

Demetri Kofinas: What's up everybody? Welcome to another episode of Hidden Forces with me, Demetri Kofinas. Today, I speak with Dr. Heather Berlin, a cognitive neuroscientist and assistant professor of psychiatry, at the Aiken School of Medicine at Mount Sinai, and a practitioner of clinical neuropsychology at New York [00:00:30] Presbyterian Hospital. She has hosted the PBS series, Science Goes to the Movies, and the Discovery Channel series, Super Human Showdown, and co-wrote and stars in the critically acclaimed off Broadway and Edinburgh Fringe Festival Show, Off the Top, about the neuroscience of improvisation. Berlin has made numerous media appearances, including on the BBC, History Channel, Netflix, Nat Geo, Star Talk and Ted-X. She received her PHD from the [00:01:00] University of Oxford, and a Masters of Public Health from Harvard University. In this episode, we explore the neuro-basis of consciousness, a materialist perspective on reality, that accounts for the nature of experience, by putting the brain front and center in the unfolding drama of human perception.

What are our thoughts and our feeling come from? Who's in charge of our volitions and our desires? What is the physiological basis of depression, anxiety and [00:01:30] psychosis? What is the substance of source of human creativity, inspiration and genius? Is there really nothing more to the experience of consciousness, to life itself than the observable firing of billions of neurons jumbled together in an atomic stew, consisting of almost entirely of empty space? As always, you can gain access to reading lists put together by me ahead of every episode, by visiting the show's website at, HiddenForces.io. [00:02:00] Lastly, if you are listening to this show on iTunes or Android, make sure to subscribe. If you like the show, write us a review. If you want a sneak peek into how the show is made, or for special storylines told through pictures and questions, then like us on Facebook and follow us on Twitter and Instagram at @HiddenForcesPod. And now, let's get right to this week's conversation.

So Dr. Heather Berlin, it's really wonderful having you in studio.

Heather Berlin: Yeah, [00:02:30] happy to be here.

Demetri Kofinas: Is this your first time in a hip-hop studio?

Heather Berlin: Yeah so, it's pretty impressive but, the first thing I noticed was this amazing smell of weed when I walked in. It's like 11 in the morning, I'm like, "Uh, am I gonna get high from being in here?"

Demetri Kofinas: If you were here at 8AM, it would be like a hotbox in here.

Heather Berlin: What? Left over from the night before?

Demetri Kofinas: Yeah, exactly. Yeah. What time did people leave from here? Like, three or four? 4AM? Yeah so, imagine what it must be like [00:03:00] at 4AM. Yeah, I prefer not to do the mid 8MA, because I don't know if we're gonna be able to keep it together.

Heather Berlin: Well, I'm definitely getting like a contact high, for sure.

Demetri Kofinas: Before we started, you said, "Your husband is a hip-hop artist?"

Heather Berlin: My husbands a rapper.

Demetri Kofinas: That's amazing.

Heather Berlin: Yeah so, that's how he makes his living. But, he raps about academic topics. So, he raps about science, and literature, and-

Demetri Kofinas: Really?

Heather Berlin: Yeah. He's had several off Broadway shows.

Demetri Kofinas: What's his name?

Heather Berlin: His name is BaBa Brinkman, and-

Demetri Kofinas: [00:03:30] BaBa Brinkman?

Heather Berlin: Yeah. Actually, you'd be interested in his latest ... So, he writes these rap guides. He's done the rap guides of evolution, to human nature. Now his latest, is a rap guide to consciousness. So, actually as we speak now, he's recording a Facebook live with Deepak Chopra, to promote his new album, The Rap Guides of Consciousness.

Demetri Kofinas: That's so interesting.

Heather Berlin: Yeah.

Demetri Kofinas: When did you first meet your husband?

Heather Berlin: We met in 2012, and I was actually giving a talk. Kind of like a Tech Talk but in New York. It was something called Lucid NYC, like a [00:04:00] cool place and East Village, where they had these academic talks. I gave a talk, and then he came on stage after me and did a performance from his latest show. So, we kind of saw each other on stage, and then he kind of picked me up after the show.

Demetri Kofinas: That's so cool. That's so cool.

Heather Berlin: Yeah. Now we have two kids, and yeah.

Demetri Kofinas: Yeah, you just had another child recently, right?

Heather Berlin: Yeah. Thank you.

Demetri Kofinas: Congratulation.

Heather Berlin: I have a, "3 1/4," she would say, girl and a 11 month old boy.

Demetri Kofinas: So, are you gonna stop? Is that it?

Heather Berlin: I'm thinking, "Yeah." I mean, you never know but, yeah.

Demetri Kofinas: You never [00:04:30] know. That's the nature of the human biological experience, and we're gonna talk about the biology of the brain as well.

Heather Berlin: That's right.

Demetri Kofinas: That's interesting. So, you're meeting Deepak Chopra. Tell me a little bit about him because, you guys differ in your conceptions of reality and consciousness.

Heather Berlin: Yeah. So, I'm meeting him for lunch actually, right after this. You know, it all started because I was at this consciousness meeting in Tucson and he was there talking, and I just tweeted something like, "Oh, I'm hearing Deepak right now. Don't [00:05:00] believe the hype." [crosstalk 00:05:01]

Demetri Kofinas: When was this? [crosstalk 00:05:02]

Heather Berlin: This was a few years ago. A few years ago, maybe in 2014 or so.

Demetri Kofinas: Oh man.

Heather Berlin: He got back to me. He got back to me, and he responded to me and said basically, "Would you like to meet and talk about this?" So, we did. I did a couple of interviews with him, and we disagree but, I respect the fact that he wants to engage with people who disagree with him, and have these intellectual debates. [00:05:30] So, I believe from a scientific perspective, that consciousness is created by the brain, or product of the brain, or an emergent property, however you want to say it. His idea, is that consciousness just exists in the universe, it's immaterial, and matter is a manifestation of consciousness. So, matter wouldn't exist without consciousness. So, it's kind of like flipping and ripping on its head, and there's no evidence [00:06:00] for that. I mean, it sounds kind of cool, especially with this weed smell right now but I mean ...

Demetri Kofinas: You have a very strong sense of smell. I don't smell anything right now, and I have a pretty good sense of smell.

Heather Berlin: Also women, when you're pregnant, it increases your-

Demetri Kofinas: Oh, are you pregnant?

Heather Berlin: I'm not pregnant. Oh, God. I don't know, actually.

Demetri Kofinas: See? Maybe it's three. So, what you're touching on, is this sort of distinction of materialism and an immaterial sense of the origin of consciousness, or the seed [00:06:30] of consciousness. You're saying that Deepak, his conception of this is that, consciousness is a pre-requisite for matter.

Heather Berlin: That's what he's saying.

Demetri Kofinas: So, I don't have a clear theory on the immaterial view of consciousness, but Deepak I suppose, professes ... I'm not clear on what he thinks. But, I do find the materialist theory unconvincing. [00:07:00] I'd love for you to try to convince me on it here. So, this is where I struggle with it, and you said, "There's no evidence for his theory." True. My view, the empirical method doesn't work in answering the questions of the nature of reality and consciousness, and I'm sure you're familiar with this, but because of the fact that I could be tripping right now, and I am tripping in a way. I mean certainly, this is simulation of my mind. What do [00:07:30] you say to that sort of perspective?

Heather Berlin: Absolutely. Basically, your perception is a controlled hallucination. It's all a hallucination. So, it's a creation of your mind. So, the brain itself, inside this box, never actually directly experiences anything. Right? It's a simulation based on signals that are coming in from your retina, information coming from ears, and they're just electrical impulses that are translated into other information, or signals in the brain. The brain then interprets that, [00:08:00] and then people think something magic happens, and then we have perception. So what you're talking about, basically is that. Your subjective experience. What we call consciousness. It's a first person subjective experience. I assume you're conscious, but I don't know that you are. All I know, is my own experience. Right? And then, I'm interpreting all these signals, and feeling things, and I assume you feel things too.

So, this fundamental question, I mean, since Dick Heart was really questioning, is this separation from the physical [00:08:30] substrate, the brain, the neuro chemicals sloshing around and this experience we have. This subjective experience, which feels immaterial. So, there's a great philosopher, a friend of mine, Dave Chalmers, who came up with this term, "The hard problem, the easy problem of consciousness." The easy problem would say, "Okay, if we can ...," which is actually not that easy, because we still haven't done it. If we can map out, if we can correlate every single experience that we have with neurons firing in the brain, we can track, "Okay, this [00:09:00] feeling of seeing red, looks exactly like this in your brain." That's a correlation.

If we could do that, that's one thing. That's the easy problem. The hard problem is, "Why is it that this physical substrate is creating subjective experience?" Some philosophers say, "We might never be able to answer that question." Just because it's hard to answer, doesn't mean that it requires a magical explanation. Some people have likened it to -- "Oh, so it must be something with quantum physics, because quantum physics has these mysterious properties, and consciousness is mysterious, so there must be something [00:09:30] there." So far, there's no real evidence to support that.

Demetri Kofinas: What do you mean when you say magical? How are you using that term?

Heather Berlin: I think when I say magical, I mean something outside of the physical world as we know it. You know, immaterial. A ghost, metaphysical.

Demetri Kofinas: Metaphysical?

Heather Berlin: Metaphysical, yeah.

Demetri Kofinas: Something that we can't perceive. I mean, a metaphysical thing would be a sort of social construct, right? I mean, would that be considered metaphysical?

Heather Berlin: Yeah. Concepts can exist outside of, let's [00:10:00] say, "Physical." But, even a concept as you experience it, is also tied to neurons firing in your brain. So concepts, would they exist outside of brains experiencing them? Probably not.

Demetri Kofinas: Well, I think it's also interesting distinction too, which I would assume someone like Deepak Chopra doesn't necessarily view concepts as being some kind of metaphysical thing, in the way that he views consciousness. Whereas Plato would have, for example. He would have seen those as the forms. So, there's this also [00:10:30] interesting thing, when you bring up this magical and metaphysical, and we touch on this a little bit on the phone call that we had before, which is that I think a lot of these theories of minds and questions of consciousness, and the seed of consciousness, and all this stem from death anxiety. I think that people are anxious around the idea of death.

Heather Berlin: Right. I mean, not all people. I am one of them, but that is what driven me-

Demetri Kofinas: Well, you have an interesting story about that. Why don't [00:11:00] you tell our audience about your experience with your grandmother?

Heather Berlin: Oh, yeah. So, I was sort of mostly raised by grandmother, who was closer to death than I guess most parents are to their children. So from a very early age, she'd sort of be like, "I just want you to know, when I'm not here, everything's gonna be ...," and always sort of giving me this idea that she can kind of go at any time, which I think [00:11:30] started my anxiety. You know, this person who was my main caretaker, who I love so much, was going to die, and what did that mean? So, I started thinking about death early on, and there was this time, I must have been about five years old, when I was riddled with, I realized that I was gonna die, and that I would no longer exist, and that-

Demetri Kofinas: How old were you, you said?

Heather Berlin: Probably around five.

Demetri Kofinas: How did you make that realization?

Heather Berlin: You know, I just had it. I just said, "Okay." I guess I realize the concept of death. [00:12:00] "Animals die, my grandmother is going to die, and wait a second, I'm gonna die, and what does that mean? It means, I'm no longer gonna exist. I can't even think to myself anymore."

Demetri Kofinas: Is that a common? I'm curious about that because-

Heather Berlin: It's not common to-

Demetri Kofinas: When is it usually, that children sort of reckon with death?

Heather Berlin: It happens at different ages. I think if you've had a traumatic experience or you've come very close to death, it'll probably happen a little bit earlier. I think children understand the concept of death. Animals die, other things can die, but realizing their [00:12:30] own mortality, it can come in very at various times. I think I was a bit young for that, to have that real existential kind of understanding of death.

Demetri Kofinas: You know, it's interesting. And then I want to let you continue. I don't want to interrupt but, it makes me think about sort of this, process of repression, and I wonder, because you meet many people who say, "Oh, I don't think about these philosophical topics." Or, "Yeah, they're too deep. I don't really care." Is that true, of does the vast majority of [00:13:00] people, not only have the capacity, but the interest in those things, but they repress them at an early age? So something like, the realization that I'm going to die, having that fundamental understanding, is something that almost everyone has at a young age and they repress it?

Heather Berlin: It's hard. So, repression happens automatically. So, suppression is something that happens consciously, where you say, "Okay, I'm having a fight with my significant other, I'm gonna consciously push that away, cuz I know I need to function at work today." So, you can consciously push it into the unconscious. Repression happens automatically. So, it's hard to say [00:13:30] when it happens, because you can have maybe this subconscious or maybe almost conscious thought of, "I am actually going to die," and then it's so anxiety provoking, that it immediately automatically gets relegated to the unconscious. So, you might never even fully consciously experienced that thought. So, you can't really say when or if that happens, but it does make sense that it is so, for many people, anxiety provoking until they come to terms with it, or come up with some rationalization, or come to a religious or spiritual belief that can kind [00:14:00] of relieve the anxiety. Until then, it just might fester there, in the unconscious.

Demetri Kofinas: So, you had this experience at the age of five, and then what sort of happened after that?

Heather Berlin: So, I had this moment of, "Okay, I can't even talk to myself in my own head, when I'm dead." So then I thoughts, "Well, even if I don't have ..." it was pretty like, a profound kind of thing.

Demetri Kofinas: Like an eternal darkness.

Heather Berlin: Yeah. Nothingness. So, I said to my father the next morning, who's a physician, [00:14:30] "Where do my thoughts come from, and can I keep them when I die? So, even if I can't talk to anybody else, or have a body or whatever, can I at least just have my own inner thoughts?"

Demetri Kofinas: Which, would actually be a nightmare.

Heather Berlin: Right. I know. Some people have that, who are in a completely paralyzed state. If you've ever read *The Diving-Bell and the Butterfly*.

Demetri Kofinas: I have not.

Heather Berlin: Good book, and they made it a film. But, he couldn't move anything, except for like blink one eye-

Demetri Kofinas: And, he came out of that?

Heather Berlin: No, but they were able to communicate with him, by just a whole system of blinking his eye.

Demetri Kofinas: Oh my goodness. So scared.

Heather Berlin: So, imagine the experience. [00:15:00] So, he was able to talk about and write about the internal experience of what it feels like to have all your thoughts, but not be able to move a muscle in your body. So yeah, you're right. It probably would be frightening experience, but maybe sort of in a ghost-like, where I can kind of move around in this ... You know, how you would imagine a ghost would be. You don't have to have a body, but you can have your thoughts [crosstalk 00:15:19]

Demetri Kofinas: Isn't that what happens if you take too much Ketamine?

Heather Berlin: It's called dissociation, where you get this out-of-body experience. Yeah, you feel disconnect from your body, and it is frightening actually. Well, when you're in a-

Demetri Kofinas: I know people [00:15:30] that used to do that for fun.

Heather Berlin: Yeah, I don't think that, that was my fun. I mean, I was a kid in the 90's growing up in New York, so I, yeah.

Demetri Kofinas: Oh, did you? What clubs did you go to?

Heather Berlin: Oh man. Really? I went to *The Limelight*.

Demetri Kofinas: Of course.

Heather Berlin: The Limelight was the place.

Demetri Kofinas: Did you go to Factory also?

Heather Berlin: No. I went to The Tunnel.

Demetri Kofinas: The Tunnel?

Heather Berlin: You remember that?

Demetri Kofinas: Yeah.

Heather Berlin: Oh, I can't remember the rest. I just remember, the old church. The Limelight it was. Now they've turned it into like, a mall.

Demetri Kofinas: Well, it was a David Barton Gym, but David Barton went bankrupt.

Heather Berlin: Oh.

Demetri Kofinas: Are you familiar with David Barton Gym?

Heather Berlin: Yeah, I've heard of it.

Demetri Kofinas: He buys all [00:16:00] these expensive historic buildings, that he cannot possibly monetize into a gym, and then went bankrupt.

Heather Berlin: Oh, okay.

Demetri Kofinas: So, he had The Limelight, and he had the old library at Barnes and Noble and Astor Place. He turned that into a gym, which was then bankrupt, and now New York Sports Club bought it, and they're paying I think, \$250,000 a month.

Heather Berlin: Oh, my God.

Demetri Kofinas: Anyway. Interjection, but continue please. That's interesting though. So yeah, you had your experiences.

Heather Berlin: So you know, I had my experiences. I lived in The Village, and I was going to clubs, and I had a lot of fun in those times. [00:16:30] It was like, rave years and ... First, it was a bit of rock. I was into the rock scene, and Limelight was the rock place to go. I remember, I met Trent Resner, who was Nine-Inch-Nails and all that. Then, it became sort of more ravey situation. Yeah. But yeah, Special K, Ketamine, I remember that.

Demetri Kofinas: Yeah, Special K.

Heather Berlin: Special K. Now, they actually use it as a treatment for depression. So, there's trials actually going on at Mount Sinai, where they're using Ketamine.

Demetri Kofinas: Interesting.

Heather Berlin: Not in such high doses, where you disassociate but, as [00:17:00] a treatment for depression. It's been shown to have some positive results. So, yeah.

Demetri Kofinas: I do actually want to get into that with you, about depression and anxiety disorder, and things like that but, please continue.

Heather Berlin: Right. Let's talk about my anxiety. This is my therapy session.

Demetri Kofinas: I want to hear more about your life. It's very interesting.

Heather Berlin: Yeah, so I said, "Where do my thoughts come from? How can I keep 'em when I die?" He said, "Well, they come from your brain." And I said, "Okay, great. So like how, so I can figure out how I can keep them if I don't have a brain?" He said, "Actually," he didn't have an answer for me. You know? We don't exactly know how. [00:17:30] So, at that moment, I said, "That's what I want to try to figure out. Where do my thoughts come from, so I can keep them when I die." Or, "How am I having this sort of phenomenal ..." I couldn't say it in words at the time, but the real question was, "How do I have neurological experience, and can I still have it if I don't have a body, and why is it tied to my body?" So yeah, I remember I wrote in first grade, on your essay, "What do you want to be when you grow up?" I said, "Dad, what can I be?" He said, "Well, I guess a psychiatrist, from the medical world view."

Demetri Kofinas: He's like, pressuring you to go to a psychiatrist.

Heather Berlin: [00:18:00] I know, right? So, I wrote my essay, "I want to be a psychiatrist when I grow up, because I want to know where my thoughts come from, so I can keep them when I die." And they of course sent me immediately to the school psychologist, which was the best thing that they could do for me because, then I was fascinated by like, he was doing all these tests on me, and I was fascinated by what the psychologist was doing, and the psychology of the mind. So, it could have went one of two ways. Either, I was gonna go to a special school for kids who need help. But luckily, they saw that I was advanced, and they put me in some enrichment programs, which was great for me. I got [00:18:30] to take classes in psychology when I was only in elementary school.

Demetri Kofinas: Because of the tests gave you, they discovered that you were advanced?

Heather Berlin: Yeah.

Demetri Kofinas: I had the opposite experience.

Heather Berlin: Yeah. Oh.

Demetri Kofinas: But, go ahead.

Heather Berlin: I mean, who knows but, I could have really easily gone another way, where they were like, "She needs help." But luckily, they put me in a place, where they can enrich my curiosity, rather than thinking I was weird and different.

Demetri Kofinas: Oh, cool.

Heather Berlin: Yeah. So, then I got exposure to psychology, and the science of the mind. So, even though I had interest in a lot of other things, like the arts as well. [00:19:00] I did painting, and music. I always kept that one theme of like, "How does the brain work, and I want to figure it out." That's just led me to where I am today. That kind of constant thread. Maybe to relieve anxiety, but I still haven't found an answer that relieves it, to be honest.

Demetri Kofinas: Well no, I fall in the same category. I mentioned it also because, I think oftentimes there is an expectation, and it's justified I think, that people [00:19:30] look for immaterial explanations for consciousness, because of the anxiety that consciousness is rooted in the material, which we know degrades and disappears. I don't know to what extent that's true, in my case. I told you briefly, that I have experienced sort of. I had brain surgery, I've been on that operating table right before I was gonna go out, no idea what the outcome was gonna be, sheer terror. I definitely had no preconceptions about [00:20:00] eternal life or anything. There was no comforting thought. I was very, very afraid. So, I can't say that I'm not afraid of death, and that might not bias me. It probably does. But, I don't necessarily think that death is a continuation of life in some way, or that there is any ... I have no comforting theory around death, is what I'm trying to say.

But, just simply the notion that I can make a definitive statement empirically, about the nature of [00:20:30] my own experience, I find I haven't been able to be convinced by those arguments, even now while we were talking, because I have absolutely no confidence at all in any of this. I'll say, after my brain surgery, when I had the experience of getting my memories back, which itself was very interesting, but it was an aberrant experience that could fall within the constructions of sort of a materialistic view. In fact, I don't necessarily see it as immaterial, the way [00:21:00] that that happened. What I found profound, and interesting, and enlightening, was both the period of re-engagement with and mythology happened during that period. Not just classic mythology, but also the mythology in films like, The Matrix or stories like, Gattaca, or the films of Terrence Malick, The Thin Red Line.

Things that I loved when I was younger, or that I had seen before, but they just [00:21:30] didn't speak to me in the same way. They spoke to me in completely different way, and all of a sudden, religious books, myths, all those things, all carried the sort of universal message that made sense. All of a sudden, because of this experience that I had. I saw it entirely as metaphorical. The same thing happened to me during my period of radiation. It wasn't something, where I spoke to God, or someone came to me and said, "This is what's

going on," or, "You're not going to die," or anything like that. [00:22:00] It was just more of that like, I realized that there was this authoritative experience that was giving me insight, and wisdom, and understanding, that I could not articulate, but that I felt was primary to ... I don't know how you say that. What is the correct terminology? It is-

Heather Berlin: Comes before?

Demetri Kofinas: Comes before everything else.

Heather Berlin: Right.

Demetri Kofinas: Yeah.

Heather Berlin: And, that's interesting. So, there's two sort of views [00:22:30] here. One is that, every experience is coming from your brain, that you're having. So, when you change the brain in any way, whether it's ingesting drugs to change your experience, or having a brain tumor, or brain damage, stroke, all different ways your brain can be affected, it's gonna change the way you think. Because, there's a direct correlation between your brain and how you think, and we see that. Alright? If someone gets a specific lesion, we can actually go in, and we can stimulate different parts of the brain [00:23:00] when we're doing cortical mapping, let's say before a person's gonna go in for epilepsy surgery. They implant this electric grid, and we can stimulate different parts, then we can see exactly. We can do deep brain stimulation, and affect people's emotions and thoughts. So, we know that there's a causal relationship there. So, when you have a tumor, it was subcortical, right?

Demetri Kofinas: I had a craniopharyngioma. I don't know what the terminology would be if it's subcortical. It was in the center [00:23:30] of my brain, pushing up into the cognitive areas, into the hypothalamus.

Heather Berlin: So, yeah. Subcortical layer is like the evolutionary older ... sort of like, it's almost like the earth, if you think of the brain. You go right down into the center, into the core, and that's sort of where the tumor was, hitting all these primary areas in the brain. The thalamus, right? Which, is the relay station. All the senses go straight to the thalamus, and then it goes into the cortex. So, critical parts of the brain, that are ... So let's say, if you damage [00:24:00] a part of the cortex a small bit, you'll have a little deficit, but not much. But, if you damage, I mean, depending if it's a language area, lose your language. That's pretty bad. But, if you have that same size small lesion, but in one of these subcortical areas, it can cause significant changes.

Demetri Kofinas: Personality.

Heather Berlin: Personality, yeah. Many things. Emotional regulation.

Demetri Kofinas: I have personality changes.

Heather Berlin: Emotional regulation, yeah. Motivation,

Demetri Kofinas: Creativity was also affected for me, big time.

Heather Berlin: Did it go up or down?

Demetri Kofinas: Down, big time. [00:24:30] You know, it's interesting Heather. I had a very interesting experience as well. I'm curious as to what you have to say about this. I lost the capacity to imagine. I could not see the future, in a way that was constructive.

Heather Berlin: That's interesting.

Demetri Kofinas: I mean, I had sort of fears. I also told you, for the audience who may or may not know, the people that are joining this conversation, I had anterograde amnesia. I've read a great deal, including two books on Patient HM. I [00:25:00] wasn't exactly like his case. I wasn't like a fish, exactly. But, I was kind of. I had absolutely no declarative memory of events that happened a few minutes before. I had a lingering sense, that something was wrong, that I may have known that this person, and that gave me tremendous anxiety.

Heather Berlin: Anxiety, yeah. I mean, that's a lot of people with dementia experience. So, when we talk about retrograde versus anterograde amnesia, [00:25:30] retrograde means that you get some sort of head trauma, whatever it may, the incident, or tumor, or brain damage, and you can't remember anything before. You can't remember anything from the time of the incident back, but you can form new memories.

Demetri Kofinas: Yeah, that's retrograde. Yeah.

Heather Berlin: That's retrograde, exactly. What you had, was the sort of opposite, anterograde amnesia, where you had your memories from before, which were kind of solidified. Those are more like, hippocampal long term memories, but you had problem retaining or creating [00:26:00] new memories, from the time of this going forward. But, then you said, "You regained them."

Demetri Kofinas: I regained them. Right after the surgery, as I mentioned to you, my surgeon was Dr. Greenfield, and you said you're doing some work now there.

Heather Berlin: Yeah, I'm at Cornell and Neurosurgery [crosstalk 00:26:14].

Demetri Kofinas: Shout out to Dr. Greenfield. Actually, I should send this to Dr. Greenfield.

Heather Berlin: Absolutely.

Demetri Kofinas: Dr. Greenfield, wonderful doctor. The only one I was able to find. I went to Sinai, I went to Columbia, I went all over the place. I contacted some people in Pittsburgh, Dana Farber, Harvard, [00:26:30] Japan. I mean, my dad's a physician. We looked everywhere for something. This came out of the blue. In fact, he was introduced to

me through Susan Walden, who's a Radiation Oncologist, who did my radiation at Memorial Sloan. So, Dr. Greenfield, amazing, he drilled a hole in my head, a burr hole, and passed a catheter through my cerebral cortex, and went right through the third ventricle, and sucked this whole thing out.

Heather Berlin: Nice.

Demetri Kofinas: So, the moment [00:27:00] this happened, it's a remarkable experience. The moment this happened, obviously, the moment it happened, I was under anesthesia but, my first memory was kind of being positioned in the burn ICU. They put me in the burn ICU, which is on ... Let me tell you something. If you're recovering from a brain tumor and dementia, the last place you want to be in is burn ICU.

Heather Berlin: Yeah.

Demetri Kofinas: I didn't write anything about that story. In fact, I never publicly talked about it. That's a whole other ball of wax.

Heather Berlin: Unbelievable. It's torture.

Demetri Kofinas: Scary.

Heather Berlin: Yes.

Demetri Kofinas: No [00:27:30] one told me I was in burn ICU. You know that?

Heather Berlin: Oh man.

Demetri Kofinas: No one told me. I found out about it, because there was a chemical fire one morning. That next morning at like 2AM, there was a chemical fire in Queens, and they were bringing all-

Heather Berlin: Everybody came in, in emergency. Oh God. That's traumatic. Traumatic.

Demetri Kofinas: It's interesting though. But, it's relevant because, the moment I came out of surgery, had I not had the brain surgery, had it not been successful, I'd have had no concept of where I was, [00:28:00] and what just happened really. But, I did. But, I wasn't aware of the significance of that in that moment. What happened was, I immediately looked at my father, and I did remember to ask him. I said, "What happened?" And he told me, and I put it all together. He say that. I mean, immediately. Because, it wasn't just anterograde amnesia that I had, I had other problems. I couldn't tell you the president, couldn't tell you my birthday. I was on an airplane months before that, going to Los Angeles to be in a documentary, [00:28:30] which I was in, and looked normal, except for the fact that I was completely scruffled, and unkempt, and looked like a wild man I think, in my

opinion. But, I was lucid, seemingly. Forgot where I was going on the airplane. This was months before my surgery.

Heather Berlin: Well also see, this tumor that was growing in the sort of, subcortical area of your brain, was causing pressure on the cortical areas, right? So, when you say like, "You couldn't think into the future," part of the brain that has to do with future forward thinking, is the prefrontal [00:29:00] cortex. Also, short term memory, dorsal lateral prefrontal cortex. So, even though your prefrontal cortex didn't have the tumor in it, seems to me that this pressure that was being put on your brain from having this subcortical tumor, that was rather large. I mean, I saw an image of it actually, in this [crosstalk 00:29:15]

Demetri Kofinas: It was large.

Heather Berlin: Yeah. Which, pressing on your cortical areas, probably causing these more cortical type problems of working memory, probably attention problem I'm imagining you were having.

Demetri Kofinas: Everything.

Heather Berlin: Yeah.

Demetri Kofinas: [00:29:30] I lost my sense of time. I would also begin smoking incessantly.

Heather Berlin: Impulse control? You know, it's really interesting. Some of my research was in time perception, and I found that the orbital prefrontal cortex, part of the most ventral part of the prefrontal cortex is involved in time perception, as well as the lateral dorsal prefrontal cortex. So, a lot of my prefrontal cortex patients, they had actual lesions to the prefrontal cortex, were impulsive, lacked emotional regulation, and had time perception problems. So, [00:30:00] that makes sense.

Demetri Kofinas: So, you're saying that. Two things I just want to mention. Another thing I did incessantly was, play Tetris, which is a fascinating thing. I worked in television. I had a television show that I created and ran. It was a beyond full time job. I slept three hours. It was insane. My symptoms became obvious in January of 2013. The summer before that, I began playing Tetris, which is for me, weird.

Heather Berlin: Like, mindless? [00:30:30] Yeah, exactly.

Demetri Kofinas: We'd sit during production, during the run down meetings, where we're going through the run down, we were going through prep for the show, and I'm just sitting there wheeling around in my chair, playing Tetris. That to me, I went through my emails after I wrote that story, because I was working on something else. I went through my emails trying to find, when did the dementia begin. I don't have any clear evidence that it began then. In fact, the clearest evidence that I really have was, that it began right after I

ended the show, but [00:31:00] anyway, it is a weird thing. The reason I say that, is because I played it incessantly from then, until the day of my surgery. After my surgery, I never played it again. And, I wasn't aware of the fact that I hadn't played until about a month or two afterwards. I was like, "Wait a minute. I haven't played Tetris." You bring up time. I was sitting in my therapists office after my surgery, and I'm looking at him, and I'm looking at the clock, and you want to talk about being high. It felt like I was higher than I'd ever been in my [00:31:30] life. The time was passing so slowly after my surgery, because of that perceptual difference. Before, time was just flying.

Heather Berlin: Mm-hmm (affirmative) It was going so quickly. Yeah. And then in retrospect, it's all relative. Right? I mean, our perception of time is relative. So actually, when you really sit down and measure it ... You know, I've done experiments with this, and healthy people, when everything's okay with their brain, actually have a slower subjective sense of time, compared to the real clock time. Let's say, [00:32:00] it's been a minute exactly, if I time minutes, I say, "Okay, how much time has passed?" You'll make an estimate, you'll say something less than a minute. You'll overproduce and under estimate. So if I say to you, "Read these numbers on the screen, and stop when you think it's been a minute." You'll probably go a little bit longer, like a minute 20, and you'll feel like that's been a minute. Or, if I tell you to estimate, you'll under estimate. This means, we have a slower subjective sense of time than the actual real [00:32:30] time. And people who are impulsive, or who have a faster subjective sense of time, actually are closer to the real time.

Demetri Kofinas: So, when you say, "Healthy," you mean people who are sort of-

Heather Berlin: Don't have any brain damage, or the average ... I'm saying a brain that's a healthy brain.

Demetri Kofinas: What if you're OCD? Does time pass quickly?

Heather Berlin: Interestingly-

Demetri Kofinas: Is that why Woody Allen's so afraid of dying, because everything's moving so fast?

Heather Berlin: I always think he's a little bit like the opposite of impulsivity. Impulsivity is like, "I need that one marshmallow now. I can't [00:33:00] wait until later." And it's not just-

Demetri Kofinas: Oh, addictive personalities?

Heather Berlin: Well, it's sort of like, "You can't wait for a reward, despite what the negative consequences might be." So, I started looking at, it's not just about reward sensitivity. Like, "I want that marshmallow now. I can't wait for two." But, it's also subjective sense of time. Waiting might feel subjectively much longer to them. Like, waiting five minutes might feel like an eternity, because their time is going so sort of, subjectively quickly. In their mind, they have faster subjective sense of time. Does that make sense?

Demetri Kofinas: Yeah, yeah, yeah.

Heather Berlin: So, you can't [00:33:30] wait as long. So, it's not just wanting the reward, but also not being able to tolerate the waiting. OCD is a little bit different. So, impulsivity and time perception problems have under activation of the orbital prefrontal cortex, OCD is over activation. So, you're over thinking, you're going over, and over, and over again. So, it's a little bit different.

Demetri Kofinas: Right. Which, is why it's interesting.

Heather Berlin: It's like an over control, versus under control.

Demetri Kofinas: How does that relate to spectrum autism disorders?

Heather Berlin: So, there's some overlap between autism spectrum disorders and OCD [00:34:00] symptoms, in terms of the perseveration. There's some overlap between the two. I was actually working in a lab at Mount Sinai, where I was looking at impulsive and compulsive disorders, and another part of the lab was looking at autism spectrum. There was a lot of overlap between the two. But, they're different. You know autism, it's related to sort of a different genetic ... We're trying to find the genes that are related to autism, and the genes that are related to OCD. So, they're different diseases you say, of the brain. I don't want to pathologize it but, they've different [00:34:30] underlying ideologies or causes. Ultimately, the symptomology, there is some overlap.

Demetri Kofinas: You know so much.

Heather Berlin: Oh, thank you.

Demetri Kofinas: I feel like everything I ask you, you have so much to say. So, that makes me-

Heather Berlin: Well, what I wanted to say, is that when you have these changes in the brain ... So, it can give you sort of religious or existential experiences. So, there's people who have temporal lobe epilepsy, where they get problems in their temporal lobe, which it seems you has some temporal lobe problems as well, with where your tumor was and the effects on your memory.

Demetri Kofinas: Yeah, I had a lot of problems. I still do.

Heather Berlin: [00:35:00] Okay. But, they sometimes become hyper-religious when they have temporal lobe epilepsy.

Demetri Kofinas: Okay. So, you're drawing a line now from OCD to temporal lobe epilepsy?

Heather Berlin: No, what I'm saying is that, your experience that you said, when you had this tumor and after, you had sort of like this experience of, there was this thing that came before, and everything made sense, like The Matrix.

Demetri Kofinas: It felt like revelation.

Heather Berlin: Right, right. So, that feeling, some people [00:35:30] interpret that as becoming more religious then, because they have these sort of, I don't know what you want to call them, existential experiences?

Demetri Kofinas: Knowledge that I didn't learn.

Heather Berlin: Okay. It's an experience. That's basically an experience. If you didn't learn it through-

Demetri Kofinas: It's so difficult to describe.

Heather Berlin: You feel it to be true. You know it to be true.

Demetri Kofinas: Yes. I know it to be true, without having learned it.

Heather Berlin: Got it.

Demetri Kofinas: Which is the weirdest thing, and makes no sense. But, that's the best way I can describe it.

Heather Berlin: Right. So, it's like a revelation.

Demetri Kofinas: [00:36:00] That's why all this sort of religious mythology and religious languages and metaphor all of a sudden made sense. Because, it was like, "Oh my God, Yes. I understand exactly what you mean."

Heather Berlin: Mm-hmm (affirmative) So, there are two explanations. One, is that it's true. Like, you had this revelation, now you have the secret knowledge about how everything exists. No, I mean, some people take that explanation.

Demetri Kofinas: It's definitely not a secret knowledge or anything, which I wish it were so good.

Heather Berlin: But, there's some other underlying truth, that we only can understand via this revelation.

Demetri Kofinas: I think that might [00:36:30] be true.

Heather Berlin: Okay.

Demetri Kofinas: I think that might be true. Alright.

Heather Berlin: Some people might say that.

Demetri Kofinas: Me and Deepak might be in the same camp on that.

Heather Berlin: That's right. You might be. Or, we can say, "It's just actually an experience that you had, that was related to changes in your brain, and we can simulate those experiences." So, there is a way that you can actually stimulate the parts of the temporal lobe, and cause people to have those experiences as well. So, there's two explanations again. Some would say, "Oh, that's the God module in the brain." So, this is what-

Demetri Kofinas: The pineal gland.

Heather Berlin: Not even the pineal gland.

Demetri Kofinas: No, I know. But, I mean ... [00:37:00] Yeah, yeah, yeah.

Heather Berlin: Some used to long time ago, say the pineal gland is where-

Demetri Kofinas: Well, people still say that. A lot of Yogis here in New York City say that.

Heather Berlin: Oh yeah?

Demetri Kofinas: They're working on their pineal gland.

Heather Berlin: Right. Antiquated idea. Yes. But basically, some would say that this it's called temporoparietal junction, or where you can simulate and have these experiences, or if you have temporal epilepsy, you have these experiences. So, some describe that oh, that's the place in the brain that God communicates to you. Or, that's why, if you stimulate [00:37:30] it, you have these experiences. Or, it can just be that it's an experience caused by different types of brain activation. Which, you change the brain, you change your experience.

Demetri Kofinas: I think that when someone attempts to make such an argument, that this is the seat of divinity in the brain, or people that say, "We can prove life after death, by seeing what happens." Like, people have experiences. I think that's like following the rabbit hole of materialism, [00:38:00] to try to create. It's like, trying to create an empirical explanation to a non-empirical phenomenon. I mean, I don't think that makes any sense at all. I do hear what you're saying.

Heather Berlin: This is the thing. This is getting a little bit into Deepak territory, but it's sort of like, his knowledge of consciousness just existed. It's immaterial. Right?

Demetri Kofinas: Deepak knowledge.

Heather Berlin: I say, "Well, how did you attain that knowledge? Like, how do you know that?" And he's just [00:38:30] saying, "Well, maybe via meditation or whatever, you can get to these higher levels of understanding, and knowing, and experiencing." Look, you don't need language to experience these feelings, and to be conscious. Right? You don't need your sense of self. You don't even need a personality, right? Just to experience a feeling, or seeing the color red. But, we do know that those experiences are tied to very specific functions in the brain. When you knock [00:39:00] out those functions, you knock out those experiences. So as a scientist, I think they're intricately tied.

Demetri Kofinas: Let's do a thought experiment.

Heather Berlin: Okay.

Demetri Kofinas: You've watched The Matrix, right?

Heather Berlin: Of course.

Demetri Kofinas: You've seen all three?

Heather Berlin: I don't even remember the order ... Yeah, probably. Yes.

Demetri Kofinas: Okay. So, I have talked about this so many time on this show. Like, so many times. I literally, every time I talk about it, I always have to apologize to the audience, because I feel like I'm that guy that always talks about The Matrix, and I'm gonna be like that old man on the bench talking about it.

Heather Berlin: Right.

Demetri Kofinas: So, I had seen the matrix, the first one when I was young. [00:39:30] In 1999, when it came out. Then the second one, I saw, and I was like, "Eh. It's not very exciting." I didn't even bother watching the third one. After my surgery, I watched The Matrix, all three, and I was blown away. Also, I cried a lot after, and I still do now. Not as much, but that's one of the only things that's endured. I can even cry at a commercial. Like, if it's a really deep commercial? My capacity to-

Heather Berlin: That's like me, pregnant. Oh yeah. [crosstalk 00:39:57] these commercials. Why am I crying?

Demetri Kofinas: [00:40:00] I relate with pregnant women. I related more with them, obviously after my surgery. So, I was able to see things. So many things there. I mean, I can sit and we could talk about that all day. But, let's put that aside for a moment, and let's play with the thought experiment of The Matrix. Which is, that if you were in The Matrix, how would you know that you are not in The Matrix? Let's take it very literally. Even though, [00:40:30] I'm not saying that we're being controlled by machines, but let's go that literal

route, which is that we're in a material world, and you are put under some kind of anesthesia, whatever it is, and you have a simulation running in your brain, that's being controlled by a computer. This is all within physically possible. This is all physically possible. We can theorize. We can't do it right now, but I'm sure we could do that, and you think that you are living in 1999, New York City, [00:41:00] but you're not.

Heather Berlin: The thing is, it is a simulation. Like, what we experience as reality, is sort of a simulation.

Demetri Kofinas: Sure.

Heather Berlin: And, we can manipulate it. The only thing that's blocking us is, our understanding of how the brain works. The more we understand it, the more we can manipulate it and change our whole perspective. I mean, even now with VR. You know? You can put people in different places, and feel like it's real. It'll just get realer and realer. Life is like that. It's like a virtual reality for us. So then, the only [00:41:30] question is, is there an actual reality that exists independent of our experience? Right?

Demetri Kofinas: Yes. That is part of our-

Heather Berlin: If your reality is a simulation, like in The Matrix, right? But, if you weren't experiencing the things in The Matrix, would there be an independent reality that still exists outside of that simulated experience that you're having?

Demetri Kofinas: I don't know the answer to that.

Heather Berlin: Okay.

Demetri Kofinas: And, [00:42:00] it's interesting because, The Matrix is a great example also, because something I didn't understand before my surgery which was, The Matrix was not just The Matrix. It turned out, Everything was The Matrix, and you figure that out with the third one, which is that, the whole world that they thought was real, was also a matrix. So, it's matrix all the way up and down.

Heather Berlin: And, it makes you question your own reality, right? But the thing is, if this was somebody created it, then who?

Demetri Kofinas: Well, let's [00:42:30] put that aside. I'm not even saying that. I'm saying, "How can you make it an empirically definitive statement, about the nature of reality, when you're living in a matrix?"

Heather Berlin: We are limited by our brain, that's here to interpret the world [crosstalk 00:42:47]

Demetri Kofinas: Some more limited than others.

Heather Berlin: True that.

Demetri Kofinas: No pun intended, you know? It speaks to the point. Anyway, go ahead.

Heather Berlin: Yeah. I mean, we are given this piece of material, [00:43:00] whatever it is, to experience the world we find ourselves in. That's limited, right? Some people say that our understanding of consciousness or the world we're in, is like an ant trying to understand calculus. It's just like, beyond our comprehension. You know? But, what we have is what we have. So, we find ourselves in this world, and we say, "What's the most objective way I can try to ask questions and understand it, and to create this scientific method, to insert objectivity?" Right? To try to get away from [00:43:30] the subjectivity, which has this sort of system of checks and balances, and revises itself. This is the way we've created, to try to understand at least what we have as truth, what's around us. Who knows. This could all mean nothingness but-

Demetri Kofinas: There we agree. So, I agree with you. So, here's what I think you're saying, and this is what I would say, which is that science, the empirical method, and all of these technologies of the mind that we've developed, allow us to approximate reality, or to be better able to [00:44:00] predict. Because, that's what a model's all about, the future. And, to the extent that we can do that more effectively good, but to use those tools to make a definitive statement, or to make any statement of any type of reliable statement, about the nature of consciousness itself, and the nature of experience and of being, I think falls outside the model. It doesn't work.

Heather Berlin: You see, what you're saying is, that we can't measure subjectivity, or we can't experiment [00:44:30] with it, we can't measure it. I disagree. I don't think it's outside the framework of the model.

Demetri Kofinas: Well, I don't think I'm saying that. Maybe I am. But, let me try to restate it. I do think you can measure all these things. In other words, I'm not taking a solipsistic idea of the world. I'm not saying, that when you put electrodes in my brain and you see things, that you're not seeing those things, and those things aren't real. But, they are the shadows of something. What I'm saying is, "That something is what [00:45:00] we're trying definitively talk about when we talk about theories of mind, we're talking about consciousness." That's the hard problem, right? What I'm saying is, "That can only present the reverberations. We experience the phenomena of whatever the core of reality is." So, how can we make a definitive statement about that, when again, within all the models we're using right now, I literally could be asleep, and there could be a God operating a machine. [00:45:30] Or, I could be Truman in the Truman Show, and that would actually fall within a completely logical analysis, based on the empirical method. No?

Heather Berlin: So, what you're experiencing-

Demetri Kofinas: Feel free to mock my ideas.

Heather Berlin: No, that's what I'm saying. No, I like it.

Demetri Kofinas: I love having you, and this is amazing. I haven't had a guest to have this type of ... I literally, this is totally useless. I created a run down, but it's totally useless.

Heather Berlin: Really? Oh.

Demetri Kofinas: I usually go off these things, but no, this is great. I just had to forget it.

Heather Berlin: We're going off the rails.

Demetri Kofinas: [00:46:00] We're tearing up the script here, Dr. Berlin.

Heather Berlin: Yeah. I mean, look. One explanation is that, you can say we're living in this simulation, and nothing ... Also, according to Deepak, matter doesn't exist, it's only here because we're experiencing it, we've created matter but, consciousness is immaterial, and all this stuff. But again, this gets us nowhere. Right? We still find ourselves in this world, having these experiences. Okay? And, if we want to try to understand them, [00:46:30] the best tool we have, is the scientific method. Now, consciousness always used to be relegated to the realm of only philosophers can talk about that. Then in, it was around 1994, Francis Crick, co-discoverer of DNA, decided after discovering the key to life basically, wanted to then tackle this problem of consciousness, and understanding the neural basis of consciousness.

He wrote this book, The Astonishing Hypothesis, and then began to collaborate with [00:47:00] someone named Christof Koch, who's a neuroscientist, and legitimized the field of the scientific study of consciousness. Like saying, "Look. We can actually try to use the scientific method to study this thing, which is supposedly untouchable. And, there's a whole field now. I encourage you to go to these conferences, The Association of The Scientific Study of Consciousness, and you'll see that we're devising ways. Now look, it's still a hard thing because, it is subjective. The larger question of, "Is this all not real, [00:47:30] and is it all created by somebody?" It sort of not relevant to the question at hand. It's like saying, "Are you gonna get into a car crash?" Right? That's like a real material thing. Let's just say, something that's happening here or there, whether it's a simulation or not, you're gonna experience pain, you might lose a leg.

Demetri Kofinas: Sure. [crosstalk 00:47:50]

Heather Berlin: So, there's some realities, at least in our simulation, that have real world consequences in the world that we're living in. If it's all a matrix, that's fine but, we're still [00:48:00] living in it, and there's still lots of questions that can be answered within that. So, I think it just sort of defused to say, "Well, it's all, you know-"

Demetri Kofinas: No. What I'm saying is that, if I'm playing Call of Duty, I need to know how to play Call of Duty. I need to be really good at that, so I'm gonna study the maps,

and I'm gonna learn all the tricks and everything else, and that's what matters. Well, it doesn't matter how to make an egg. What matters is, I want to play Call of Duty. I gotta be the best at Call of Duty. I'm in this, whatever it is, [00:48:30] I develop models and theories to help me navigate and excel in this matrix, but to make a definitive statement about anything at the core ... All I'm saying is that, I agree with everything you're saying. I'm just saying that, I don't see how any of those tools allow me to make the definitive statement about where I reside, or where I am, or the nature of this, or if there is life after death, or what life is, or those core-

Heather Berlin: So, I once went to this meeting. It was actually at The House [00:49:00] of Lords in the UK, in London.

Demetri Kofinas: So, it was fancy.

Heather Berlin: Very fancy. Very fancy. I was invited by Baroness Greenfield.

Demetri Kofinas: Did they have tea?

Heather Berlin: Yes, they do. They do indeed.

Demetri Kofinas: Do they call them crumpets?

Heather Berlin: Yeah.

Demetri Kofinas: That would be amazing.

Heather Berlin: Actually, a friend of mine, Susan Greenfield is a neuroscientist in the UK, interested in these questions of consciousness, and was made a Baroness by Tony Blair, so member of the House of Lords. She organized this meeting of neuroscientists, philosophers, psychologists and religious leaders, [00:49:30] to ask the question, "If we can understand the neuro basis of consciousness, what would that mean for the concept of a soul?" So, we had these discussions, we presented our research and ideas, and came to the conclusion that this idea of this eternal soul, at least the way the religious leaders had explained it, was outside the realm of scientific ... you know, we can't touch it either way. We can't prove it or disprove it. And, that's the realm you're kind of talking about. It's sort of like, yeah, I can't say to you whether there life after death definitively, I just haven't seen any [00:50:00] evidence for it, but maybe that's just the way it's designed. They'll never give us material evidence for some immaterial afterlife. And, that would be great. Like look, I'm all for that. I'm not trying-

Demetri Kofinas: Or maybe not. Depends on what it looks like.

Heather Berlin: That's true. That's true indeed. It could suck. So, my husband is a very staunch atheist, and I always say, "Well, how do you know?" Like, this definitive thing of like, "I know there is no God." I'm not as presumptuous to know [00:50:30] that. I just say, "Look, as far as I can see, there's no evidence for that. So-

Demetri Kofinas: But, there wouldn't be any evidence.

Heather Berlin: Maybe not. So, that's where belief comes in, and I'm open to say like, "Maybe there is something else. I mean, it is pretty amazing that we find ourselves here in this ... It's amazing that the brain could organize itself in such a way, or was organized by someone or whoever, this piece of matter, that's so small compared to like, let's say, the enormity of The Universe in terms of mass and matter, yet it can comprehend itself, and it's place in The Universe. That's amazing.

Demetri Kofinas: [00:51:00] Can it comprehend itself in its place in The Universe? I mean, imagine.

Heather Berlin: Well, it has the concept of that, at least.

Demetri Kofinas: But, you would agree for example, that your comprehension of The Universe exceeds, or there's a magnitude more than a dog, and genetically the dog is what? 90% of our DNA?

Heather Berlin: I'm sure that we don't know much but, this is the best we have.

Demetri Kofinas: Exactly. Again, but back to that point.

Heather Berlin: And if it's still, just because of the fact that we are limited in our understanding, and as you said, some people more than others.

Demetri Kofinas: Definitely.

Heather Berlin: I love that. There's a lot of individual variation [00:51:30] amongst us all. Some people who are geniuses and who have great insights like Einstein or whoever, who have maybe even a greater understanding of how things work, than us mere mortals, or whatever. But, just because we might have a feeble understanding, doesn't mean that there is necessarily something else. Right? So, we just don't know.

Demetri Kofinas: Exactly.

Heather Berlin: And, I'm open to that, to say, "We don't know." Yeah.

Demetri Kofinas: I think that's the intellectually honest thing. I think again, that brings us back to my point, which is that, when someone tried to prove [00:52:00] that there's an afterlife, or to propose a concrete theory, I'm always like, "I don't feel comfortable with this." Because, that again, to me is intellectually dishonest. What do you think about artificial intelligence, and all the conversations that are happening around the integration of theory of mind, and the sort of applied philosophy. I wouldn't be surprised if you have. Have you read Nick Bostrom's work?

Heather Berlin: No. What has he written?

Demetri Kofinas: So, he is the head of the [00:52:30] Future of Humanity Institute at Oxford. He's written a book called Super Intelligence, and he's the best I've found. In fact, he's the guy that Bill Gates and Elon Musk quote regularly. In fact, Bill Gates has the best review ever on his book jacket cover. It literally just says, "I highly recommend this book. - Bill Gates.

Heather Berlin: No. I love that.

Demetri Kofinas: That's all you need. What else do you need?

Heather Berlin: When you're Bill Gates, you could just say that. Enough said.

Demetri Kofinas: I highly recommend this book. That's it. Boom.

Heather Berlin: Should [00:53:00] have just said, "Enough said. Yeah. Drop the mic."

Demetri Kofinas: That's it. So, he-

Heather Berlin: What's his name? Bolton?

Demetri Kofinas: No, Nick Bostrom.

Heather Berlin: Bostrom.

Demetri Kofinas: Nick Bostrom.

Heather Berlin: Nick Bostrom.

Demetri Kofinas: So, I heard Nick for the first time, and our audience knows this because, I sing Nick's praises. I heard Nick speak for the first time, on a different podcast called, The Partial Examined Life. Are you familiar with that?

Heather Berlin: That I've heard.

Demetri Kofinas: It used to be really good. I don't feel it that much anymore. I don't really listen to it anymore because, it got too pedantic. But, it used [00:53:30] to be just more for broader non-academic philosophical thinking. And, they brought him on, and he talked about artificial intelligence engineering as applies philosophy. This thing where we have these philosophical debates that you and I can have here, and never resolve, that people can have forever, but all of a sudden now, we need to resolve them. We need to code them. We need to code values, we need to do all of this. To me, without being presumptuous, [00:54:00] I must say, I can't see how I'm ever, ever gonna be convinced that this is a good idea.

Not saying that we can prevent us going down the road, sort of creating super intelligence, but where I see the issue, and I'll let you talk now because I feel like I'm just talking, which I

do all the time, which is why I have a podcast, so, is sort of this alignment, or this possible misalignment of goals between the machines in super intelligent [00:54:30] machines, and us. No matter what we attempt to do, because we can't answer these basic questions of, "What is a good life? What is happiness? What do we want? What do I want?" People don't even know what they want. People walk around every day. They're like, "I don't know what I want. How am I gonna be happy?" How are we gonna program intelligent machines to align with goals that we ourselves don't understand?

Heather Berlin: That's a really good question. You know, there's a couple things with AI, and actually I haven't seen the new Blade Runner movie, but I'm very excited for that.

Demetri Kofinas: You really think it's gonna be good? Is it good? I heard it's better than [00:55:00] people thought it would be.

Heather Berlin: I heard it's good. I'm gonna see it tomorrow so, I'll get back to you on that.

Demetri Kofinas: I like Ryan Gosling. He's cool, I like him.

Heather Berlin: Yeah. But you know, that idea of, at some point we're gonna be able to tell the difference. Right? And, it's a classic kind of terrain test. But so look, I think that the let's say, "Simulations, or computer and technology, already more intelligent in many ways, than we are. Right? They can do mathematical problems much quicker, and faster, and better, and solve algorithms and all these things, that it depends on how you measure [00:55:30] intelligence, right? I think a lot of the stuff with the machine learning is really interesting now, that you kind of program it, and then it learns on its own, the way that we do. The way a brain actually works. One interesting thing is that, the bugs that we have in our brain ... so like, when I say, "Bugs," things like illusions that we have. Because the brain, it's not a perfect representation of reality, right? So, there's these little bugs that we can play with, and we do that with illusions. The bugs that are in our brain are different, and that's how we might be able to tell the difference [00:56:00] between AI and us. Their bugs in their programs will be different than our bugs, if that make sense.

Demetri Kofinas: No, not exactly.

Heather Berlin: Okay. So, the glitches. Glitches. The little glitches we have in our brain, which we do, which I said can be revealed with these visualizations.

Demetri Kofinas: What's an example of a glitch in our brains?

Heather Berlin: Here, do you have it on this piece of paper here? I'm gonna show you.

Demetri Kofinas: Oh, I've seen these things. Yeah, I think I do have them. The shadow illusion.

Heather Berlin: The shadow illusion. Here's the shadow illusion.

Demetri Kofinas: Or, like this thing. The sex thing, which I couldn't see it.

Heather Berlin: Oh, you couldn't see that.

Demetri Kofinas: I couldn't see it. But, when you pointed it out, I saw it. Now [00:56:30] I see it. I can't unsee it.

Heather Berlin: You can't unsee it.

Demetri Kofinas: I can't unsee it.

Heather Berlin: Now it's there always, forever more. But you know, our brain plays tricks on us basically, because it's programmed that way. Or, unconscious biases that we have, that play themselves out in different ways. So, those kind of things that we can play with, and when you understand the brain more, you can kind of play with these tricks. Well, we know where the sort of little glitches are, blind spots you want to call them, maybe. The ones that AI's will have, will be slightly different than the ones brain. So, they're not made exactly the way our brains work, [00:57:00] right? They're different. Anyway, the point is not if they can be more intelligent than us and do things better, and quicker but, "Will they be conscious," is the question. Will they have subjective experience? That matters because, you can kick your refrigerator now, right? Because, you don't think it has feelings. But, if it's an advanced refrigerator AI, whether it has a feeling, whether it can feel that or not, will make a difference on how we treat them. It's true.

Demetri Kofinas: I know. No, I'm familiar. Look, I'm familiar with this. Go ahead, sorry.

Heather Berlin: So, I think that's the big question, where it's gonna [00:57:30] get into the ethics of things. Not whether they're gonna be these super brains, which they probably will be able to process many things greater than us. But yeah, can they experience love, emotion, pain? That's where our values come from. So, even though we can't articulate our values, what makes us happy, what do we want, what are our goals? We do feel things. We feel unhappy. We can feel unhappy. We know what makes us happy, when we feel happiness. Like, oh, that thing makes me happy. So, I guess we can program those models into these machines but, will they actually feel them? Will they actually experience subjective [00:58:00] experience? That's the big question. Now, I met with this thing called Sci-fi Camp at Google, and they had Larry Schmidt and Sergey. Hey invited a bunch of scientists and tech people to their Google campus for a weekend to have these discussions. I met with them, and we were talking about AI, and Marvin Minsky was there, and all these amazing people.

Demetri Kofinas: Really? That's cool.

Heather Berlin: I said, "Well, would it be conscious?" They just said, "We don't care. That's not what we care about." That kind of disturbed me.

Demetri Kofinas: What do they care about? Did they answer that question? See? That's the important question [00:58:30] to ask. "What do you care about? What is the goal of the engineer?"

Heather Berlin: I think it's making predictions.

Demetri Kofinas: That's the scary part.

Heather Berlin: It's not whether it has feelings or not. And, that really blew me away because, that was sort of like, "Well, that's the only thing I care about." Right? Whether you can create-

Demetri Kofinas: You care about that. That's interesting.

Heather Berlin: Yeah, I care about, if you create these AI's and whatever, do they have feelings? That's important for ethics, for the way everything's gonna go. Also, if we're worried, are they gonna do a hostile takeover? Well, if [00:59:00] they have empathy, maybe they won't.

Demetri Kofinas: You gotta read Bostrom's book.

Heather Berlin: I will.

Demetri Kofinas: You're gonna love it.

Heather Berlin: Okay.

Demetri Kofinas: It's gonna be super, super awesome for you to read. You're gonna really enjoy it because, what Nick Bostrom does, you have to really devote the time to it, but what he does is, he brings you down these thought experiments, where you realize that actually, the malevolent outcomes, don't require malevolence and that, that's the point of the notion of goal alignment. That you can have perverse instantiations of the goals that you've set [00:59:30] for the AI. The AI can think that what it's doing is, you told it maximize human happiness. So, it figures the best way to do that is, we put electrodes in your brain, and we stimulate this, and you're forever happy. Or, we lobotomize you, because we realize you gonna overthink too much.

Heather Berlin: You know what's a great ... We're going down the film way but, a great film that shows that exact concept is, that one with Will Smith. It was like an AI film with Will Smith. I can't remember the name of it but, it sort of at the end, don't you remember, there was these like [01:00:00] ... I wish somebody was here to talk to you about it.

Demetri Kofinas: Oh, oh, oh. Something with the robots. I Robot.

Heather Berlin: I Robot. Thank you. Whew.

Demetri Kofinas: I Robot, which is now like a vacuum cleaner, isn't it?

Heather Berlin: Right. Well, the I Robot film, I don't want to give it away but-

Demetri Kofinas: Please do. I don't think it was that great.

Heather Berlin: Okay. No, it wasn't that great but, this concept was. The super computer who's controlling everything at the end, is trying to destroy all humans. The robots basically turn against them, even though they were programmed to be benign and all that. Her thing was, I was here to maximize [01:00:30] ... it was something like, the best outcomes or something, and basically humans are the worst things for The Earth. Right? Because, if you really do that calculation, what's in our best interest is to just get rid of us, because we're actually causing all these problems. It was sort of this logical calculation, that was based on the goals that were programmed into this computer. But in the end, it came out, "Oh, we need to get rid of all of humanity, because that's would give us the best outcome."

Demetri Kofinas: Yeah. And so, he does this. [01:01:00] He also gives other examples, where it doesn't necessarily misunderstand the goal, but it maximizes that. So the classic example is, The Sorcerer's Apprentice in Fantasia, where Micky creates the mops and the buckets to wash the floor. They're basically an algorithm that runs to wash the floor, and they don't stop and the whole world becomes broomsticks and water. So I mean, that's very interesting. In that context, [01:01:30] I've thought the way that we should approach the problem ... Again, with great humility, because I'm not an engineer. But, to me what makes sense is, this notion of parasite and host. That we want to develop an AI, that is a host organism and sees us as a beneficent parasite. Which would allow the flexibility for us to live around this super organism, that's gonna do whatever it's gonna do.

Heather Berlin: Well I mean, we're already sort of in those relationships. [01:02:00] Not explicitly but, we use our iPhones. I don't know how we're helping them.

Demetri Kofinas: We're slaves.

Heather Berlin: Yeah, we are pretty much slaves.

Demetri Kofinas: We're slaves to stuff.

Heather Berlin: So, I don't where we're gonna program into them, that they need us. That's the tricky part. But, I guess we can come up with something.

Demetri Kofinas: We're really controlled. Of all the people I've ever had on this show, you must have the deepest insights and thoughts around the extent to which our agency is

controlled by the technology [01:02:30] and the algorithms, that run in the cloud of Facebook, and Google, and all the social media.

Heather Berlin: I have this fight with my husband. He wants Alexa ... We have Alexa and I say-

Demetri Kofinas: No way!

Heather Berlin: Thank you very much.

Demetri Kofinas: No way. Tell him, "No!"

Heather Berlin: I did.

Demetri Kofinas: What's was his name again?

Heather Berlin: BaBa Brinkman.

Demetri Kofinas: Tell BaBa, "No!" No BaBa.

Heather Berlin: He's gonna have to hear this.

Demetri Kofinas: It's funny, his name is BaBa, and the kids will call him BaBa.

Heather Berlin: Right, because BaBa means father or wise one in Indian Sanskrit. His real name is actually Dirk, but when he was born, his parents [01:03:00] were kind of these hippies, and they said-

Demetri Kofinas: Dirk

Heather Berlin: Dirk, it's Dutch. He's Dutch. His father is Dutch. So they said, "He was born with this contemplative look on his face, and he didn't cry or whatever. Oh, he's a Baba." They just named him that, and it stuck. But my daughter, I see her saying, "Alexa, play this. Play this." And, there's something in my gut that tells me, that is not right.

Demetri Kofinas: Tell BaBa, his parents were hippies. He should know better. He shouldn't be putting Alexa in the house.

Heather Berlin: Thank you very much. But anyway, I see it. I see it happening all the time. People are being zombified, and it's [01:03:30] scary. Then people say, "Oh, you're a technophobe or whatever." I say, "Look. There are advantages that we have from this, obviously. I mean, I use the internet, I use Google, I have my iPhone but, we have to be really cognizant of how it's affecting us, and I think we need to put limits on it. Just like alcohol use, drug use. There's internet addiction now. You know? And, it activates the same parts of the brain as drug addiction. So, we really need to be cautious and observe our own behavior, and moderate it."

Demetri Kofinas: I think definitely, you're [01:04:00] a parent so, you have more insights on this. I'm sure there is some way to control it on some level, but I wonder to what extent you can control it. You know before we end, I want to ask you something because, you mentioned this point of impulsivity. You mentioned something in your work, that resonated with me, which had to do with success, and the relationship between success and impulse control. One of the things that I've said to myself and to others, is that if I have children, and [01:04:30] I hope to at some point in my life, I think that the greatest thing that a child can have in the world today especially, is the capacity to control impulses. To have self-control. Because of the fact that, we live in a more simulative environment than we ever have. What I thought was interesting, and why I mentioned is because you wrote, or you said, maybe perhaps multiple times that, already or for millennia or whatever, it's always been the case that success is highly correlated to impulse [01:05:00] control.

Heather Berlin: Mm-hmm (affirmative).

Demetri Kofinas: Maybe I'm kind of messing with what you said, but maybe you could talk about that a bit, and then I just want to ask also, what makes a genius?

Heather Berlin: Oh, okay. Whoa, that's a lot.

Demetri Kofinas: That's it. We don't have to go too far.

Heather Berlin: They basically did all these measures about what predicts future life success. Lots of tests with young kids, and they found that the single greatest predictor of future life success, in all areas, job attainment, and marital happiness, body mass index, was this marshmallow test, which is a test of impulse control. Where, [01:05:30] you say, "You can have one marshmallow now, or you can wait and have two marshmallows later." There's these great videos that were done, where they watch these kids. Some of them just sit there, perfectly nice, and they wait for the other, and some of them are just struggling, because they hidden camera them. Then, it's great if you ever go online to watch these videos. Some just can't even, they just right away take it. So, you see all these individual differences between them. Really what it is, is a measure of prefrontal cortex function, of executive function, and that is the thing that predicts.

Do you want to [01:06:00] sit home and study now, and have that sort of self-control, or you want to go out and party? You know? And those kinds of things, will lead to greater life success overall. So, impulse control in a sense, is a litmus test for prefrontal cortex function, which helps predict that. But on the flip side of that, there are certain points where it's good to decrease that prefrontal cortex function to let go. It's not good to be overly controlled all the time. It's not good to be, always let go and have impulse if you can't control it. But if you have the ability to switch it on and off ... Because creativity, [01:06:30] we're looking in the brain now, and when people are being spontaneous, they're being creative.

They did some imaging with my husband during freestyle rap, and there's some studies that show that when you're free styling, or when you're doing jazz improv, you actually get

decreased activation parts of the prefrontal cortex, and that leads to lack of a filter, and creativity, and anything goes. That's good. Children are more creative. Their prefrontal cortex is not fully developed until about 25. In some ways, it's okay to let go and it's healthy to do that, but it's good to be able to turn it back on again when you need to because, there is problems if it's turned off all the time, basically.

Demetri Kofinas: It's interesting. [01:07:00] I think I'm the only one of my friends who does what I do, and I try to explain to them the challenge of, having to be both a producer and sort of the talent, or are, or creating the art. Thinking about this sort of thing. Switching between those two is very hard, at least for me, it's very hard, and they require very different skills. So I think, "Yeah." No, I agree with you on that.

Heather Berlin: Yeah, the producer part would be like, prefrontal cortex turned on, order, logic.

Demetri Kofinas: Problem solve, boom, boom, boom, boom. Give it to me.

Heather Berlin: [01:07:30] And then the creative, is the letting go. You can be both. I feel like I do. I mean, I have my science, but I couldn't do my science as well, and that kind of very convergent thinking, without being able to have the divergent thinking of letting go.

Demetri Kofinas: You're very impressive. Our audience should know, audience, you should go into YouTube and put in Heather Berlin's name, and look especially for a group that she was on, Star Talk.

Heather Berlin: Oh yeah.

Demetri Kofinas: With Neil deGrasse Tyson and this girl, Nerdy. She has Nerdy Talk Radio or something.

Heather Berlin: Oh, Cara Santamaria.

Demetri Kofinas: Yeah, okay. And [01:08:00] then a couple of comedians. That guy on the far left was so hilarious.

Heather Berlin: That's great. There's another one I did at Bam, which was with Mayim Bialik. It was with Neil, Bill Nye, Paul Rudd and another comedian, Michael Ian Black, and Eugene Mirman.

Demetri Kofinas: That's so cool.

Heather Berlin: It was so much fun, and we did it in front of a live audience at Brooklyn Academy.

Demetri Kofinas: I didn't know stuff like that existed. I had never seen that show before.

Heather Berlin: Yeah, it's a great one. And actually, just filmed one now. He's doing a TV show for NatGeo.

Demetri Kofinas: Who? Neil deGrasse?

Heather Berlin: Neil deGrasse. It's called Star Talk.

Demetri Kofinas: He's so much better like that. [01:08:30] I don't like the cosmo stuff.

Heather Berlin: The canned cosmos thing. Yeah.

Demetri Kofinas: He was so much cooler than I thought.

Heather Berlin: When he has to read from a script like that, you don't get the full Neil.

Demetri Kofinas: No, his passion comes out. He's real. He's the real deal.

Heather Berlin: Yeah, he's great.

Demetri Kofinas: He's visceral. He's a visceral guy.

Heather Berlin: Absolutely. But yeah, I have a website, HeatherBerlin.com. If you go there, there's a video section you can [crosstalk 01:08:49] videos, and yeah.

Demetri Kofinas: Please do audience. Last question. Tell us, what makes a genius? How do we know if we're geniuses, and how do we know more importantly, if we're not?

Heather Berlin: The technical way that I would do it, is [01:09:00] there's these IQ tests that you can give, and if you're above a certain IQ-

Demetri Kofinas: No, I failed those. I failed those.

Heather Berlin: Yeah, okay. So, that's that. But, I think that my definition of genius is that, people who, you think outside the box. Right? You think about things that nobody else had thought of before. You put things together in a way. So for instance, Darwin. Right? There was all this data out there, and other biologists had that information, but he took that data and put it together in this novel way, creating this ultimate theory of evolution. Right? People who have the information that we all have access to, [01:09:30] but think about it in novel ways. So, I think this idea of divergent thinking, of putting pieces together in a way that nobody thought of, and when they think of it, everyone's like, "Oh, of course. That's obvious," but nobody else did. So, my definition of genius sort of revolves around the idea of creativity, and it can be in any field, discipline, music, art, science, you can be a creative genius. You know? But, that's where I place it. It's not necessarily about being able to do match problems the quickest, or have [01:10:00] the highest vocabulary. But, it's what you use with the tools that you're given.

Demetri Kofinas: Being able to synthesize and pull apart from different aspects and ideas, and create something entirely new?

Heather Berlin: Yeah, sort of. Some people call this fluid intelligence. There's knowledge that you can accumulate. You can be the best, sort of. People say, "Book smart person." Right? I can memorize everything in the books, and have that with me. But, what do you do with that?

Demetri Kofinas: What do you-

Heather Berlin: What do you make of that? That's a deeper kind of understanding, and I think that's what differentiates genius from others.

Demetri Kofinas: You hear that, audience? Heather Berlin [01:10:30] is telling all of you, that you should listen to Hidden Forces, because we cover different topics every week, and we're helping you to synthesize your genius brains, and come up with genius ideas, and that's why you listen to this show. Dr. Berlin, you are an amazing guest. It was such a pleasure to have you on.

Heather Berlin: Thank for having me.

Demetri Kofinas: Thank you so much for coming on the program.

Heather Berlin: Yeah, thank you.

Demetri Kofinas: That was my episode with Heather Berlin. I want to thank Dr. Berlin for being on my program. Today's episode was produced by me, and edited [01:11:00] by Stylianos Nicolaou. Sound engineering is also by Stylianos Nicolaou. For more episodes, you can check out our website at HiddenForces.io. Join the conversation through Facebook, Twitter and Instagram at @HiddenForcesPod or send me an email. Thanks for listening. We'll see you next week.