

# Bridging the Gap Between Neuroscience and Philosophy of Mind

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Robert J Marks:

Greetings and welcome to Mind Matters News. I'm your more-than-a-meat computer host, Robert J. Marks. Co-hosting and doing the heavy lifting today is the always-effervescent bagpipe-playing, barbecue master chef, and sourdough bread artist Brian Krouse. And with Angus Menuge, Brian and I have co-edited a book called Minding the Brain, and it's all about whether the mind is greater than the brain. And today, we are having a great interview and continuing the interview from last time with our guest Dr. Joseph Green on the limitations of cutting-edge neuroscience, that was his chapter in the book, and so far it's just been fascinating. So with that, I'm going to turn the questioning over to sourdough expert Brian Krouse.

Brian Krouse:

All right. All right, good to be back talking about this fascinating subject. So I guess last time, we drilled into some of the cutting-edge aspects and the limitations of neuroscience, sticking to the technical scientific aspects. But now I'd like to move on and try to talk a bit about some of the philosophical issues. And of course, this is a theme of our book, Minding the Brain.

And in your chapter, you broadly put it like this. The philosophical question here is are we nothing but our brains? And I wonder if a good way to get into that is to just first define some terms. So you use a term in the chapter. Well, maybe I'll mention a couple terms and you can pick whatever order you want to get into. So you use the term materialistic monism. And you talk about the connection of this to the scientific method. And also, you introduce these terms of physical states and mental states. So could you kind of just unpack stuff in that neighborhood?

Joseph Green:

Yes. I'm a neuroscientist, right? So these terms are further away from my usual expertise and what I go about. But they're very important terms because the fact the way we approach doing science, I would say. And science, and neuroscience within it, I think has a specific method. And this method over the years has become, I would say, maybe this may sound a bit criticizing, but a bit flattened in a way, in the sense that we go about finding things in the neural system in a way that highly depends on our tools.

So we use tools that probe the system in a quantitative way, if you like, as much as we can, but also that prove the material aspect of the brain and essentially just the fact that neurons can spike or that specific chemical signaling is on or off or different neuromodulators are moving, are being released in the brain and so on. And all of these mechanisms or all of this signal is something that we can measure and quantify. Yet it doesn't mean that this is necessarily a full description of the brain. What I was mentioning last time is the fact that because we can record well neurons, we have been focusing a lot on neurons. It doesn't mean that neurons are the entire answer to what the brain is. So there is a bias that is quite strong in reducing the system.

Brian Krouse:

Is that what you mean by the materialistic monism, is basically saying all there is is matter?

Joseph Green:

I would say that there is a strong bias in thinking of the system as identifying it with what we can record. So whatever we can record and the way we go about it, and we can go about it is all there is. But it doesn't mean, I think, that that is necessarily true. There might be more to the system than what we can see or we can record.

At the same time, it's true that the scientific method needs answers and needs answer on what you can do on the system. So there is nothing wrong in a way with what we're doing, at least I don't think so. I think what we're doing, neuroscience is the right way forward. We are doing what we can and the best we can to pile up a good understanding of the brain does things. But it doesn't mean that we're yet seeing the full picture because we're reducing it, flattening it to whatever we can do.

And this has become, despite I go about it in this general way, this has become a bit of a belief, the fact that the brain is just a bunch of neurons and then we are just our brain, so we're just a bunch of neurons and no more. So it has become something that is not just a scientific method, it is something that is a bit more pervasive than a scientific method. It's really a description of ourselves.

So I don't speak of this so much that you see, I can nail it down in two minutes. But there is clearly a gap there, I would say, between the way we go about things or scientific method in neuroscience and the broad strokes claims that go about ourselves and we're just a bunch of neurons that has some computation. I don't believe that to be true.

Brian Krouse:

I see. I've heard put that this materialistic view, you could think of it as one metaphysical model. And then are you indicating that there ... Well, it might be the case that a different metaphysical model is a more true description of what's going on. For example, there might be some immaterial component of ourselves, whether it's some classical conception of the soul or something like that. But the fact that whatever this component of us is is not material would mean that it's not subject to measurement in the same way.

Joseph Green:

Yeah, this is where the conversation in this domain kind of leads, and essentially this is the ... Some people would say that this is the exit door from neuroscience and the entry door into philosophy, whenever we start asking and questioning whether or not there is more to the brain than just neurons. And it's an unfortunate, I would say, division of duties between sciences that stems from the fact that, again, the neuroscientific method of specific boundaries, of the type of questions that you can answer. And we know it cannot answer things about immaterial stuff because again, we just go about recording material things. So whether or not there are immaterial parts to the brain, we don't know it from a neuroscience perspective or at least we don't know it yet.

Brian Krouse:

Is it too naive to say that the fact that we don't, as we were talking about last episode, it's really a young field in many ways. We're discovering new cell types. We don't understand the mathematical model of the dynamics. There's all kinds of room for ... we're far from a full description of the causality going on inside the brain. So is it just that this makes logical space for different metaphysical models still to be true? And maybe as we progress, it'll rule one or the other out, but right now you can't get there from the data, is that what you're saying?

Joseph Green:

I think it might. I'm not the right person, I would say, to claim that specific metaphysical models can be ruled out or proven. But I would say that the space of specific, say, correlates or predictions of metaphysical models is being constrained more and more by our scientific advance. And this is becoming more and more interesting.

I think last time I mentioned that, for example, we can think nowadays of what it would take to modify or perturb a decision of an animal. So if we were, in a few years, understanding what are the areas, what is the specific circuit mechanism that the animal exploits and leverages to take decisions, and we could modify them, right? Say, "Now you go right," or "Now you go left," and now you see this and you do this thing. Then even this simple observation that I think it... Or understanding, I believe may or may not constrain some of the metaphysical theories.

Maybe not on aspects that are essential, right? An animal is still an animal, it's not a human. Does an animal have to have, for example, free will? It depends on what you mean with free will, right?

Brian Krouse:

Yeah.

Joseph Green:

Is a simple decision like going right and left subject to something like free will? Well, it's not an important decision, so maybe not. Right? It depends a lot on your metaphysical model that you take.

Brian Krouse:

Even if you could stimulate the brain here and then that leads the mouse to turn left instead of right, that doesn't necessarily tell you anything about what's happening in ordinary decision process of the mouse.

Joseph Green:

Yeah.

Brian Krouse:

All of that being done within the brain or some of it being done in the mind, interacting with the brain.

Joseph Green:

Right. It could also be that even if we could modify the decision of the animal, it doesn't mean that we modified what the animal decided. We're just modifying the downstream process, the correlates of this decision or part of the chain of this decision mechanism, doesn't mean that the decision was necessarily taken here or there. It gets very, very complicated.

Brian Krouse:

Yeah, that reminds me a little bit of Dr. Egnor, who's been on this podcast before, who's talked about patients that are conscious and they have a certain stimulation directly to their brain that causes them to move their arm. They could distinguish between the case that that stimulation caused it, it felt like someone was moving their arm for them versus them choosing to move their arm.

Joseph Green:

Yeah, exactly.

Brian Krouse:

Is that-

Joseph Green:

Yes.

Brian Krouse:

What to make of that is good ... Lots to say, I'm sure. But yeah, that's interesting.

Joseph Green:

Yeah, these are very, very important questions. I think that the major distinction that I drew in the chapter was about the fact that, least as I see it, it's important to understand that neuroscience is limited in going about these questions. And I think it's important to raise a flag in the sense that, a red flag in saying that neuroscience doesn't bear necessarily answers to these sort of questions. So whenever we take neuroscientific claims and we elevate them to philosophical theories about us as human beings, I think we're doing an extrapolation, which is not part of the scientific process of neuroscience, so we need to be careful.

Brian Krouse:

That makes sense. Now, would you have any opinions on if taking a materialist monist or maybe an agnostic metaphysical attitude would impact the way that you do neuroscience today?

Joseph Green:

I think it would. Yeah, I think it would-

Brian Krouse:

Okay. How would that cash out?

Joseph Green:

I think it does in a way on the... It would impact it to different levels, maybe that's a way to answer. Our understanding of us as human beings, of who we are, why are we here? What do we do, right? Impacts whatever we do, right?

Brian Krouse:

Yeah.

Joseph Green:

Even if you are not to do neuroscience, but you were to be a-

Brian Krouse:

Just at a human level of knowing what am I and yeah.

Joseph Green:

Yes, it does, right? It's for sure.

On a more specific level, understanding the role of our brains in who we are, it changes a bit, your understanding of what is a person. How much of what we do is controlled by things that happen in our brain? And thinking that our brain are everything we are, it's an important question. Is it or is it not true? Am I just a bunch of cells with no purpose to some degree? Or is there something more? Right? What is that more? These are questions that I think are higher resolution into the neural system. So if you study the brain, you understand more and more of the type of questions of what comes from your brain, what comes not from your brain, and it reshapes a bit how you think of your cells, right?

Brian Krouse:

Yeah.

Joseph Green:

And this is important. Yeah.

Brian Krouse:

You definitely see that going on a lot in popular media, whether it's like news stories sometimes, or a lot of popular books will... They'll be talking about some sort of human level behavior, phenomena, tendency, and then they'll describe it. But then when they go to really get scientific about things, they'll tell you some neuroscience explanation like stuff lights up over here when you're doing that. That's how we really know this is real and true. It seems like it almost serves as a scientific grounding. It is not enough to just explain the behavior and what's going on. You have to explain how it's coming out of the brain in a certain way, adds a fixity to it or something like that.

Joseph Green:

Neuroscience is unfortunately invoked oftentimes to make a claim even when neuroscience does not fit in the picture if you say... It's used as a... There is this fallacy that is called when you appeal to authority. So the appeal to authority is a logical fallacy that is often used in debates. So if I tell you I went to this restaurant and it was really tasty, you would believe me better, more and more if I were to say I went to this restaurant with this neurosurgeon and was really tasty. The fact that the neurosurgeon was sitting with me has nothing to do. Doesn't tell you anything about what we ate, but you would believe me more. That's just the bias of-

Brian Krouse:

Interesting.

Joseph Green:

... the soft power of neuroscience that has really taken over a lot of people.

Brian Krouse:

Very good. Well, big picture, what do you think's at stake here? You've already said some of this already, but I could just think about this. This has implications far outside of how we do neuroscience, but really, this is almost more of a culturally affecting topic.

Joseph Green:

Yeah, I think that-

Brian Krouse:

Ethical implications perhaps.

Joseph Green:

Right. Again, because I'm not a philosopher, I don't feel completely at ease in speaking of different philosophical framework and say this is more likely, that is more likely or taking a clear stance there. As a scientist, I don't feel I have enough knowledge in a way of the different philosophical frameworks and how they can be ruled out or constrained by neuroscience.

At the same times, I see that some might be more or less likely. But even more importantly of whether or not some are more or less likely is whether or not scientific monism or the fact that everything is materialistic and we're just a bunch of neurons is a claim that we should stick to. And what I'm trying to say is that we shouldn't, because neuroscience hasn't proven that, hasn't proven that we're just a bunch of neurons. And even more importantly, doesn't have the tools to prove it.

Brian Krouse:

Yeah. Yeah, that's-

Joseph Green:

It's not necessarily the science. So there is this, as you say, it's a difficult boundary between the two sciences of neuroscience and philosophy. And there are so many conversations and just the language is so different and it's really tricky to go about philosophy of mind. And then there's few people on the planet really, they're very experts in both. And I can speak of this freely, maybe one day I will study more.

But I think from the more neuroscientific side, it's important to recognize that there is definitely space for philosophical debate on this issue. And that why it is constrained partly by neuroscientific funding, I don't think it's ruled out in any way or completely proven.

Brian Krouse:

That's very helpful to hear from a neuroscience expert such as yourself, is that we don't have to think that, oh, maybe the current state of the knowledge really does establish that the mind is the brain. It's like, no, no, it's not the case, it's much more open than that. And the more proper, more humble stance, I guess you could say, is to remain agnostic about that, in this respect at least.

Joseph Green:

At least from a neuroscientific side, I think we should take a more agnostic perspective. I think that's essential to go about who we are in a more humble way and about what we do as well in a more humble way. We do science at the best we can. It doesn't mean that we know everything of the system, yeah.

Robert J Marks:

You mentioned Francis Crick and Christof Koch, who are both, I would say naturalists, have said philosophical problems best left to philosophers is the idea of consciousness. So consciousness is maybe something that they can't address as neuroscientists. Isn't this just admitting defeat? That indeed, that there is no way to explain the way that the brain works, it's all philosophy?

Joseph Green:

Yeah. Christof Koch recently had this beautiful interview with Michael Agnew, where he went over and explained beautifully the two debates very much in detail like this, some of this material on consciousness. And I think what emerges from the position of some of these scientists is that I would say there is a bit of the mistake that I was mentioning before. They take what they focus on or their position, they elevate it to a degree as if that is the truth. And they have a hard time recognizing that the system might be else from what they think.

I think in part, I find Christof Koch extremely open in many ways, but still he has his opinion, right? His naturalistic opinion about the system and thinks of consciousness in a more, I would say, operational way. How can we define consciousness in a way that is a bit maybe more clinical and practical and less consciousness from a philosophy of mind perspective?

Now, we're back to the problem that I mentioned before, probably of language, of terminology. When we say consciousness, what do we mean? It gets tricky very quickly. But I think for people like Christof, that is one of the two leading ... Christof is one of them. Christof Koch is one of the leading scientists in consciousness. He also one of the two leading theories for consciousness. And these people have been thinking a lot about operationally defining consciousness. When do you say that a person is conscious or not on a medical bed in order to ... Like when he's in the hospital?

If you go under a procedure, you might want to know whether or not this person is actually alive. How do you define that aliveness? But when we say alive, we might mean life as very generally alive as on the medical bed. And when you say consciousness, you may define consciousness from a philosophy or mind or consciousness, can I actually operate this person or declare him dead?

And these questions are both extremely important, but they come from completely different sides. They're both essential, I think, to our society, to us to define who we are. But one is a bit more practical, right? I'm on the hospital bed. Could my family declare me without consciousness and declare me maybe dead? And the other is more about why am I here on the face of the earth? What does it mean to be a human? So obviously I live on different levels, so I find them both important, but they're unfortunately both captured by the same word, consciousness, at times.

So I like to disambiguate them a bit. I think we do need good practical definitions. I think one of the recent research of Christof Koch, for example, goes about defining consciousness, I believe, on whether or not ... Ideas like that there are specific areas in the brain. There is the cortex, which is the outer shell. And under that, there is an area that is called thalamus that is connected to the cortex. And whether or not these two, we speak of the thalamocortical loop, whether or not the thalamocortical loop is engaged in functioning seems to be one of the signature of consciousness maybe from an hospital like medical perspective. Very important. Very, very important, I think.

Robert J Marks:

I think you hit a good point. I think that lots of people talk about consciousness, but nobody really defines it. And that's something that needs to be done in order to have a good conversation about it.

Let me end with kind of a left field question. I believe, and wrote a book about it, there are things which humans do which are non-computable. So that means that artificial intelligence, in my viewpoint, will

never catch up to human intelligence. This is information that I got from Roger Penrose in his book, *The Emperor's New Mind*. Now, that suggests that maybe someday we can tap the human brain as a computer. And I think that they grow things like livers and kidneys on pigs. I asked a guy one time, "Could you grow a human brain on a pig?" He said, "Yeah, you probably could." I'm just wondering if we grew little human brains on a pig, do you ever think that there's a way that we could tap into that and have this supercomputer like human intelligence? Do you have any thoughts on that or is that too weird?

Joseph Green:

I'm skeptical about all of this.

Robert J Marks:

Okay.

Joseph Green:

I'm very skeptical about the fact that that will ever be possible. I don't think so. Yeah.

At the same time, it's very surprising what came out recently, whether or not ... I think what is happening, happened recently, the fact that we have intelligence among us which is similar to the mathematical intelligence that humans have. The new generation of ChatGPT models can do math at a very high level. And we used to call that intelligence for humans, when we were to refer to a person as saying that, "Oh, that guy is very smart," it meant he could do very sophisticated math. And now these systems can do that sophisticated math.

Robert J Marks:

Well, they can do it. But Stephen Wolfram wrote ... He's the brains behind Mathematica, which is a great symbolic mathematics package. He wrote a book and he suggested that ChatGPT should take his Mathematica and put it in as a part of the ChatGPT. And indeed, that never happened.

But I think ChatGPT wrote their own version of Mathematica. And just like when you go to Google and you ask it to add two numbers, it doesn't search the web. It uses something called a mixture of experts. It kicks into a calculator mode. And I think the ChatGPT is not using its browsing history, and it's learning from all of these billions and trillions of different documents. But it switches to a different mode, it switches to the Mathematica mode, and then it uses your prompt to make that question into mathematics. So yeah, I guess I'm not surprised that ChatGPT is doing this advanced math.

And I tell you something, I offered a graduate course in probability and stochastic processes, and I offered this take-home test. And then after it was over, I went to ChatGPT and I gave it the questions and it got them all right. This is advanced stuff, it was really incredible. But it was using the equivalence of Mathematica. It wasn't this ChatGPT, it was this mixture of experts where it switches attention between things. So that, I find, is incredibly interesting.

But I think that in order for us to achieve this kind of super intelligence, maybe we have to go to something in biology and learn something in biology because there's stuff that happens between our ears that we just can't explain in silicon. That's my 2 cents.

Joseph Green:

Yeah, our intelligence is completely different from the one of the system. And we are embodied, which means that we have a body and we have sensations, feelings, and a lot more than just pure math.

Robert J Marks:

Yeah, okay. Good, good. Then we'll leave and agree on that. This is really great.

So we have been talking to Dr. Joseph Green. He's a computational neuroscientist. Dr. Joseph Green, by the way, is a pseudonym. And he wrote a great chapter in the book, *Minding the Brain*, titled *On the Limitations of Cutting-Edge Neuroscience*. We're going to come back because I find this stuff incredibly interesting, and we will do that. So until next time, be of good cheer.

Announcer:

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