LIVE EVENT Q&A: Dr. Andrew Huberman Question & Answer in Seattle, WA

Recently I had the pleasure of hosting two live events, one in Seattle, WA and one in Portland, OR. These events were part of a lecture series called The Brain Body Contract. My favorite part of each evening was the question & answer period, where I had the opportunity to answer questions from the attendees of each event. Included here is the Q&A from our event in Seattle, WA.

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- Welcome to The Huberman Lab Podcast, where we discuss science and science based tools for everyday life. I'm Andrew Huberman, and I'm a Professor of Neurobiology and Ophthalmology at Stanford School of Medicine. Recently, I had the pleasure of hosting two live events: one in Seattle, Washington and one in Portland, Oregon, both entitled, "The Brain Body Contract," where I discussed science and

science related tools for mental health, physical health, and performance. My favorite part of each evening, however, was the question and answer period that followed the lecture. I love the question and answer period because it gives me an opportunity to hear directly from the audience to what they want to know most, and indeed to get into a bit of dialogue so we really clarify what are the underlying mechanisms of particular tools, how best to use the tools for things like focus and sleep, we also touched on some things related to mental health and physical health. It was a delight for me and I like to think that the audience learned a lot. I know that many of you weren't able to attend those events, but we wanted to make the information available to you. So what follows this is a recording of the question and answer period, from the lecture in Seattle, Washington.

00:01:07 Momentous Supplements, InsideTracker

I hope you'll find it to be both interesting and informative. I'd also like to thank our sponsors of these live events. The first is Momentous supplements, which is our partner with The Huberman Lab Podcast, providing supplements that are the very highest quality, that ship international, and that are arranged in dosages and single ingredient formulations that make it possible for you to develop the optimal supplement strategy for you. And I'd also like to thank our other sponsor, which is InsideTracker, which provides blood tests and DNA tests

00:01:35 Upcoming Live Events: Los Angeles & New York

so you can monitor your immediate and long-term health progress. I'd also like to announce that there are two, new live events scheduled. The first one is going to take place Sunday, October 16th at The Wiltern theater in Los Angeles. The other live event will take place Wednesday, November 9th at the Beacon Theatre in New York City. Tickets to both of those events are now available online at hubermanlab.com/tour; that's hubermanlab.com/tour. I do hope that you learn from an enjoy the recording of the question and answer period that follows this, and last, but certainly not least,

00:02:16 What Is Your Most-Used Protocol?

thank you for your interest in science. [upbeat music plays] "What is your most used protocol?" I'm assuming that you mean the protocol that I use the most. I genuinely do the morning sunlight viewing. And this evening I went and looked at the sunset, every single evening, and I absolutely do 10 to 30 minutes of some Non-Sleep Deep Rest protocol, every single day, every single day! The reason I called it Non-Sleep Deep Rest is because while I love the classic traditions of, and things like Yoga Nidra, my fear was that if I called things Yoga Nidra, that people would get spooked. But I also have to say that I rather loathe the fact that scientists use so many fancy terms, that it also vaults information from the very people that fund the work. So I have a kind of an ax to grind with the scientific community too. So Non-Sleep Deep Rest was my attempt to kind of put my arms around a number of different things like Yoga Nidra, which I have great reverence for, and other tools like that. I do that usually in the early afternoon, or if I wake up first thing in the morning and I haven't slept enough, or not that well, I'll do 30 minutes of Yoga Nidra and I feel terrific after that. I'll just mention a brief anecdote. I learned about Yoga Nidra while researching a book that I never wrote, that may or may not ever be published. I went and spent a week in a trauma center and addiction treatment center in Florida and saw some amazing work, of some amazing people, and some amazing transformations and it was a big part of their daily routine, for these people to do Yoga Nidra and Non-Sleep Deep Rest and I thought they're really onto something here. So almost religiously for me, every day, 10 to 30 minutes. Not that it matters, but the CEO of Google's really into NSDR.

00:04:12 Should You Vary Wake-Up Time Seasonally?

I don't know him, but he's written about that a number of times. "In Seattle, sunrise varies from 4:30 AM to 9:00 AM, depending on season, are you recommending to vary your wake-up/outside time with the seasons?" Somewhat. You know, you don't need to see the sun cross the horizon. That would be great, but not everyone can wake up with the sun. You want to get so-called low solar angle sunlight. Why? 'Cause of that yellow-blue contrast that we talked about before. Many people wake up before the sun is out. If that case, if you want to be awake, turn on as many bright lights as you can. Up here, I don't know, does anyone here, you don't have to admit this if you don't want to, but maybe nod or raise your hand if you're comfortable with doing that. In the winter you feel less well, or typically in the transition, yeah, it's huge up here. [audience laughing] It's

really, it's amazing. And then when you're on campus or that's where I've spent time and you see Rainier and it's like, the blossoms are out and you feel almost high because that's dopamine, you know, animals that have white pelage in the winter, and then it turns dark in the summer and spring months that pathway, the melanin pathway, is from tyrosine, which is the precursor to dopamine and also to melanin production in the fur. So the whole system is linked. It's not rigged, it's linked. So what do I suggest? I suggest in the winter months, getting 30 minutes of sunlight viewing. I know it's a lot, but it's much better than feeling lousy all day. And then the real key in the winter is to try and catch some sunlight before it goes down. If you're indoors and it goes down and then you go outside and it's dark, your brain and body don't really know where they are in time. And then you flip on "Ozark" and you're watching "Ozark", and then you really don't know where you are in time. I have one more episode. Don't tell me what happened. That show is, when I was a postdoc,

00:06:05 Why Is My Drive Depleted Upon Waking-Up?

I used to recommend, "The Wire," to my competitors. [audience laughing] True. "I go to sleep fired up, ready and excited to do whatever it takes. When I wake up, that drive is depleted. Why, and what can I do?" Interesting. Have not heard that one before, but if I were to venture a guess, you know, we didn't spend much time tonight talking about the autonomic nervous system, this kind of seesaw that takes us from very alert, potentially panicked, but to very, very deep sleep; even, you know, God forbid we go into a coma. It's 'cause the parasympathetic nervous system is overactive relative to the sympathetic nervous system; the seesaw of autonomic function. You may be sleeping very, very deeply. And when you are in deep, deep rest, the last thing you want to do is get into that forward center of mass thinking, planning, predicting, right? In, you know, again in Yoga Nidra again, Non-Sleep Deep Rest, there's this common theme in the script of going from thinking and doing and predicting to being and feeling, they say. And I'm not making fun of them as the moment I hear that, I go, "Oh, just I want to be and feel." What are you doing? You're actually just moving into sensation, but no planning, right? There's nothing mysterious about it. Sensation, but no planning. Now in sleep, a very deeply parasympathetic sleep state, what's happening? You actually, that visual aperture is actually so big, you're not in panoramic vision, your eyes are actually closed. Space and time are from past, present, and future are invited into your thinking. You're in

a deep, deep state of relaxation and it may be, Dustin, that when you're waking up, you're having a hard time transitioning out of that because you're sleeping so deeply. You may be waking up mid-sleep cycle. Many people find it useful to set an alarm so that they wake up at the end of a 90 minute so-called ultradian cycle. There's some sleep apps that do this on the phone. I can't recall their names, but so rather than sleeping seven hours, you might be better off sleeping six or seven and a half hours, right? Waking up at the end of one of these 90 minute cycles. Try that. That would be consistent with what we know about the biology. But I think it's common to, if you sleep very deeply, to wake up and not necessarily want to spring out of bed. I've heard of these people that just want to spring out of bed and attack the day; Jocko Willink, 4:30 in the morning, his Casio phone, and his watch. I'm seeing his watch when, and it's like eight for me. I'm like, "Wow," like again, these people are amazing. I must be doing something wrong. But these are, you know, I don't wake up that way. You know? Like Tiger, I'm like, I want water, I want sunlight,

00:08:42 What Are Your Favorite/Most Impactful Books?

90 minutes later I want caffeine. Yeah. "What are some of your favorite books that have had the biggest impact on you?" Kyle G, thank you, Kyle. Gosh, so many! You know, for non-fiction, well, Oliver Sack's autobiography, "On the Move," had a profound impact on me. You know, people hated him? The scientific community tried to kick him out. They said horrible things about him; created all sorts of scandals. It wasn't until "Awakenings" became a blockbuster movie that suddenly he got appointments at NYU and Columbia. Ha! Then now they wanted him back; the revered neurologist. Like incredible, right? But he was also a real seeker in the cuttlefish thing. And he had a lot of internal struggles too, some of which I relate to, some of which I don't. Actually, I've been in touch with his former partner because I actually moved to Topanga Canyon for a short while just 'cause Oliver lived there. I thought, "If I go there, I'll actually finish this book." Guess what? Just moving someplace doesn't allow you to finish a book. He lived in Topanga so I was like, "That's the key." It didn't work. And people were wondering why I was hanging around their house all the time 'cause it was Oliver's former home. So that's an amazing book, and tells you my obsessive nature. The other books that have had a profound influence on me, I would say in the non-fiction realm, well I learned how to make a decent steak and a few other simple recipes, not well, from Tim Ferris's book, "The Four Hour Chef,"

'cause I really needed help. That was a fun one. I like Robert Greene's book, "Mastery," because I've had amazing mentors and that book is all about finding mentors and assigning mentors to you, even if you don't know them. And as you can tell from my stories about Oliver, who I never met, and a few other folks, that I've just decided that they don't know it, but I'm mentoring them, that they're mentoring me, excuse me, that book was really important for me. And that mentor-mentee relationships always involve a breakup, either by death, or by decision, or by consequence, to your circumstance rather. There's, something happens, and they're supposed to break. You're not supposed to apprentice with somebody forever. That was an interesting book for me. I would say in the fiction realm, [Andrew sighs] I would say in the fiction realm, it's all childhood books 'cause it's been a long time since I've read fiction. I read a lot of poetry. I'm a big Wendell Berry fan. I like poetry because poetry to me is, is like the subconscious, it, the structure is all messed up and you think you understand what they're talking about but you don't really know. And so it always feels important and consequential, even though, you know, it's your own interpretation. And then I love the psychologists. I love Jung. I love Erikson. I love the psychologists and could read endlessly about the early days of attachment theory and things like that because I find that stuff to be fascinating. So those books have been a lot of fun and I love picture books with animals. [audience laughing] And so if you can get a hold of Joel Sartore's Instagram account, the "Photo Ark," he decided to take pictures of every animal on the planet,

00:12:08 What Excites You About the Future of Mental Health Treatment?

especially the ones that are endangered. He's a amazing photographer, but his books are even better so if you like animal books. "What excites you most about the future research of mental health treatment, particularly anxiety and depression?" Oi! Michael, thank you, Michael. Well there, I think that we're in an exciting time. I am, I'll just reveal my biases, I'm quite pessimistic at the idea that we're going to have better medication soon for most things. What I do think we are starting to approach is a time in which we understand how broad categories of drugs impact broad categories of chemicals, which kind of shift our mind in broad categories of directions. What does all that mean? I think we're starting to realize that because there are different receptors for all these chemicals all over the brain and body, that that side effect-less drug is unlikely to exist for mental

health, but that the combination of, maybe some pharmacology, but especially behavioral tools, people actually learning how to drive this thing that we call our nervous system is potentially helpful, maybe very helpful. Now in cases like schizophrenia, autism, and I didn't put those next to one another for any reason by the way, OCD, eating disorders, and I'm very mindful of the fact that, you know, anorexia is the most lethal of all the psychiatric disorders, right? Amazing and sad fact. I think for those conditions, we are soon going to enter a time in which it's going to be combination behavioral, drug therapy, and yes, brain-machine interface. I don't mean putting chips down below the skull. I think there's going to be, and there are things happening now of people using devices like virtual reality, as well as transcranial magnetic stimulation, placing a magnet on a particular location on the head combined with a particular, maybe drugs, maybe psychedelics, maybe not, to enhance plasticity. I urge a vote for psychedelics and I want to make a serious point about psychedelics. Five years ago, when I, well, four years ago when I started doing a bit of public-facing stuff, I was absolutely terrified to say that word; terrified. I thought I'd lose my job. I really did. I thought, "Don't say psychedelics." And I'll be very honest, you know, I, for me, I think that the clinical data on MDMA and on psilocybin are very interesting, very interesting. I don't think they are the first and only pass at rewiring the brain, but it is clear that the brain can enter a state of heightened learning capacity, but it needs to be directed towards something. The goal of opening plasticity, just, it opens plasticity. That's not the goal. It's like running; the goal isn't running. The goal is to run in a particular direction. So what I think is really needed is to drive that plasticity in particular directions. And I would love to see more directed use of those in, of course, the safe clinical setting where it's appropriate. And a guest on the podcast, Matthew Johnson, who's at Johns Hopkins, I asked him, "What's the deal with the microdosing?" And you know what his answer was? I was very surprised. He said, "Macrodose." And I thought, okay, I'm not a guy who, you know, I'm not into, I'm not, I'm not a pushing this. I'm not a proponent. I said, "You're kidding me. Why? Why would you say this?" This guy runs an NIH funded lab at Johns Hopkins School of Medicine. I thought, "Why?" And he said, "Because the one session with a trained professional that's triggering rewiring plasticity, that's guided, is," as far as they know from the data, you can go back and listen to, these are his words, not mine, but he's the expert in this area, "are encouraging plasticity in a particular direction." And he thinks that that's far more useful than just kind of nudging the system a little bit without any particular goal or outcome. Very interesting, and very surprising. And again,

a trained academic at one of the most elite institutions in the world. I think we're in very exciting times, for those compounds. And they're like, there are studies at Stanford and elsewhere on ketamine and other things, but it's early days. Young people should be very cautious, young, young people, and adults should be cautious, especially people with preexisting psychiatric issues and people who have a propensity for addiction although some of those compounds are being used to treat addiction. So I'd be an idiot and I would be lying, if I didn't say that it is a very exciting time for psychedelic therapies. [audience cheering and applauding] "Where do you see the biggest area?" and I've done only one clinical trial. True. I was a part I took part in one clinical trial. So I don't speak from a lot of experience there,

00:17:25 What Is the Biggest Area Tor Performance Enhancement?

just a little bit. I was a subject in that trial. "Where do you see the biggest area for performance enhancement within the elite athletes and operators that already hit marks of proper sleep and nutrition?" Meg Young, thanks for your question, Meg. Yeah, I think that, well, first of all, very few of them hit marks for proper sleep. But for those that do, so once you have your sleep dialed in and you got your nutrition dialed in, and the motivational component is there, I think where there's a lot of work still to be done and where people can really get outsized effects, is in this weird little cavern of human existence that we call creativity. And I didn't have time to talk about it tonight, but there's a very unique brain state that we call creativity, which is taking preexisting neural maps and starting to combine them in unique ways to create new ways of performance. Performance can be basically summarized in any domain as essentially four stages. You have unskilled, skilled, mastery, which is when the brain can generate movements or cognitive computations that are, create very predictable outcomes and then there's this fourth tier, this fourth layer, which is virtuosity. And virtuosity, by definition, means inviting back in a component of uncertainty. What this looks like in terms of operators or this looks like in terms of athletes, or even we can say musicians, or people who are in the cognitive fields, or poets, or writers, is what it means is introducing that uncertainty about what's going to happen next and the way to do that is to destabilize the system. In other words, to create states of mind in which there are literally sensory disruptions. It's like, like what I would like to see is more training in a kind of "funhouse of mirrors" type environment. That's when you start to see incredible performances emerge. And

virtuosos invite in uncertainty, they actually don't know what they're going to do next. And so this becomes a little bit of a vague concept and what I'm about to tell you next might seem a little silly, but one of the best ways to access creative states is to, no surprise, use your visual system to view things that are highly unstable and uncertain. I don't just love fish tanks; I love staring at videos of aquariums in Tokyo, and actually watching the fish because it's completely unpredictable. There's some evidence that doing things like that or people would say, "Oh, I was in the shower," or, "I took a walk in nature and then I had this idea." I actually don't think it was the walk or the shower, it's that nature is filled with unpredictable visual stimuli, auditory stimuli. When you can predict what's going to happen next, you have very little opportunity to uplevel your game so to speak. It's only by way of unpredictable sensory input that you can do that. So if you're a coach, or you're working with people who are very high level performers, do you want them to stand on one leg and spin around and then do what they're doing? Not necessarily. What you want to do is try and get them into brain states that are different than the brain states that they're in when they normally enter their practice. The liminal state between sleep and waking, excuse me, the liminal state between sleep and waking is a very powerful one for accessing creativity. Many people access ideas as they're waking up in the morning, they have great insights, other people while strolling in nature. I don't think it's the strolling or the waking up. I think it's the lack of, as we call it top-down regulation on rules. You are able to access combinations of neural maps that are unusual. So you can play with this a little bit. A lot of people throughout history have used compounds, drugs, to do this, right? Great writers would get drunk and then try and write or wake up and they would, the amount of self-abuse that people including athletes and creatives put themselves through to try and capture these windows of cognitive ability is pretty intense. And I don't think that's a good idea. I think one should be an explorer and try and find these cognitive states

00:21:44 Can You Still Do a Kickflip?

in ways that are non-destructive. I'm starting to sound like my mother, with all this. [audience laughing] Heel flips on lock. No kick flips. Next question. [audience laughing] [scattered applause] There's some skateboarders in the audience; my first non-biologic family. There's some amazing skateboarders in this audience and I'm not going to be the one doing a kick flip anytime soon, but they're great to have. One of the reasons we built

the podcast with the help of the great Mike Blabac is because I learned a long time ago that if you want things done right, and you want to do them outside the lane lines, and you want to have control over how things come across, you do it with skateboarders, 'cause I didn't come from a community where, you know, I didn't have parents at my sports games and things like that

00:22:32 Tips on How to Improve Memory

so, thanks to the skateboarders and the misfits and the those folks. "Do you have any tips on how to improve memory?" Yes, Ron Vered. Yes! Okay. This is a wild literature and I love it and it's changing the way that I do things. I thought that to remember things you're supposed to get really, really excited, really focused, and remember them. Guess what? That's not how you do it. There are data, and there are stories going back to medieval times that they used to teach kids things and then throw them in the river. There's a beautiful Annual Review of Neuroscience written by the late James McGaugh, a brilliant researcher who taught me that, in this review. And it turns out that if you want to remember something you want to spike adrenaline after you acquired that information, after! That means the double espresso and the ice bath after you study for math, immediately after. And you think about this, you know, that makes perfect sense, right? Think about the one trial learning that nobody wants to experience, which is a car accident or some traumatic thing. You didn't get the spike of adrenaline first. You got the spike of adrenaline after. So again, you know, I discourage the use of excessive stimulants or you know, anything like that. But if you're going to try and remember information, you need to get your brain and body into a high autonomic arousal state. Literally you need to deploy adrenaline into your system after you have made the attempt to learn some information. So much so that if you give people a beta blocker after learning emotional information, they don't learn it as well. Incredible, just incredible data in animals and humans. This is the beautiful work of Larry Cahill at UC Irvine and James McGaugh. So that's how I would focus on remembering things better. And it's also true that if you tell yourself that something's really important to you, you'll be able to learn it better. If you meet people and they tell you their name and you forget it two seconds later, well, you should probably be thinking, and now I do this, I meet people and I think, "Okay, what terrible thing did this person do?" Just try and spike my adrenaline or something like that. It's a terrible trick, but haven't figured out a better way,

00:24:54 How Do You Manage Social Media Addiction?

but that's actually one data-supported way to do that. Easily a dozen or more studies in humans on that very topic. "How do you manage social media addiction?" Paul. Oi, well we should be careful with the use of the word addiction because here, I think it's entirely appropriate. When you are engaging in a behavior over, and over. and over again, and you're thinking to yourself, "This isn't even that interesting," you're officially addicted. That's the litmus test for addiction. Not, "This feels so good." People talk about the dopamine hits of social media. Those only come at the beginning, but then when you find yourself scrolling, you're like, "What am I doing?" Maybe it's that narrow visual aperture; you're a hypnotized chicken, but maybe also you are seeking more dopamine hits because guess what? That dopamine wave pool is depleted, at least for that activity. It is true that dopamine, you have a baseline and then you have peaks on, on that ride on that baseline. I do think that we can have dopamine for one behavior, and not for another, but it's a generalized phenomenon. So how do you manage it? You have to stop seeking within social media. And so I've taken on the practice of turning off my phone for a couple hours each day. It's incredibly hard. People get really upset too, by the way, cause if you haven't noticed these tethers that people expect. We recorded a podcast recently and it, so I, I don't want to go into too much depth now, about attachment and grief. And, you know, we all have a map now, you know, you understand what the maps are, of space, time, and a dimension called closeness to everyone that we know space, where they are, time, when they are, dead, alive, when will I see them again et cetera, and closeness. And the phone has allowed us to tap into space, time, and this closeness map, which define all our attachments, on a very regular basis. So you can understand why it's so valuable to people. You know, the plane lands and everyone's texting. The planes, take off, everyone's texting. It's like, "Where are you?" Well, the plane's in the air, there's this thing called flight tracker. No one cares about that anymore. You want to hear from the person. So I do think that, I used to do an every odd hour of the day my phone was off, and like half the relationships in my life disappeared. They couldn't talk, they couldn't tolerate it. I loved it, but I loved them too. So I would say take breaks. And I would say at least an hour. And if you find yourself excited to get back on the phone, that excitement, that is the dopamine system. So you can kind of learn where it is for you. But if you find yourself scrolling mindlessly and it's not doing anything

for you, you are driving that wave pool down, down, down, down, down, so hopefully that analogy will help. It's weird to call myself Dr. Huberman.

00:27:43 Were You Nervous Tonight/ How Did You Prepare?

In my business if you refer to yourself in the third person, it means you're officially a narcissist. [audience laughing] So I'm just going to start with, "Were you nervous tonight and if so, what did you do to prepare?" Brianne, you saw my nervousness, didn't you? No, the, I asked myself that question. I was excited, and I think I'm good at lying to myself and telling myself that autonomic arousal that might be nervousness is excitement. But in truth, I wasn't, I was and am really excited to tell you all these stories and about biology. I know this might sound like a little bit of a line, but I actually don't feel myself as a, like a person when I do the podcast or I do this stuff. I took a walk before I got here and I have to be careful. There are only two topics that make me cry. One is talking about my bulldog. The other is talking about my graduate advisor. So I have to be very careful, but I took a walk and I imagined that they were here and, I know, and don't make me cry. Lex Friedman made me cry on a podcast and it was really unfair. And he was like digging and digging and there are a few people in the audience that know Costello. And it's like, you know, and I just kept thinking to myself before coming in here, like, you know, I love them and miss them and I, Costello would be entirely bored with this whole thing. So I distracted myself a bit and not so nervous. I do get nervous about things, sure, I'm human. But when it comes to biology,

00:29:10 Is Learning from Failure Equal to Learning from Success?

I think I still feel like that little kid who just wants to tell you all this stuff, you know, so, you know, I can't help it. "Is learning from failure equal to learning from success? Is one more efficient than the other?" Rachel, thanks for your question. Well, on a trial-by-trial basis, we know that when you fail at an attempt, on the next attempt, your forebrain is in a position to engage better. And this makes total sense, right? You feel that frustration [alarm buzzer] and you want to get the next one, right? Well, you're harboring, or I should say funneling more neural resources, your focus, that aperture tightens. Now you have to be mindful of that too, because when you have a failure and then you're like, you're going to hit the bulls. I'm thinking about a dart board, 'cause I'm terrible at darts,

you know, sober I'm terrible at darts. I don't even drink. So that next trial, part of the problem is, is that focus can narrow so much that you can start to lose access to information that might help you. If you were just to relax a little bit and dilate that focus a little bit, but in general, on a trial-by-trial basis focus is the cue that your nervous system is going to be positioned to learn better on the next trial. Now in terms of life experiences, gosh, I wish for everyone fewer failures and more successes, but you know, failures keep you humble. And I've had a lot of 'em. I mean, if people ever wanted and they, you know, I'd be happy to tell you about, I mean, I've made a ton of mistakes in life, a ton of mistakes. Some of those were mistakes of persistence, like dumb decisions. I kept like, "It's going to change. It's going to change." And it's clearly never going to change. And then some were failures of misjudgment about other people or situations. And a lot of them were just plain failures like the experiment didn't work, or the, it just wasn't the right thing. And you try and reframe those. I do think that we owe it to ourselves and to the people that we know to try and generate some wins here and there and try and help other people generate wins. You know, in running a lab over the years and I still do, you realize that you want your students to publish a paper and feel that success pretty early so that they can experience, A, how much work it is so they pick problems wisely, but, B, so they can feel that, like, "Oh, I can do this." And I think that, you know, this gets into the psychological as well. I think that yes, failures help, but successes help. And there, I think, you know, I function best in a team. And I think that for those of you that are feel like you're fighting some challenge alone, I do think that there are great resources to be had in trying to access other, you know, other people as sources of support. I think that that's a great tool. There's this whole literature, scientific literature, around social connection and how that can help us reframe motivation and goals. Anyway, maybe that's a topic to expand on another time. But failure is important on a trial, trial by basis. People who don't experience enough wins for a long period of time, the brain is a prediction machine after all

00:32:23 When Are You Going to Start Training Jiu-Jitsu?

and they start to predict failure so takes a bit more work to wedge oneself out of that. "When are you going to start training jiu-jitsu? Lex made me ask." Ryan Flores. Okay. Here's the story with that. Lex said, "Do you want to try jiu-jitsu?" I said, "Sure." Lex said, "Okay, it'll be great to show people beginner's mind." I said, "Sure." We went and did a

jiu-jitsu class. He was very nice; nice, nice, Russian, nice. Like, "Oh yeah, yeah, yeah." Then he puts it on the internet with me in a rear naked, him putting me in a rear naked choke, it was actually Lex Friedman choking out Andrew Huberman, There, I just talked about myself in the third person, dammit, edit that one. I have not had the time for jiu-jitsu. I like my ears the way they are, you know. Have you ever seen these people that do jiu-jitsu? Their ears literally look like stumps. No, I should do it. It looks like a great sport. And unlike the other sports I've been involved in my life, boxing, please don't do it. It's not healthy. Skateboarding and all this, you don't really damage your head doing jiu-jitsu.

00:33:28 Discuss the Supplements You Take

So no. I'm going to get you back for that one Lex. Okay. "Can you go through," oh wow, John Edwards. There's a joke that my friends used to tell about the supplements I take. They used to say, someone would say, "What supplements do you take?" And they would just go, "All of them." I don't take all of them, but I have been very systematic. For about 30 years, I've been interested in compounds that change the nervous system. And I do think that the, the events of the last few years have changed the way that people view supplements. I think that more people are starting to think about how to take better care of their health. And they, people are realizing that obviously, great sleep, mindsets, social connection, exercise, nutrition and so forth are very important. But I, I actually don't know anybody, granted, I run with a strange crowd, but I don't know anybody that doesn't take something nowadays. You know, I could go through the whole list, but I would say the most fundamental things and there's no product pitch here, the most fundamental things are the things that are going to support your kind of foundational health. So for that's going to mean mainly getting either by food sources or supplements is going to be getting sufficient amounts of these essential fatty acids. So important. For some people that's taking liquid fish oil, for some people it's a capsule, for somebody that's eating fish. I don't like the way fish tastes unless I'm in Seattle, by the way, the seafood here is amazing, not so much in California. So I think the essential fatty acids, and then I'm big on the data, dare I say, out of Stanford, Justin Sonnenburg's lab and Chris Gardner's lab that these fermented foods of which all these cultures have interesting fermented foods, kefir, and sauerkraut, and kimchi, and, you know, pick your fermented food. That those seem to really encourage health of the gut microbiome. So I

started eating a lot of those and taking no probiotics except in, you know, a few of the supplements that I was already taking. So I'm not trying to dodge the question, but I think, by and large, if you're eating well and doing the other foundational behaviors as well, you can get it way with a minimum of supplements. D3, it seems to be a lot of people deficient in D3, but not everybody. So I think that those are the main ones. However, I do think that nutrition should be the primary entry point. Again, it should be behaviors first, then nutrition, then supplements, then prescription drugs, only if you need them. And then, you know, for some people, their brain-machine interface like TMS and things like that are going to be useful, but behaviors change your nervous system, no supplement actually rewires you or changes your nervous system: behaviors do that. I hope I didn't dodge that question entirely. I do take some of the things that we talk about on the podcast to do some focused work, sometimes alpha-GPC, but lately I've been doing this whole thing of cold water exposure to spike my adrenaline, 'cause I hate it,

00:36:29 Advice or Protocols to Improve Learning & Retention

and it spikes my adrenaline after learning based on the McGaugh and Cahill data. "What would be your best one or two pieces of advice or recommended protocol for improving learning and retention for graduate students in science and medicine? We try to sleep sometimes." Thank you, JD. Oh great. You're at UW, JD. So, you know, I used to teach this course at Cold Spring Harbor on career development for scientists and the there's a lot in there, but the two things that are most important are, I, for sake of answering this question, I would say, are, find non-destructive ways to reset your dopamine and your energy levels and do those at least every three days. So for me, it was kind of a, a tough thing to take a long walk, or to spend, I used to work really hard on Mondays, really hard on Tuesdays, and I would not go in until the afternoon on Wednesdays and sometimes not at all. And then I go in Thursday, Friday, and work really, really hard and then not at all on Saturday and then maybe do a little bit of work from home on Sunday. And I was very productive that way. But those breaks are absolutely key and it's not encouraged so much in academic or tech or maybe anything now. I hear about so much stress and overwork. I say, you just do it and define the culture and let the results and your focus be the thing that defines you, not how many hours you're in there. But I realize there's a huge cognitive load and energetic load and for that, I do think these Non-Sleep Deep

Rest protocols are where it comes in really handy. There are at least two faculty I know at Stanford. One whose a so-called Howard Hughes investigator, who is big, those are big deal appointments. They get tons of money, et cetera, et cetera, and they do amazing science most of the time. These individuals certainly do. And they take two 20 minute naps, per day, in their office. When this guy came and visited me, years ago when I was at a different university, he took the time that we were supposed to meet in my office and talk about data, he asked if he could take a nap. [audience laughs] And he gave a great talk that afternoon. So there you go. I do think you have to take control of your schedule and do those things. And I hope that helps.

00:38:42 What Exciting Research/Work are You Doing?

And then of course, for some people, exercise and so on is the way they reset. "What research or work are you doing or that your colleagues are doing that you're most excited about lately?" Glen, yeah. One project in particular, I hope this paper gets accepted soon, it's been out for review forever and so if the reviewers are in the audience, please just tell us one way or the other, you know? We did a very large scale study during the pandemic, we meaning David Spiegel and I, and an amazing PhD named Melis she now has two last names, excuse me, Balban, Yilmaz Balban. And Melis we essentially equipped people with remote monitoring devices and measured sleep and heart rate variability and a bunch of stress and bunch of other things. And we gave them a very brief set of breathing protocols and it turns out that this thing that I'm talking about a lot on the podcast, these days of this double inhale, long exhale, the so-called, "physiological sigh," was the most effective breathing practice for allowing people to control their heart rate variability, reduce overall heart rate, access better sleep, and these were extremely short protocols. So I'm very excited about this. I didn't discover physiological sighs. I love the idea that people can do a very brief protocol, once a day, maybe even just while walking down the street or in the moment and actually learn to control that autonomic seesaw better. So I'm very excited about that. And then we are gearing up to do some studies on people who have more severe forms of anxiety and panic attack, using mainly respiration, but also looking at some of these eye, vision-related ways of controlling the nervous system. I love that stuff.

00:40:22 How Does Dopamine Factor into Neuroplasticity?

If I keep talking about it, I'm going to give you a data presentation so I'm going to turn around. "How does dopamine factor into neuroplasticity if at all?" Colin, great question. It's a very strong trigger of plasticity, so much so in fact that there's some work that shows if you stimulate with an electrode, the brain area that releases dopamine, and you pair that with anything, anything, even just like an eight kilohertz tone, [vocalizes a high tone] the brain remaps and it's like, "Oh, I love that eight kilohertz tone." Remember dopamine is dumb, and is just dumb. And it is just, you know, it's like Costello when he sits this dog, I could hang a rope from a tree. This dog was so lazy he wouldn't cross a room for a steak. You had to give the steak to him, [audience laughing] but it would run across a field. He would run and jump on and hold onto that rope, and he would sometimes bite through his lip with like blood dripping down. And I was like, "Oh my gosh," it was like breaking my heart. He loved every sit, that's dopamine; turns us into idiots. He was as smart about what he needed to be smart about. Dopamine. So if you trigger dopamine release with Ritalin, Adderall, to a lesser extent L-Tyrosine, and certainly please don't do this, but cocaine, amphetamine, whatever you're doing seems super interesting. It's true. And that's why it's such a slippery slope. It makes anything you're doing seem interesting and important. And actually I'll use this as an opportunity to say something about the psychedelic thing earlier. One of the issues with MDMA, it's a very unusual brain state: it's high dopamine, high serotonin, completely synthetic compound. There are other things in there that it does as well. One of the problems with people I see with the problem with people just taking MDMA, just at a basic level, is that if you're not pushing that towards some therapeutic outcome, music sounds amazing. Everything feels and sounds amazing, but it's a very neurochemically, you know, severe state. So that's why I think if people are going to explore those things, do it as part of one of the university-supported clinical trials. One of the reas- those drugs make everything seem interesting, even stuff that's not terribly interesting. Now they also have the potential for trauma healing capacity. These are the MAPS studies and so on. So you have to be very careful with what you pair with dopamine and what you pair dopamine with. And for those of you that are high sensation seeking, novelty seeking, and everything's interesting to you, and you want more, and more, and more, experiences, I, you basically have a eight cylinder car in you and you need to be very careful how you drive that thing. Like any high performance automobile, it's going to spend more time in the shop,

00:43:12 What Advice Do You Have for Future Scientists?

[audience laughing] so learn to drive appropriately. "What advice can you offer to future scientists who want to make an impact like you have?" Ryan O'Boyle, get tenure first. No, I'm kidding. So I have this weird history in science and I'm not looking for sympathy here, but my undergraduate advisor, who I adored, he's like a father to me, my graduate advisor, and my postdoc advisor, who I also adored, all three of them died: suicide, cancer, cancer, really young. So the joke in my field is you don't want me to work for you. But in all seriousness, all three of them had a really morbid sense of humor, all amazing people, but it is this kind of weird curse that I've had. So what scientists, you know, what advice, you know, well, Ben Barres, the late Ben Barres died of pancreatic cancer, an amazing individual. They're actually making a documentary about Ben's life. He's transgendered. He was a totally irreverent. He said whatever he thought. He offended everybody. He was awesome. Brilliant too. Ben and I had a conversation as he was dying. I recorded a lot of conversations with him and I told him I was interested in doing public-facing education. And he said, "Well, you're tenured now and, people are going to be upset, and they're not going to like it, and your colleagues are probably going to hate it so whatever you do and you better make it good." And I was like, "Wow, that doesn't really help much, Ben." And he said, "You know, you seem to have a compulsion for it." So, he was right. I think that if you are excited about science, and sharing what you know, then do that. And even if it seems super nerdy, I mean, there are these ento- I think they call themselves entomologists, the insect people, they, I mean they make insects seem really, really cool. And if you are excited about spindle kinetics or whatever, you know, tell people about it, I really mean it. I think that the one caveat is that I do think it's important to get a formal, rigorous training in it first. I think that you'll go further and faster in the long run. And there's some amazing people out there. There's a postdoc at Stanford. I think his name is Ben Rein, I think if you shorten it up on Instagram, it's actually brain, brein, 'cause he works out he talks about brain science so that's why it's weird: B B R E I N. He does a great job. And he's a really good example of someone who's still on the ascent with his career, doing serious science, and doing science communication. But you have to be careful, it's time consuming. Look, you, people will dislike you for whatever. I made the mistake once of saying that I eat butter. Apparently that's a sin on the internet. I like little bits of actually like a lot of butter,

but try and eat little bits of butter. But somehow it's like, there's this idea that I eat sticks of butter. So you have to be careful. [audience laughing] Like, I mean, the things I've heard, I heard I was dead. That was cool. So you have to be careful and remember everything is stamped into the, the cloud now and the metaverse or whatever it's called. So I would say, here are the rules that we have at the podcast and on here's the rules that I created for myself. I truly don't do it for me. I do it 'cause I think people want to hear about it, but I've been telling myself that since I was six years old. The other thing is never, ever, ever do it just for your own gratification. You should really try and think, "Is anyone going to get anything useful out of this, potentially?" That's the goal. If you're doing that, it'll work out for you. If you are thinking about how to get followers or something like that,

00:46:47 Is Age 66 Too Old for Neuroplasticity & Learning?

it ain't going to work out. That's my advice. "Is age 66 too old for neuroplasticity?" No, no, I'll cut myself off, "to begin learning again?" Sandra Trazzare, no! Did I pronounce that right? Thank you, Sandra. No, Richard Feynman, the great Richard Feynman, taught himself to draw later in life. He was also really into flotation tanks. Did you know that? Yeah, he was also into bongo drumming naked on the roof at Caltech. Richard Feynman, you know, did so many things that would get most people fired nowadays. He's just lucky he was alive when he was. You can absolutely learn at 66 and way beyond. There's an amazing study from Rusty Gage's lab at the Salk Institute years ago, showing that even people who are very late in life, terminally ill in fact, are still producing new neurons in the dentate gyrus of the hippocampus. These people that were gracious enough to allow researchers to inject them with dyes that would label these neurons for analysis postmortem, after they died. Absolutely you can learn. What's harder is focus. Oftentimes what's harder is sleep as well, but the same mechanisms apply. There's no evidence whatsoever

00:48:00 How Do You Read Research Papers?

that neuroplasticity disappears at any stage despite what Hubel and Wiesel told the BBC. "How do you tackle reading research papers? Do you have a specific strategy?" Anne Hun, yes I do. I do. I take notes on everything. I try and so I there's four questions

that we teach students and that I think that I use. The first one is: "What's the question they're asking, major and more specific?" Second is: "What did they do? What are they, like methods-wise, what did they do?" You don't have to know all the details in the methods necessarily, but be versed in those methods, but you have to kind of understand like, are they looking at mice? Are they looking at humans? Is this a, you know, did they have people in two different conditions or just one? You have to understand what did they do, then you ask, "What did they find?" And then the last question is the most important one and you should write down the answer to this is: "What did they conclude?" And then you look back at the first question and you go, "Did they actually answer that question, or is it something unrelated?" And those four questions are essentially the way that I parse each paper. Learning to parse papers is tricky for the podcast. I use the telephone. I call people and I badger them and I ask them, you know, "Like who's doing the really good work in this area?" And I spend a lot of hours doing it. And then the best way to remember science is to tell someone about it. So before each podcast I'll call someone and be like, "Hey, did you know that they used to throw kids in the river?" After, I do this, and my sister, my poor sister, and she's like, "Yeah." My sister, by the way, does not watch the podcast. I, she's a therapist. And she's like, "Hey, I learned this amazing breathing technique." I was like, "Oh yeah, really? Tell me about it." And it's like, someone else is there. I'm like, "You know, I have a podcast."

00:49:40 What is Your Favorite Condiment?

She's like, "I don't like your podcast." You know, it's older sister, it's older sister. It's, she's not lying. "What is your favorite sauce, condiment, seasoning? Sauce. There's one in every audience. I like the spicy stuff. We've been fermenting our own food at home. It's kind of cool. You put the cabbage and the stuff in the little ceramic thing outside, and then it, it goes [popping] It makes this amazing sound. And then you can like make your own sauerkraut and you know, with peppers and like fermenting that stuff, it's really good.

00:50:10 Most Important Takeaway from Your ADHD Research?

Okay. They're telling me one more question so we'll do two. "What's most important from your ADH, ah." Gabriel, a lot of questions about ADHD, for people on medication or not

on medication, so I'll answer both. For people on medication, I think work with somebody really good who's willing to work with you to allow you to find that minimal effective dose, and also timing that dose. One of the key things that we know now is that from that waking up point in your morning until about eight or nine hours later, we've sort of named that phase one of the day for lack of a better naming protocol. The systems that release cortisol, dopamine, and epinephrine, are essentially more effective at producing those than they are in the later periods of the day. Which makes sense if you think about the way that the autonomic nervous system works, et cetera. So there's an important question that I can't answer for you, but you can answer for you, which is if you're using Ritalin, Adderall, Vyvanse, these things that enhance dopaminergic transmission, Modafinil, Armodafinil, by the way, for the people in the audience like me, who didn't go to college when these things were all in use, the numbers of people that use these compounds, on and off prescription, is astronomical. It's incredible. I didn't realize it. I think something like 80% of college students use these at some point. Incredible, 'cause they put you into a narrow aperture tunnel of concentration. So you want to, with a physician's support of course, to help, get permission or not, to figure out what time of day to take your medication. Now for people who are not on medication, I'll just go right back to what I said earlier, which is that you can train focus, but it feels terrible to train it. It is hard. Again there are these large scale studies in China and elsewhere of people literally teaching themselves, and yes, they blink, although less often, to focus their vision on a narrow aperture and to really battle through that agitation, stress, and learn how to keep their focus. Now focus will drift, right? Focus is not a constant; focus will drift, and you pop out of focused states and then refocus, and pop out, and refocus. That's something that you can train up. I've heard from many people who have managed to train themselves off medication or to lower doses of medication, and look, some people can't do that. They absolutely have to maintain their standard medication protocols. This is a larger discussion, obviously, as it relates to ADHD.

00:52:58 What Future Episodes Are in the Pipeline?

We're going to do another episode on ADHD because the data are coming out so so fast. "What future episodes are in the pipeline?" David Nguyen. Okay, thank you for that question. We have one on grief. We have an amazing episode with a guy from the Rockefeller University on the, this is, am I allowed to say it's going to be my favorite

episode? I love all the guests, but this episode just blew me away. It's on the relationship between language, speech, dance, and music. And I have no musical talent and I'm not a very good dancer. So that's being generous. Amazing interplay between those things, exercise in the brain, OCD, bulimia, binge-eating disorder, Peter Attia's coming on. He'll teach us about everything medicine, and longevity. And I'm kind of blanking at the moment. David Anderson from Caltech on aggression and emotional states. Amazing. And then there are a number of people, Lisa Feldman Barrett, or Barrett Feldman. I always get it backwards. Sorry, Lisa, on emotions in the brain. And really we do take suggestions about who to bring on the podcast very seriously. What we're mostly looking for are the people that no one else has heard, that people haven't heard of, who are not going on podcasts every week and that people should absolutely hear from. And then I will tell you, they're going to kill me for saying this, but I'm going to do it anyway, we have some short series coming up with expert professionals. I'm going to do a short series on trauma. And my hope for this series is that you'll actually get to see an exquisitely skilled trauma therapist, take someone through, excuse me, I seem so excited I'm spitting on the audience, excuse me. So it, to take someone through actual trauma therapy. This isn't staged. This is somebody who's actually in a point of near suicidal grief and trauma, taking them through it in the course of the podcast, as people can see what this process actually entails. That's a very meaningful project to me for a number of reasons so we're really excited about that. And you know, to be honest, I feel like there's just such a treasure trove of information out there I just want to grab it all, and tell you all about it, until, I always say, "If nothing else, I'll cure insomnia." So, the, yeah. [audience applauding vigorously] Thank you. Appreciate it. [applause continuing] Thank you so much for your time. I really appreciate everyone coming out on a weekday and I'd be remiss if I didn't say, Thank you for your interest in science. [audience cheering and applauding] [upbeat music playing]