babies and isolate them from birth in fake environments or whatever. But you have a bunch of money and you can just kind of design whatever study you want, and it can take ...

Well, I guess I'm interested both in what you would do if you had 30, 40 years, but also what we could learn in just a few years. What do you think the most useful kind of study would be?

Saloni Dattani: That's a good question. I think it would probably be something experimental about, for example, changing the environment that kids grew up in. And if you sort of moved girls and boys to a more traditional home environment, would they act out differently to a more liberal home or something like that? Or trying to randomize the treatment of whatever large intervention you have between sexes, I think. Maybe something like that.

Julia Galef: Like randomly assign socialization?

Saloni Dattani: Yeah, exactly, because the main claim is that our society is extremely gendered and there are these gender roles that affect how we behave in the world, and if you could put people into a different socializing environment, would they act differently? I think that would be the sort of central claim that would have to be fulfilled.

Julia Galef: Got it. I mean, don't we just see men and women behaving differently over different periods of time? Surely, genes can't be that different from one generation to the next in America, so it's got to be culture.

Saloni Dattani: Yeah, I agree.

Julia Galef: Why do you think it matters? Or, why do you think people think it matters how much of the difference in observed sex behavior comes down to innate factors?

Saloni Dattani: So, I think it's two things. I think the first thing is a belief that if you say something is innate, that means that it's fixed and it can't be improved on. So maybe you think there's a difference between men and women on maths performance that is innate, and that means that women are maybe doomed to be worse at maths. And the idea that we can't improve on those things is not an appealing one.

So I think that's one reason why people are afraid of attributing things to innate causes -- which is not necessarily something that we should conclude because there are lots of innate sort of causal pathways that can still be altered by the environment, anyway.

Julia Galef: Like, what would be an example just in this particular case of math abilities in males versus females? What's an innate pathway that could exist that could also be altered?

Saloni Dattani: That's a good question. I'm not sure about maths performance. I think the-

Julia Galef: Okay, what's another example, then?

Saloni Dattani: The textbook example of this is like people who have shortsightedness, for example. They're predisposed to read a lot of books, maybe, for example, and then that results in shortsightedness, but it doesn't really matter because they can wear glasses or contact lenses, and that resolves the problem that they face.

Julia Galef: Got it. I see, so just to go back to the math example and speculate wildly:

if it were the case that females were quote/unquote "hardwired" to have difficulty with some aspect of math -- like when you do the spatial, visualizing objects: rotating an object in your mind or something is harder for women than men -- if we knew that, then we could design interventions like glasses...

Although... it's not even clear to me why it would matter if that was innate, though? Couldn't we just observe that women have trouble with this aspect of math, and then design aides to help with that, without ever finding out whether that difficulty was hard coded or not?

Saloni Dattani: So, I think the question of whether they're innate relates to sort of the present environment. So, for example, somebody might say, I don't know, 30% of the differences between women's performance in math is due to innate differences.

And then they might say, "Well, look, there's lots of ... there's a large role for the environment at present, which means that there are lots of environmental interventions that are already taking place that affect people's performance," and they don't treat it as something that can change over time.

So, let's say we find a new cure for some disease that affects women disproportionately, that would affect how innate the trait is later on in life when that cure is discovered.

Julia Galef: Oh, so this is a different use of innate than-

Saloni Dattani: Yeah.

Julia Galef: See, this is another reason I think the debate has felt so slippery to me, is that what we're counting as innate is kind of contextual.

Like, in some cases, what we care about is ... like, anything, once the students arrive in the testing room or something and we care about what differences were a result of the testing environment versus whatever they brought in with them or something -- but you could zoom out farther and ask, "Why did they end up with those differences going into the testing room? How much of that was due to genes versus their childhood socialization."

It's so confusing, oh my God. If I were empress of the universe, I would pass a law that whenever you're writing a paper or book or blog post or whatever, whenever you're opining on this, you have to draw your causal diagram of what you're talking about. Like I was doing in the air, in my head earlier... because then we might have a hope of figuring out what we actually believe.

Saloni Dattani: Right, yeah, I completely agree.

Julia Galef: You, at the end of your review of Rippon's book, you had this kind of depressing, "I'm losing my faith in our ability to discuss this," takeaway. Less so because of the confusion that I was just complaining about and more about ... I think you were despairing because of the misleading representation of research. Was that right? What was the cause of your despair?

Saloni Dattani: The reason that I felt very pessimistic about that style of debate is that it's very rigid in what it allows each side to believe. Every single piece of evidence has to line up on one side or the other, in the books that she's written, for example.

So, she would place a very high standard of evidence that she would require from claims about innate causation. And she would not place any standard, any of the same rigor on claims about socialization.

And, I think that that's a very common thing in these kinds of culture war debates where people have a lot of expectation for the claims that other people make, and they don't really try to improve the quality of their own arguments.

Julia Galef: Yeah. My favorite way to describe this phenomenon: I think it was Tom Gilovich, the psychologist who said that when we're evaluating something we are predisposed to believe or want to believe, we ask, "Can I believe this?" And then, if we're evaluating something we don't want to believe, we ask, "Must I believe this?" Just unconsciously that's the frame that we're evaluating the claim through. And the space between can-I and must-I is so big; you have so much wiggle room to get whatever conclusion you want.

Saloni Dattani: Right, exactly.

Julia Galef: Are there exceptions, though, to your despair? Are there any writers or researchers who you think are trying to be even-handed in the standards of evidence they use?

Saloni Dattani: Well, there have been recent discussions between Gina Rippon and Cordelia Fine and some of the sort of evolutionary psychologists who take the opposing views. So, there's been a bit of back and forth on that, but I think they still haven't really ... that still doesn't translate to the popular science books that each of these groups write. So that's something that I worry about.

Julia Galef: Yeah. The debates you're referring to, are they in an article, a symposium, or --

Saloni Dattani: Yeah, so, there's a back and forth on, I think, Psychology Today, the website. So, there have been a few claims and counterclaims made from each of the groups where they address each other's criticisms.

Julia Galef: Okay, that's great. Can you send me a link to that?

Saloni Dattani: Yeah, sure.

Julia Galef: I'll post that on the podcast website.

All right, well, before I let you go, Saloni, can you suggest a ... or, not even suggest. Can you tell us about a book or other resource that influenced your thinking in some way?

Saloni Dattani: Yeah, so, one that I was thinking about is a book by Jerry Coyne called Why Evolution is True.

Julia Galef: Oh, yeah, that's the name of his blog, right?

Saloni Dattani: Yeah. That's also the name of his blog. So, it's a fantastic book that covers lots of different lines of evidence about evolution and how we know that it's most likely true. So, one thing that I didn't realize before was how having this theory to begin with can then lead to lots of other predictions. And those individual predictions can be confirmed or disconfirmed. And he kind of explains how they all fit together and how all of these lines of evidence converge.

Julia Galef: And the realization that the theory of evolution makes these predictions that can be confirmed or disconfirmed, was that significant for you because previously, the theory of evolution had seemed unfalsifiable or-

Saloni Dattani: Yeah, so, I think I had the impression that it was very obviously true. But also, I wasn't sure what could be used to disprove it.

Julia Galef: Right. That's so tricky, isn't it...

Saloni Dattani: And, so I think I had read a book about evolution when I was very young, about eight or so, and it was very convincing. But I also didn't have a clear picture in my mind about how scientists developed theories and then tested them out.

And this was a book that really shaped my thinking about the philosophy of science and how we should make claims and counterclaims.

Julia Galef: Yeah. Oh, that reminds me, actually: there was a question I wanted to ask you that I completely left out. You said ... this might have been in a Twitter thread about your book review, but you said that ... you were talking about the fact that sex differences that appear in young children are less likely to result from culture, but the opposite is not true.

You said there's a vast literature in the philosophy of biology that addresses these questions that popular science debates ignore. And, I'm just curious: how much do you think philosophers have been

adding to this discussion, beyond what thoughtful scientists are already saying when they describe the implications of their work?

Saloni Dattani: Yeah, so, it seems as though there's quite a large section of the philosophy of biology that addresses the questions of innate and acquired characteristics. And there are lots of biologists in history who have contributed to this debate, but hardly any of them feature in popular science debates in the present year for some reason.

And I'm not really sure why, because when you look at those debates, they really clarify what the arguments are, what the different theories of innateness are and how we know whether some parts of them are true or false.

Julia Galef: Oh, cool. That sounds like what I wanted all along! It was under my nose.

So, you say they don't factor into the popular science discussion, which I guess, I'm not shocked by. That's not really what the popular media is meant to do.

But do they at least factor into the academic debates over this? Or are the academics themselves confused about what they're arguing over?

Saloni Dattani: No, I think the academics are ... it seems like their consensus is about which definitions don't make very much sense and which ones are much likelier to be true.

Julia Galef: Okay... you know, when I saw you say that on Twitter, it took me back to the early days of Rationally Speaking when we were doing the Cordelia Fine episode and others, when it was me and Massimo Pigliucci co-hosting.

And we used to get into these just constant recurring arguments over the role of philosophy. And I was more dogmatically like "straw logical positivist" back then. And I was like, "Look, questions are either empirical and you can answer them with science, or they're just disputes over definitions and they don't actually matter, so what is the role of philosophy?"

Which obviously drove philosopher Massimo up a wall. And so, sometimes, he would point out, "Look, there are these tricky questions about the implications of theories and what actually would constitute evidence for a theory,"

And I would allow that, but I would say, "Okay, but then the scientists should just be arguing about that. It's their theory. Why do we need a whole separate field called philosophy of physics or bio or chemistry or whatever, to have these arguments?"

And I forget what he would say. I'm sure he had some good response to that.

But it brought that debate back when I saw you comment about philosophy of biology. The debates that you're referring to are the discussions that kind of clarify specifically what the hypotheses are, and what we mean by innate, and what would be evidence of that version of innate.

Are those philosophers who are making those clarifications?

Saloni Dattani: Yeah.

Julia Galef: I see, okay.

Saloni Dattani: So, it's loosely philosophers. There are a few biologists who I think have been prominent in the intellectual history of this kind of field, so I think there's one called Conrad Waddington who developed this theory of the developmental landscape. So, that's kind of the theory that I laid out in my article where you would look at somebody's trajectory over time, and if they diverge from some trajectory because of an environmental intervention, than that would be evidence for some cultural contribution to people's behavior.

Julia Galef: Is that the hypothetical experiment that you were describing when I asked what you would do to pin down the theories?

Saloni Dattani: I think that was not exactly the same, but I think this would ... this is, I think, a very good clarification of what it means for something to be innate and something that's predictive. It's a trajectory that is buffered against any environmental changes.

Julia Galef: Interesting. I'm so excited, now, to dig into the philosophy of bio literature, to see the mapping of the different hypotheses. Maybe you can give me a few links to some articles, and I'll put those up, as well.

Saloni Dattani: Yeah, sure.

Julia Galef: Cool, well, Saloni, thank you so much for coming on the show. This has been a fun and, yes, clarifying discussion. We'll link to your

review and to your Twitter feed, too, which I recommend to all our listeners.

Saloni Dattani: Great, yeah, thank you so much for having me on. It was great.

Julia Galef: This concludes another episode of Rationally Speaking. Join us next time for more explorations on the borderlands between reason and nonsense.