This episode is brought to you by Aeropress.

I love Aeropress with more than 45,000 five star reviews and customers in more than 60 countries, it might be the highest rated coffee maker on the planet. Let's rewind just a bit because back in 2010, 2011, I tested the entire gamut of coffee brewing and filtering options alongside a former barista world champion. This was for research for the four hour chef.

That concluded with a statement that the Aeropress was, quote, bar none, my favorite brewing method and quote, I even mentioned it and made a cup of coffee on late night with Jimmy Fallon using the Aeropress.

Here is the back back story.

Remember the aeroby, the amazing UFO like disc that you could throw farther than a football field.

Alan Adler, a mechanical engineer in Stanford University lecture, created that. Then after conquering the 1980s toy market, he began to obsess over one thing, coffee.

The result was the Aeropress, which debuted in 2006.

It was quickly adopted by the specialty coffee community and it became so popular with the barista community that someone in Oslo Norway started a world Aeropress championship because the Aeropress combines the best of three brewing methods. You get a cup that is full bodied like a French press, smooth and complex as if you were using a pour over method and rich in flavor like espresso. Best of all, it's super small.

You can pack it in your bag when you travel.

It takes literally five seconds to clean.

It is all practical, no fuss.

And you don't have to drink mediocre coffee at your office or Airbnb.

And now they have a new crystal clear version, sleek enough for display and tough enough for the road.

You can pick one up at aeropress.com slash Tim.

That's A-E-R-O-P-R-E-S-S.com slash Tim for less than \$50.

That's aeropress.com slash Tim.

And my listeners, that's you guys can get 15% off.

Just use the link aeropress.com slash Tim.

I highly encourage you to try it out.

You will not be disappointed aeropress.com slash Tim.

This episode is brought to you by Viori clothing, spelled V-U-O-R-I, Viori.

I've been wearing Viori at least one item per day for the last few months.

And you can use it for everything.

It's performance apparel, but it can be used for working out.

It can be used for going out to dinner, at least in my case.

I feel very comfortable with it, super comfortable, super stylish.

And I just want to read something that one of my employees said. She is an athlete.

She is quite technical, although she would never say that.

I asked her if she had ever used or heard of Viori, and this was her response.

I do love their stuff, been using them for about a year.

I think I found them at REI, first for my partner.

T-shirts that are super soft, but somehow last as he's hard on stuff.

And then I got into the super soft cotton yoga pants and jogger sweat pants.

 $\ensuremath{\mathrm{I}}$ live in them and they too have lasted.

They're stylish enough.

I can wear them out and about.

The material is just super soft and durable.

I just got their Clementine running shorts for summer and loved them.

The brand seems pretty popular, constantly sold out in closing.

And I'm abbreviating here, but in closing, with the exception of when I need technical outdoor gear, they're the only brand I bought in the last year or so for yoga running loungewear that lasts and that I think look good also. I like the discrete logo.

So that gives you some idea that was not intended for the sponsor read.

That was just her response via text.

Viori, again, spelled V-U-O-R-I, is designed for maximum comfort and versatility. You can wear it running.

You can wear their stuff training, doing yoga, lounging, weekend errands, or in my gaze, again, going out to dinner.

It really doesn't matter what you're doing.

Their clothing is so comfortable and looks so good.

And it's non-offensive that you don't have a huge brand logo in your face.

You'll just want to be in them all this time.

Their men's core short, K-O-R-E, the most comfortable lined athletic short is your one short for every sport.

I've been using it for kettlebell swings, for runs, you name it, the banks short.

This is their go to land to see short is the ultimate in versatility.

It's made from recycled plastic bottles.

And what I'm wearing right now, which I had to pick one to recommend to folks out there, or at least to men out there, is the Ponto Performance Pant.

And you'll find these at the link I'm going to give you guys.

You can check out what I'm talking about, but I'm wearing them right now.

They're thin performance sweat pants, but that doesn't do them justice.

So you got to check it out.

P-O-N-T-O Ponto Performance Pant.

For you ladies, the women's performance jogger is the softest jogger you'll ever

own. Viori isn't just an investment in your clothing.

It's an investment in your happiness.

And for you, my dear listeners, they're offering 20% off your first purchase.

So get yourself some of the most comfortable and versatile clothing on the planet. It's super popular.

A lot of my friends have now noticed are wearing this.

And so am I.

Viori clothing.com forward slash Tim, that's V-U-O-R-I clothing.com slash Tim.

Not only will you receive 20% off your first purchase,

but you'll also enjoy free shipping on any U.S.

orders over \$75 and free returns.

So check it out.

Viori clothing.com slash Tim, that's V-U-O-R-I clothing.com slash Tim and discover the versatility of Viori clothing.

At this altitude, I can run flat out for a half mile before my hands start shaking. Can I ask you a personal question?

No, I would have seen it in a perfect time.

I'm a cyber-nerdy organism living this year over a metal endoskeleton.

Hello, boys and girls, ladies and germs.

This is Tim Ferriss.

Welcome to another episode of The Tim Ferriss Show, where it is always my job to deconstruct world-class performers, to interview people who are very good at what they do, to find out what makes them tick, their influences, things you can use that you can borrow from their lived experience.

And my guest today is David Eagleman.

You can find him on Twitter at David Eagleman, Eagleman, and just as you would think it spelled.

And David is a neuroscientist, New York Times bestselling author, Ted Speaker, and Guggenheim Fellow.

We're going to come back to the Guggenheim Fellow, I think, very shortly. He is the writer and presenter of the Emmy-nominated series, The Brain on PBS, as well as the podcast, Inner Cosmos with David Eagleman.

In Palo Alto, California, he teaches at Stanford University, you may have heard of it, runs a startup neurotech company called Neosensory and directs the Center for Science and Law.

Dr. Eagleman also runs a film and television production company, Cognito Entertainment, to bring scientific themes, both fiction and nonfiction, to the screen. And in his spare time, he is the author of eight books, including the International Best Seller Sum, Incognito, and his newest book, LiveWired. You can find all things David at eagleman.com.

David, so nice to finally carve out the time to have this conversation.

Great, great to be here, Tim.

And I thought we would start with a topic while near and dear to my heart is not something I know that much about, and that is synesthesia.

And I'll preface that by saying one book that I found somehow I don't know how in high school, which later led to me for a very brief stint, being a neuroscience major or a psychology major with a focus on neuroscience, was a book by A.R. Luria, and I may screw up another word here, but the mind of a nemonist, nemonist, I always want to say nemonist, like nemonic device, nemesine, the Greek goddess of memory.

So that gave me insight as any reader of this book would find into a vast memory and what maybe hypernesia or incredibly unusual performance in that arena can look like.

Would you mind just taking a moment to define synesthesia and to then describe the work that you've done in that area or aspects of it that you find particularly interesting?

So a nemonist is someone who can memorize anything in their life, as you know, from the book, you know, giant lists of arbitrary numbers or things like that. Some people have this ability.

And it turns out, as far as I can tell anyway, that every single one of these people has synesthesia.

So synesthesia is where there is an association between some stimulus and something else.

So for example, numbers triggering a color experience.

So three is purple, nine is yellow and so on.

But it's not only colors, it can be other things like gender and personality and shape and size and things like that.

So for someone who has synesthesia, when they're memorizing, let's say the digits of pi, there's a whole story landscape going on where the small

yellow girl who is number three is talking to the angry boy who's number seven.

And then who's talking to the old woman who's number nine and so on.

There's a whole story there.

And that's how nemonists tend to memorize their stuff.

But synesthesia, it turns out, is quite common.

It's about 3% of the population has some form of synesthesia.

And the thing I've always found fascinating about it, the reason

I've studied it for about 20 years now, is because it is just an example

how reality can be different in your head and in my head.

And we would both accept it as, OK, that's how the world is.

There I should just mention, there are all these forms of synesthesia like,

you know, hearing might lead to a taste in your mouth or tasting something might lead to a feeling on your fingertips or a loud sound might cause you

to see something or whatever.

It's just any blending of the senses we call that synesthesia.

All right.

Many follow up questions.

So I've never had a conversation with someone who has spent the amount of time looking at synesthesia as you have.

So two immediate questions come to mind.

So nemonist, would you say that that label applies to only those who seem to organically have these abilities and maybe the presence of synesthesia?

Or does it also apply to people who develop or learn techniques

for, say, competing in memory competitions?

Because they can do things that are seemingly beyond the reach of the average human, but they're not Kim Peek reading two books at the same time, one eye on each page.

Let's just say.

Right. So like with many things, there's congenital, which means you're born with it or acquired, which means you get it some other way.

So for example, there's congenital synesthesia where you're born with this mixture of the senses, but acquired is when people take certain psychedelic drugs and they listen to music and it causes them to see colors and shapes, that sort of thing.

So yes, you could be a nemonist that acquires your skills through hard training, and usually that training involves just tapping into other modalities like we're really good at location.

All animals really care a lot about location.

So you know all the stuff about memory, palaces and whatever.

And you're memorizing a sequence by placing things in your mind and different locations in your house, let's say.

So that's the way that somebody trains is by tapping in.

And really that's what synesthesia is about is neighboring areas of the

brain that are sort of tied together more than you would normally expect.

So for somebody who has colored numbers, normally we memorize the numbers or the weekdays or the months or whatever thing we're forced to arbitrarily memorize as a child for a synesthesia, they tie it into something like colors

or in many cases, spatial location.

So many synesthetes have, let's say the months of the year are laid out in front of them.

So they say, oh, oh, March is over here and April is kind of up and to the right of it.

And then May is down here and, and June, and it usually circles around their body, that kind of thing, but they have a very spatial sense of the months or

the years or the number line, things like that.

So we may come back to that, but I would like to jump to something that I think is certainly adjacent and that is creating new senses in some respects.

And this makes me think of one of your, probably several TED talks, but can we create new senses for humans?

I saw this quite a long time ago.

I put it in my newsletter five over Friday because I thought it was very much worth people watching and considering, not just considering what you had then, but the implications of developing technology.

So would you mind describing outside of congenital synesthesia, outside of gobbling, salicybie mushrooms and seeing the Andromeda galaxy appear before you as you're here, Pink Floyd, there are other options for developing a new ability to our new faculty to perceive the world.

So would you mind speaking to sensory addition, if that's the right term to use, and maybe we start with recent progress?

The whole thing that got me interested in this a while ago was understanding, just really thinking about the fact that the brain is locked in silence and darkness inside the skull.

And all it ever sees are these little electrical signals, which also, you know, can cause chemical release and so on.

But you've just got these electrochemical signals running around in the dark. And yet when you open your eyes and look at the world, you see everything in full color and it looks so rich and so on.

And you're hearing music and you're feeling things on your fingertips and you're smelling cinnamon and all these things seem like very distinct senses to you, but they're all made of exactly the same stuff, which is these electrochemical spikes.

And so I got really interested in this idea of could we feed information into the brain via an unusual source?

And would the brain just figure it out?

And so what we did is we built a vest that had vibratory motors on it.

And this was for people who are deaf.

It can capture sound and turn the sound into patterns of vibration on the skin from high to low frequency, which is exactly what the inner ear does.

And we put it on deaf people and train them.

And it turns out that works great.

You can learn to hear through your skin.

And it's because essentially the brain doesn't care how the information gets there as long as it gets there somehow, the brain will figure out what to do with it.

And the way it does is by making correlations with other senses.

So, you know, you see the dog's mouth move and you feel the barking on your skin and your brain figures out, oh, that's the sound that goes with that.

And so I gave that Ted talk on it where I showed the vest.

And then in the interim, what I did from that time is I shrunk it down to a wrist band.

I actually spun a company off.

So I should say we shrunk it down because the whole company was involved in this very hard work, shrunk it down to a wrist band and were on wrists all over the world.

And that's not only for deafness, but also for tinnitus ringing in the ears.

I can explain how that works, if interesting, but also for age related hearing loss.

So as people get older, they lose their high frequencies.

So we just use machine learning on this wrist band that listens in real time for the high frequency parts of speech, like a TH or an S or a V or a B.

And it buzzes your wrist in different ways to let you know, hey,

I just heard a TH, I heard a B, a V.

And so what happens is your ear is doing all the work at the medium and low frequencies and the wrist band is just clarifying what just got said at the high frequency.

And turns out that works like gangbusters.

Your brain can learn to fuse those signals quite easily.

And after a few weeks, people, they don't need hearing aids.

It replaces a hearing aid.

So your mind fills in the blanks once you develop the ability to associate properly. Exactly.

Because your mind is getting the information now through your wrist,

through the skin of your wrist, which is essentially acting like a perfect inner

ear, we're just transferring the inner ear to the skin, essentially.

And that just passes the information in the brain.

The brain says, oh, I got it.

That was sheep versus sheet versus chic.

It gets the information from the wrist and puts it all together.

So for the wrist to work like the vest did, what was the most important

technological innovation?

Because I think of the surface area of the vest.

I'm like, okay, your ability to discern, say, vibration at the chest versus the back would be fairly, it would appear to be fairly straightforward.

But once you constrain that to surface area and contact on the wrist, I would imagine that probably incorrectly, but I would imagine that to be much more difficult for the user to parse and learn to decipher.

It's actually not because you have very low spatial resolution on your torso. In other words, if I write, it's the density.

Exactly.

So you have higher on the wrist, but your intuition is right that there's

just less room on the wrist to stick motors.

So we have fewer motors than we had on the vest.

It turns out we use an illusion, which is if I stimulate two neighboring motors,

you will feel one virtual point in between those two.

It's like binaural beats with the audio.

Yeah, exactly.

And as I change the amplitude of those two motors, I can move that virtual point around.

So we're actually stimulating 128 virtual points on the wrist.

Oh. that's clever.

You clever bastards.

Good for you.

So I wanted to ask about maybe not replacement therapy in the sense of hearing, say hearing loss, fixing hearing loss, or fixing a pathology.

I think that'd be fair to say with tinnitus or tinnitus, which I happen to have, so I'd be curious to know how that works.

It's not very pervasive in my lived experience, but it does happen.

I'd love to know also, so this is a very sloppy compound question.

You can choose as you would at a buffet where you'd like to go with it.

What might exist for healthy normals in terms of augmenting the scope of their sensory experience?

I don't expect it will all become mantis shrimp or something like that.

But I'll mention a name that people might want to look up, Ed Cook.

And I don't know if you know this name, but he trained the author behind a

book called Moonwalking with Einstein to win the national memory championships in the United States.

Ed himself, very, very high level memory competitor.

Also fascinated with sensory substitution and sensory addition.

So maybe we could start with the tinnitus or tinnitus and then go from

there to what do you think the applications are or could be for

healthy normals, if that makes sense.

Terrific.

Okav.

So first thing, by the way, is that everyone calls it tinnitus and audiologists call it tinnitus and either one is correct. So good.

Second thing is the way it works is something that is so simple.

It's called bimodal stimulation.

But all it is is we're playing tones around your tinnitus frequency and you're feeling the corresponding buzzes on your skin.

So you're hearing the sound in your ears and you're feeling the buzz on your skin that drives down the tinnitus as much as any solution that exists.

The reason it works, there are very complicated arguments, but I think the simple thing is that you're teaching the brain, what is a real external sound? Because the skin is giving you verification that the sound actually is real.

It is external.

Yeah, exactly.

As opposed to the beep on the inside, which is fake news.

Originating externally, right?

Yeah, exactly.

Exactly.

But the stuff on the inside isn't real and it doesn't get verification or confirmation on the wrist.

And so your brain figures out, oh, okay, I don't need to pay as much attention. So that's how that works, which is cool.

So we're doing all these things in the hearing space.

And that's actually what my company NeoSensory is on the market with because that's all a very direct path.

But the really interesting thing is we've got 70 projects, 70 different projects about sensory addition and sensory expansion.

And so some of my favorites are things like for a long time, I've been wearing infrared just so I can pick up on what's going on in the infrared range.

You can actually do this in the near infrared or the midwave infrared.

But in the near infrared, the first time I put it on, I happened to be walking

at nighttime in between a couple of houses and $\ensuremath{\mathsf{I}}$ suddenly felt all this

infrared radiation, but I couldn't figure out where it was coming from. So I just followed my wrist.

And there was a security camera with infrared LEDs, which normally is totally invisible to you.

You can't see that.

But it was so obvious to me that the security camera was there because I could feel it.

But in the mid range, that's when it's really interesting because that's the temperature.

That's where it's picking up heat signatures.

And so I can like walk through the parking lot and know immediately which cars have been parked there a while, which ones have just pulled up in last half hour because there's a lot of heat coming from the engine block.

I can just feel that.

Or I happened to go in the library the first time I was wearing this.

And, you know, I could tell there were two empty chairs.

I could tell which one was sat in at some point in the last half hour because there's still a heat signature there.

And even the books on the display where people have recently picked up a book, they still leave the heat signature there.

So it's really amazing.

It's like slicing up time in a different way when you're tapped into the infrared range, but we have all kinds of projects where you can feed in data from the internet, stock market data, Twitter data.

One of the cool things that we did is we took one of these smart watches that can pick up on your skin response and heart rate and heart rate variability and that stuff.

And then we, using the API, we fed that data out and over the internet and then to the wristband.

So you can feel all that.

But the interesting part is when you take the wristband off and put it on someone else, so let's say your spouse is tapped into your physiology, your spouse can feel the things that you're time to leave Tim Maloney is dysregulated.

I have really no idea if this is a useful thing for marriages, but it is totally cool to be able to know when someone else is feeling stressed out.

I mean, you can be, the reason we did this over the internet is so you can be on the other side of the globe and you could suddenly call your wife and say, you know, hey, baby, you're stressed out, you know, you're feeling okay. And anyway, it's just a really interesting thing.

So we're exploring lots of things.

None of them have clear market paths, but they're the thing that feed me scientifically.

Of the 70 experiments slash projects that you have running, why did you choose the infrared for yourself?

Oh, because several of them are clinical.

They have to do it.

Let's say, for example, for prosthetic legs or peripheral neuropathies or whatever, you know, we're just feeding data in.

But, but because I don't have any of those problems, not yet.

Not going with, it turns out that $I^{\prime}m$ into the idea of sensory expansion.

Can I tap into other things?

And one of the things as maybe you remember from my TED Talk, one of the things I've always been fascinated by is how little we see of the world.

We see such a tiny fraction of what is happening out there.

So I've always wanted to be tapped into a lot more just as an example. You may remember this in the TED Talk, you know, the amount, what we call visible light, the ROYGBIV, that's less than a 10 trillionth of the light that's out there of the electromagnetic spectrum. And so it turns out that, you know, all these other things, x-rays, microwaves, and gamma rays, and all these things are passing through your body. Totally invisible to you because you don't have the proper receptors to pick up on it. But I suspect there are a whole bunch of Nobel Prizes hidden out there in different parts of the spectrum. If we could just pick up on those and detect them in our daily lives and be aware of things. And by the way, I should clarify one thing on that. We have all kinds of ways of detecting things in the spectrum in those different parts, but only in the laboratory. We're not walking around and experiencing the world that way. And I think that's what makes all the difference. I'll just give you one example just to clarify what I'm saying. Some colleagues of mine have this company where they look in the microwave range at the oceans to see where the ships are going and they can make estimates of commerce that way and so on. But what they discovered quite accidentally is that if you look at water in the microwave range, you can tell if it's drinkable or not. You can tell what water is drinkable and what's not. And nobody knew that before. It's just one of these things where you have to look and say, oh, hey, do you notice this? And so that's what I think we are set up for is so many discoveries of just being in the world and having different types of vision on the world. If you had to maybe edge into the realm of science fiction, but informed science fiction could just be informed projection. Let's say in the next five years, what would be your wildest hopes or dreams for the future of this type of technology?

One of them is that I think we can really use AI and machine learning for a lot of very useful stuff. I'll give you one example of actually a company that's spun off from our company,

which is it's these three college students who are doing this awesome thing to help people with autism understand the social context that they're in.

So kids with autism usually can't tell if the person they're talking to is angry or happy or sad or whatever.

So the wristband just uses machine learning to listen and say, oh, that person is angry or happy or sad or whatever.

And then just buzzes to tell you the right answer.

And this kind of thing is so useful.

Obviously we are in the middle of this explosion of what's going on in AI. And to be able to use that and do some very sophisticated thing and then just feed the data back into the user and just tell the user the simple answer to the very complicated thing going on out there. I think we're just going to see so much of that happening. Are there any other applications that come to mind? And it doesn't have to be human centric. It could be something like the augmentation you described with microwave range and the potability of water. But any other applications come to mind? One that we proposed a long time ago and we sort of did a tiny bit of work on is about stock market data, summarizing what's happening in the stock market. And moment to moment, you can feel it on your skin. There are many ways to do it with whole patterns or just like, hey, I want to follow Google and Meta and whatever. And you can feel what's going on. And what I'm interested in is if we train someone for the long term on this, can they get to the point where they say, I just have this feeling, this gut feeling that oil is crashing right now or something. Without even being perceptually aware of what all these signals are and what they mean, can they just develop a direct perceptual experience of the economic movements of the planet? Just developing trading intuitives by feeding them lots and lots of data. Because that's all vision and hearing and all this stuff is. We just, we experienced that today when you're a kid, when you're a baby, you don't know how to use your eyes or ears or whatever. You're just getting all this data going into the darkness there. And you figure stuff out. You figure out correlations. Yeah, it also ties in and I suspect we won't go too deeply on this, but it relates to AI and also just technology in general, machine learning as well, because it turns out some of the things we might have assumed to be very, very complex, playing chess, playing Go, are very easy to train machines for. Whereas if you want a machine to catch a ball, if you want a machine to walk in some capacity, do things that we take for granted, drive a car,

some of the simplest things turn out to be the hardest things.

And it seems to be that underscores in a way how unaware most of us are of how

much we are processing at any given point in time.

It's remarkable.

Yeah, this, by the way, is why I wrote my book Incognito some years ago,

which is about everything that's running under the hood that we don't have access to.

I mean, the amount that your conscious mind has access to,

it's the broom closet in the mansion of the brain, the part where you say,

oh, yeah, I'm aware of this.

I mean, look, I'm raising this cup of water to my mouth.

I have no idea how I'm doing the thing with my arm and my elbow and we're getting it to my mouth. All I am aware of is whether I spilled it on myself or not.

And it's like that with everything in your life, getting a joke,

falling in love, driving a car, all this stuff is happening totally unconsciously.

Yeah. How do you think these days, this is going to be a bit of a broad question.

There's probably a better way to put it, but about memory.

And specifically, the reason behind the question or recall, let me make it more specific,

is that we learn, we forget, or we use these terms in ways that imply we know what those mean.

And I've had experiences where, say, I studied a language long ago, 10, 15, 20 years ago. At the time, I was pretty decent.

But if you were to put me in circumstances that required German right now,

I would not be able to perform.

But in certain states, whether that's in, say, a non-ordinary state of consciousness induced by psychedelic compounds or others, it's not the only one in periods of, say,

very deep ketosis, where I'm doing, say, an extended fast and I have 2.53 millimolars of BHB measured by finger break.

I do then appear to have access to these memories.

I had assumed I had forgotten in quotation marks.

How do you think about these things?

First of all, I'd love to actually test with you on that.

What I mean is, for example, we could just pull up online some basic German test where you're doing something and see whether, when in deep ketosis, if you have a better score,

then you do other things.

Don't verify it.

For sure.

Because if that is verifiable, that's amazing and cool.

And what it illustrates is something that we do know, which is that that stuff is in there. And we know this for several reasons.

I mean, a big one is if somebody says a German word, let's say that you haven't heard in years, but you say, oh, yeah, that's right.

I remember that word.

All that stuff's in there.

The other thing is there's a psychological effect called savings, which is,

let's say you've studied German for a long time, then you don't study it for years,

but then you pick it up again and you say, OK, I'm going to get really serious and study this.

You'll be much faster at learning it because all that data is in there in some form.

It's in there.

And so it's much, much faster the second time around.

Just as an example, when astronauts come back from orbit, they have to relearn how to walk, but it doesn't take them as long as it doesn't infant. The first, they can't really walk on their own, and then they're walking fine. So what is fascinating, and maybe this is part of what you were getting at with your question is, you know, we use the word memory in computers. And that's such a shame that we use the same word because there's hardly any relationship. Their memory in a computer is perfect. You're putting in zeros and ones. You get those same zeros and ones back out. In a human brain, it's a totally different thing going on. And in my last book, LiveWired, I talk about how memory actually has to get moved around in the brain and moved into different states. And there's all kinds of weird stuff here. I'll just, I'll flag one or two, which is one of them is that memory actually has to be reconsolidated after you take it out of long-term storage. So maybe you can do this, but let's say to a listener, if I ask you, what's the name of your fifth grade teacher? You haven't thought about that, presumably in a very long time. So you bring that out of cold storage, that's called, and you're thinking about it now. Now it's an active memory represented by spikes running around in the brain. If you get hit in the head right now, that'll be gone. It'll be gone. Or if I give you a protein synthesis inhibitor. Meaning that you've brought it to the bullpen, so to speak, but now it's vulnerable to interruption in such a way that it would not make its way back to cold storage, is that what you mean? That's exactly right. That's exactly right. Did not realize that. Yeah, a memory needs to be reconsolidated. It needs to be taken from activity back into the structure of the system. And so it's vulnerable to erasure. Super weird, but I'll just, as a side note, scary memories, very emotionally charged memories, are not erasable. Those are unerasable, which sucks actually. because those are the ones that trauma victims often want to erase. You have what amounts to a secondary memory system that says, hold on to that, because that's the really important stuff. Are there any researchers who come to mind, could be thinkers, writers,

who are doing a really interesting job of just examining the question of what, if anything, gets permanently deleted to come back to the human versus computer? Because I've been shocked how things can surface from the recesses of my mind that I assumed had long been sent to the landfill. Let's just say sort of this active working memory, then you have the cold storage long term. And I assumed like, okay, at some point the warehouse is full, things get taken to the landfill. But lo and behold, certainly recognition is easier, but at points I've also had the recall, is there any particular researcher or any resources that are looking, institutes who are looking at this in interesting ways? That's a very tough guestion to address. It's something that we make observations on in our own lives. Right, how would you test it? Yeah, that's a particularly challenging one. One of the things that people do test, which is slightly different than what you're asking, but it's about the way that memory, even though we believe the part that we do remember is accurate, it's the way that that drifts. And just as an example, my colleague Liz Phelps at NYU, right after September 11th, 2001, she went and interviewed a bunch of people and said, what exactly did you see on September 11th? And she was also clever enough to ask them, tell me your memories from September 10th, the day before. And they said, okay, well, I ate lunch here, I did this, whatever. Okay, then she found these same people a year later and asked them. And it turns out both the highly emotional charge memories and the boring memories had both drifted. It turns out that everything drifts, even things that you think you could never get wrong, people get wrong all the time. So memory is a myth-making machine and we're constantly reinventing our past, especially as we tell the stories over and over again. Yeah, totally. This is part of why I'm very skeptical of certain, say, studies involving nutrition that are observational studies

where they rely on self-reporting,

but people are filling in the diary of what they ate asynchronously. And I'm like, oh man, I would bet people are gonna be 20% off minimum, on average, with that type of reconstruction. That doesn't even include the purposeful lying that people do on that. Right, right, exactly. So let's shift maybe back in time a bit. I know we've been talking about a number of the books and I'm gonna come back to LiveWired, but I wanted to ask you about influences. And maybe we could start with one who some folks will recognize, but Francis Crick, how did you meet Francis Crick? I did my postdoctoral fellowship at a place called the Salk Institute, and that's where Francis Crick was. And for anyone who doesn't know, he was the co-discoverer of the structure of DNA and just figured out all these massively important things in molecular biology. He was essentially the titan of the 20th century in biology. And I, like many people I think, had assumed he had already passed away or something. I didn't realize he was still trucking along, but the thing that was so special about that guy was that he didn't have any of the constraints that other scientists did. So other scientists all have to, whatever, we write grants, we write papers, we have to do mentoring grad students, whatever, reading applications. But because he won his Nobel Prize when he was young, he just didn't have any of that. And as a result, he was able to just spend 100% of his time doing deep thinking. And that was it. I walked into his office, he had a stack of all the journals there, you know, Science and Nature and Journal and Neuroscience and so on. And he was flipping through and one day asked him, I said, you know, what are you looking for? Because it looked like he was looking for something. He said, I don't know.

I'm just looking.

He was an amazing guy, precisely because he was so high IQ, so high octane, and had no other constraints on him. I've never known anyone who happened to be in that position before. So when you mentioned the 70 projects, which I understand is within the context of a for-profit company, so it would make sense to examine a lot of things. But if I just look at your bio, I see many different projects, many different irons in the fire. And I'm looking at an older New Yorker piece. This is from 2011. And as it relates to Crick, who died in 2004. So the advice, and you can't believe everything you read, but I'd love to hear you maybe expand on this or speak to how it impacted you, is The Dangerous Man, this is quoting Crick. The Dangerous Man is one who has only one idea, because then he'll fight and die for it. The way real science goes is that you come up with lots of ideas, and most of them will be wrong. That's right. What impact did that have on you? Well. I think if anything, that just sort of meshed with the way I already thought about things. You confirmed what you wanted to do. Exactly. Yeah. Y'all, let me think of one second tangent here, which is the worst piece of advice I ever had was when I was in college, there was a professor, an electrical engineering professor of mine, and I really liked the quy. And he said to me one day, he said, look, Eagleman, life is like you're a lumberjack, and you go into the forest with your axe, you've got to pick one tree, and you just hit that tree. If you take a whack at all the trees, you're not going to get anywhere. And it sounded so wise and so reasonable and so on, but it's just not who I am. I'm just not the pick one tree guy. And so I think it already...

Yeah.

You're sort of preaching to the choir here. Yeah, exactly. So when Crick said that, and by the way, any good scientist is doing this anyway, you have lots of hypotheses, each one of which you think, wow, that's going to crack open something big. And then you realize, oh, that's totally wrong. You're going to experiment or whatever. So you got to have a lot of them. Just a quick thanks to one of our sponsors, and we'll be right back to the show. This episode is brought to you by AG1 by Athletic Greens. I get asked all the time what I would take if I could only take one supplement. The answer is invariably AG1. I view it as my all-in-one nutritional insurance. I recommended it long ago in my 2010 number one New York Times bestseller, The 4-Hour Body, and I did not get paid to do so. With approximately 75 vitamins, minerals, and whole food-sourced ingredients. you'd be very hard pressed to find a more nutrient-dense formula on the market. It has a multivitamin, a multi-mineral greens complex, probiotics, and prebiotics for gut health, an immune support formula, digestive enzymes, and adaptogens. AG1 makes it easy to get a lot of nutrition when good whole foods simply aren't at hand or when you just want to ensure you are covering your bases. AG1 is the ultimate all-in-one nutritional supplement bundle in one easy scoop. And Athletic Greens is giving you a free one-year supply of vitamin D and five free travel packs with your first subscription purchase. Go to athleticgreens.com slash Tim. You can check it out, athleticgreens.com slash Tim. They also offer a 90-day money-back guarantee if you are not 100% satisfied. Learn more, try it out, athleticgreens.com slash Tim. Let's say you didn't have the podcast,

which people should check out, Inner Cosmos, David Eagleman, didn't have the production company you didn't have any obligations outside of science, but you had done something, maybe it was winning a Nobel Prize, where you had the same ability to sit in your office, sit in your lab, and basically do whatever you want. What types of outside of reading widely and having piles of things on your desk perhaps as cricketed, are there any hypotheses or experiments that you would have at the top of your list for things to pay attention to? Yeah. lots of them. I mean, I think most of my career has been defined by trying to understand how the brain constructs reality. You've got all these spikes running around, and the question is, how does that make this subjective reality we have with all its colors and sounds and tastes and smells and so on? Why does this biological activity in a whole bunch of cells feel like something? That feels to me like the biggest central question in neuroscience. I actually wrote an article, I think in 2004, 2006, I wrote the cover article for Discover magazine, and I called it 10 Unsolved Questions of Neuroscience, and I defined 10 guestions, and these are still equally as unsolved now as they were way back then. And so I feel like there's so much really rich stuff to answer, but anyway, consciousness really sits at the middle. And by the way, for Francis Crick, this was one of his central questions also, maybe the central question that he devoted the end of his life to. How do you put together 86 billion cells and get experience, get meaning out of it? Let's talk about consciousness for a second, which is such a slippery pig. I know some folks hate talking about it because they're like, oh, it's like talking about God. We might not even be talking about the same thing, like let's define terms.

But for the moment, we can put that aside, although if you have a tidy definition, I'd love to hear it. But do you think that consciousness is an emergent property? So at some point, these building blocks, these carbon-based structures build up, and then we have, at some point, consciousness as an emergent property? Or do you feel, and maybe there's a third answer, that it is more fundamental than that? I don't think there's any way to know. So just to define that for the audience. So the second view is something that's called panpsychism, which is that maybe consciousness is a fundamental quality of the cosmos and like gravity or mass or whatever, it's already there and you're putting things together in just the right way. And the first version is that if you put a bunch of cells together and just the right structure, you get self-awareness and sentience. We don't really know. And all the data we have is consistent with either. So the data we have on consciousness, of course, is that if you hurt your brain, let's say with a stroke or a tumor or traumatic brain injury or whatever, or you put molecules in like drugs, your consciousness can change in any of these circumstances. But all that tells us is that the physical integrity of the system is necessary for the conscious experience, but it certainly could be either. What was Crick trying to solve for? How is he trying to examine consciousness? And I know panpsychism has developed a bit of a, I don't want to say negative connotation, but even some physicists, so I guess, are taking the understanding that I couldn't even begin to explain how one might test this experimentally. So I assume it's largely theoretical at this point, but those who take the consciousness as fundamental side of things seem to try not to use panpsychism, some of them. But how was Crick approaching this? And why was it so compelling? Well, let me say two things.

So Crick had a chalkboard in his office and he had lots of things written on it, but right in the middle, he had the word meaning written on it because that was his central question is, why does any of this mean anything to us? If I look at my garage door opener or my cell phone or whatever, it's just pushing zeros and ones around in transistors and presumably nothing means anything to it, but we have all this feeling and meaning. So that was his central question. And what he was trying to figure out was what he called the NCC, the neural correlates of consciousness. So working with our mutual colleague, Christoph Koch, he was working on the NCC and trying to figure out, okay, look, there's the hard problem of consciousness, which is why does any of this equal subjective experience, but the maybe easier problem is to figure out what parts of the brain are involved and absolutely have to be there for you to be consciously aware of something. And so that's what he sort of defined that as a program and worked on that until he passed away. but there are many other people who are pursuing that in various ways. And so again, that's the easy problem of consciousness to just figure out the correlates. Yeah, it's exciting. Are there any of the 10 unsolved questions, if I'm getting the headline right, of neuroscience, of those 10, are there any, if you're like, you know what, if I could have an X prize, put something together to make it so financially compelling that some of the best scientists in the world would drop what they are doing to focus on this. This is the one or the two that I might choose. Are there any that come to mind? They don't even necessarily need to be from that piece. They could be something that simply comes to mind. Let me give a slightly different answer to the question because actually what I thought you were going to, I thought you might be about to ask,

are there any of the 10 that we have sort of made some progress on? And actually there is one, that is one, and that has to do with why we dream. One of the questions was why do brains sleep and dream? Sleep is still a little complicated, but you know, there are a bunch of hypotheses, but I think that my student and I have solved why we dream at night. And I can tell you if you're interested in that. Of course. No, thanks. Yeah, we're in a rush here. Yeah, please, please go ahead, David. Which is... It has to do with brain plasticity. So the brain is always reconfiguring itself. It's a very dynamic system, and you know, every one of these neurons in your head, where they look like branching trees, and they make 10,000 connections to other neurons, these are constantly moving. So imagine like moving trees that are plugging and unplugging and seeking and connecting with others and so on. So anyway, that's called brain plasticity, this constant reconfiguration. And it turns out the surprise in neuroscience is how rapidly things can start moving and changing. And so some colleagues of mine at Harvard back in, I think 2007, did this experiment where they put people in the fMRI, the brain scanner, and they blindfolded them tightly. And they were doing things like, you know, when you're exposed to sound or touch, what is that, you know, what's happening in the brain? And what they found is that in 60 minutes, the visual system started responding to touch and to sound. And that was really unexpected, because we know that if you go blind, your visual system will get taken over,

especially if you're really young, but no one would have ever dreamt that you'd start seeing the first signs of takeover in 60 minutes. And so that got my student and I to start thinking about something right away, and we realized that dreaming has to do with the rotation of the planet. And this is because the planet rotates into darkness. So we spend half our time in the dark. Obviously, I'm not talking about electricity, blessed times, but historical evolutionary times. What this means is you can still hear and smell and taste and touch in the dark, but you can't see in the dark. And that puts the visual system at a disadvantage. It's like you have been blindfolded in a sense. And so what we realized is the visual system has to fight back to keep its territory all during the night. So that's what dreaming is about. Every 90 minutes, you've got these very specialized circuits that blast activity just in the visual cortex. That's all that happens in dreaming is it's going just to primary visual cortex, all this random activity, and it's just to keep it defended against takeover from its neighbors. To prevent the weeds of other senses from encroaching on the walled garden of vision. Exactly, you got it. You got it. It's a screensaver. And so what's very interesting is a lot of people have asked me when I present this. I'm presenting this at a big talk at Stanford tomorrow, by the way. And a lot of people say like, wait, don't we already know why we dream? And the answer is no, we don't know how we dream. There are various hypotheses, but that doesn't mean you stop making hypotheses.

And the reason this one matters, I think, is because it is the first ever one that makes quantitative predictions across species. So what we did is we found 25 different species of primates, and we looked at how plastic their brains are. Some primates come out very plastic, like homo sapiens. Others, like the gray mouse lemur, it's called, is very not plastic. It drops out. It reaches puberty rapidly. It knows how to walk rapidly. It's sort of pre-programmed, if you want to think about it that way. What are you using as a proxy or a measurement for plasticity? Great. So it's time to wean from their mothers, time to walking, time to puberty, things like this. I got it. So how much is kind of out of the box versus how much is molding of the Play-Doh? You got it. That's exactly it. And so homo sapiens, it's unbelievable. I mean, we're so useless for so long. And that's because we've got these extraordinary plastic brains. We drop into the world half-baked, and we absorb the world around us. We absorb the language and the culture and all the knowledge that has come before us. And that's why it takes us so long to develop. But some of the other monkeys and apes or whatever, they drop out. They're good to go. And if you look at something like an alligator, it's just like eat, run, mate. That's all it's doing. There's nothing other than the pre-programming that it needs. Rapid eye movement sleep is what correlates with dreaming. So if you look at the amount of REM sleep

that these different animals get,

you find that it correlates perfectly, like a perfect machine gun correlation. More REM, more plasticity. Exactly. So if you are a creature like, by the way, if you're a baby human, you dream all the time. They have about 50% of their sleep is REM sleep, is dream sleep. And as you get older, your brain is less plastic. And by the way, you have less percentage of REM sleep. But anyway, for an animal that's not particularly plastic, it has very little dream sleep. Are you aware of any counter examples? Are there any species that seem to exhibit a decent percentage of REM sleep but that one would not conclude are particularly high plasticity outside of primates? No. I don't know any counter examples where they have a lot of REM sleep, but I did come across one which I thought was a real problem for the hypothesis, which is elephants. Elephants have almost no REM sleep. They do have a little bit of REM once in a while, but otherwise they don't. And of course, elephants have big brains and so on. But it turns out elephants only sleep one to two hours a night and they have excellent night vision. So they don't need to keep their visual cortex protected against takeover in the same way that we do. So that actually falls right in the line in the theory. I wonder if there are other animals with terrible night vision that might experience a decent percentage of their sleep as REM sleep. But it's a fascinating hypothesis, right? I mean, super fascinating. It simplifies the whole thing and demystifies it, if true.

Exactly. When you're blasting random activity and because we're visual animals, we have dreams. You know, when you get activity back there, you think, oh, I'm seeing them, riding through a meadow, I'm talking to a silver leprechaun, whatever's going on. You too. What's funny about dreams is, you know, you wake up and you try to explain it to your spouse or whoever you're talking to and we layer on all this extra stuff in this narrative to make it make sense. But actually, dreams are just these weird visuals that happen. Actually, let me just mention one thing because I always get asked about, okay, what about blind people? What happens to their dreams? Do you know the answer to that? I don't. I would suspect it probably depends on when they became blind and the type of blindness, but I don't know the answer to that. So why don't you take us there? Okay, well, it's just that if you are a blind person, you still have dreams at night. And that's because the circuits that drive dreaming are very ancient. You find these across the entire animal kingdom, actually. So every 90 minutes, they get this random activity blasted into their occipital lobe. But now that part of the brain is no longer visual. So a blind person has dreams that involves, you know, touch and hearing and so on. Like, oh, I was feeling my way around the living room and there was a big dog in the corner and I got scared and I ran, but the furniture was all rearranged and whatever. But it's all touch and hearing. It's not visual.

Yeah, you know, I interviewed Richard Turner, who is a very famous close-up magician who is completely blind. And he became blind at a pretty young age and he described his experience of reality and we have to take his word for it, of course. But highly visual. I didn't ask him about his dreams. I don't think, but really enjoyed the conversation because he has the dexterity of a very well-trained sighted person. It is nearly impossible to believe that he is not fully sighted with what he can do with his hands. It's remarkable. For people who are interested, there's a documentary called DELT-D-E-A-L-T that is fantastic about Richard Turner. Oh, I'd love to see that. It's fantastic. I really recommend it. There's a lot more to it than just magic. I mean, it's mostly his life story. But I just want to point out, it's not necessarily visual, it's spatial. So, you know, he's got this amazing spatial sense, it sounds like, about what's where and how to turn things and how to move things and get things into his pocket or whatever. But it's spatial. Well, he describes it as, in his experience, keeping in mind that he was sighted until he was something like six or seven years old. I can't recall exactly. But if I remember correctly, different experiences have a blue or a red tone to them. And have different, I think he would say, visuals or geometric representations, depending on what he's interacting with, who he's interacting with. That doesn't invalidate what you said with respect to dreaming.

I don't think I asked him that, but that's an area I know very little about. Oh, I'd love to get in touch with him and ask him about his dreams. Yeah, he's in San Antonio, Texas. I could put you in touch if you wanted. So, let's talk about additional influences. So, we hit one of the big names, Crick. Who are some of the influences that most shaped where you are today and over the last, say, 10 years as a scientist and just investigator of the world? I would say the ones that come to mind are, first of all, my father, who is a forensic psychiatrist and just a super smart guy. That was a big influence on my life. Then I went to graduate school and my advisor was a guy named Reed Montague, who was such a terrific thinker and a great athlete. He was a major influence on me. And the other one, I guess, was Carl Sagan, who I only know through television, but that was all I saw as a kid. We never watched much TV, but I saw Cosmos on PBS and it totally influenced the trajectory of my life. I mean, I just, first of all, so turned on by all the stuff he was saying. And yeah, it's interesting, actually, because my parents never said, oh, you could be the next president of the United States. They always would say, oh, you could be the next Carl Sagan. And that's the direction I ended up taking. Now, I may have missed the name Montague. Am I recalling that? Montague, yeah. Montague. What was the impact that was made? And what sport just out of curiosity?

He was a decathlete and just unbelievably good at every sport he ever tried. He was a big sprinter and a big muscular guy. And somehow when I, look, here's the thing. As an undergraduate, I majored in British and American literature because that was my first love. And so when I decided in my last semester of my senior year that I loved neuroscience, I applied to neuroscience graduate school and I miraculously got in. But I wasn't sure if I wanted to do a PhD in neuroscience. I didn't know what that would entail. And I figured I'd end up with big Coke bottle glasses and my hair sticking up ever. I didn't really know what it meant to be a scientist. And so I met this guy and he was so admirable in all the ways that I wanted to be. He just is a killer in every way and so smart. He was 20 IQ points ahead of everybody. And also could bench press and do chin-ups better than everybody. So he broke the mold. So he showed you that you didn't need to be resigned to the Coke bottle glasses. Was that proof of concept? Yes, it was proof of concept. And of course, you know, the ideas and the challenges and whatever that it opened up my world, it opened up my mind so enormously. And he was very hard on me. I was a grad student for five years and he was a total jerk all the time. But I love the guy so much, but he was really hard on me. Would you, in retrospect, have it any other way? Is there a version of the hard that would be better or would have potentially been better for you? Or was it what you needed at the time? Yeah, I suspect this is different for each person, but for me, it worked really well. And I had a coach, a track coach in high school.

and it brought out my best behaviors that way. So going from British American lit to deciding that you're going to apply for a master's program in neuroscience seems like a very hard left turn to questions. So he said, very luckily, something along those lines I got in, but there's got to be a little more into the story. So what was the pitch maybe in the form of essays or maybe it's combined with standardized testing? I have no idea what the prereqs were or the application process was like, but why decide to dedicate that time to neuroscience where you may be buying yourself a little bit of time to figure out what was next? And then what do you think if you had to make an educated guess helped you to get in from such a seemingly unrelated field? The truth is that I was always studying science and so I had tons of science on my transcript. It's just that I didn't have neuroscience in particular. And so what had happened is I was good at science growing up and so everyone told me. I feel like everyone gave me bad advice. I said, oh, you should become an actuary and do the stuff with math because I could do math or you should become a waste engineer because there's a lot of money in waste engineering. People had all these proposals that were so boring and nothing to do with Carl Sagan and real questions. So what happened is I went to college and I studied electrical engineering. I took a lot of physics. I took a lot of, you know, all kinds of things and I couldn't guite find what was resonating. I couldn't find the thing that I loved. And so I ended up majoring in literature, but I was taking these classes. It was my last semester that I took a neuroscience class. And by the way, the class I took was taught by a very old professor who was using literature from let's say the 1960s.

It was a terrible neuroscience class, but it didn't matter at all. I was totally hooked. So it seems like you had demonstrated scientific chops, right? You're not enumerate. You can do math. Was there anything else that was key you think to getting into that program? Actually, in one of my philosophy classes, we'd been assigned to write a final project, and I don't know, like a 12 page assignment or something. I ended up writing 108 pages on the brain. And the reason I was writing so much on is because I went to the library and I, over the course of that last semester, read every book that the library had on the brain, which by the way was not that many at the time because it just weren't that many. But I read everything because when I showed up for the graduate school interview, I said, look, I know I don't have much biology on my transcript, but ask me what I know and I'll tell you because I've read XYZ and blah, blah, blah. It worked. The problem is I don't think a kid could get into graduate school now with that trajectory. And I think that's a shame. Why not? Well, only because now the competition is so high. And so if you haven't rotated in labs the whole time you're an undergrad and been doing neuroscience since you were two years old and so on, then it's hard to get in. That's a bummer. And then the David Eaglemans of the world end up being waste engineers. No disrespect to waste engineers, but you would hope there to be a spectrum of possibilities. Well, it's good that you went through it when you did then, I suppose. Yeah. Oh, exactly. I really looked out.

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What would you say is one of your, for those people listening and looking at your bio and watching your TED Talks, you think, man, this guy just wakes up every morning and just karate chops the universe to bend his will and hits homeruns from start to finish. I can't believe it. That's not me. Favorite failures. And you can define that any way you'd like, but to frame it, failures or things that didn't work out as you had hoped that in retrospect, taught you a lot, bent your trajectory, or maybe set the stage for later successes. Anything that comes to mind. Well, one thing that comes to mind is I wanted to be a writer verv much. So I wrote my first book called Some, SUM. Great book, by the way. Highly recommend. Thank you very much. And I submitted it for publication and I got rejected. So I submitted it again. I got rejected. I ended up collecting a stack of rejection letters as high as the book. Nobody wanted to publish it. And some people, most of them were form rejections, but some people hand wrote stuff saying, hey, I really liked this book, but I just. I have no idea where I would put this in the bookshelf or where, like, I don't even understand what this thing is. And so that was a failure that just kept dragging on for a very long time. And I had written it over seven years. And I was pretty much certain that it was never actually going to see the light of day. And then finally, you know, I just kept trying to crush it from different angles.

of there was a particular literary agent that I wanted to hit. And so I managed to figure out three different ways to hit her so that within 48 hours, she was hearing from three different people. And so finally she said, I will take you on as a hip pocket client, which just means you're not really a client in mind, but I'll keep you in my pocket just in case I see an opportunity. And then she called me two days later and she was sort of incredulous. And she said, wow, I, some just got bought. And so that was the start of a big thing. And Tim, I know you've-Hold on, hold on, hold on. Yeah. So before you get there, vou're skipping over something really important. Two days later, seven years in the making, some just got bought. How does that happen? Did she just send it out to some folks and said, I know we're gonna hear back, but fuck it, why not? Let's try it. Exactly. Look, it took me a while to learn that this is what literary agents are about. They're sort of the first filter. And if an agent says, I'll take something on, then a publisher will actually take a look at it. But I had been trying to write the publishers directly. Right. Tim, I know you know the book. And the book became an international bestseller and pretty immediately got published in 33 languages. It got turned into two operas. Brian Eno turned into an opera at the Sydney Opera House. Didn't know that part. That's amazing.

Oh, yes. So Eno turned into opera. And then around the same time, Max Richter turned it into an opera at the Royal Opera House of London. And it finds itself back in the top 100 books on Amazon over the years. And so it's just, it's been such a special part of my life. But the point is that it was such a long extended failure. And I'm so thankful that I just kept banging on that door until it finally creaked open accidentally. So what kept you going? Well, two guestions. Why write it in the first place? So not to bury this for people who don't know. So some, the subtitle is Four Details from the After Lives. That's plural. And you know what? If you don't mind, I'll just read what I put in my newsletter years ago when I first read it. And I won't read all of it, but I'll mention some of it. This is what I put in, and you can correct me if I got anything wrong. Don't let the title of this book fool you. It isn't making a case for the afterlife. Instead, this short read, easy to finish one two days, is a collection of 40 thought exercises on the nature of existence, reality, perception, death, pain, boredom, and more. At the very least, it should make you appreciate your own life worse and all much more. And then in the official book description, quote, in one afterlife, you may find God is the size of a microbe

and unaware of your existence. In another version, you work as a background character in other people's dreams, or you may find that God is a married couple, or that the universe is running backward, or that you're forced to live out your afterlife with annoying versions of who you could have been, end quote. Why write this book? And what gave you the gumption, the persistence to keep going? Because that doesn't always happen to be clear. There are plenty of high achieving people who start books and finish them, get rejected, and after a while, they stop. So why did you end up hitting this agent for multiple angles? So why the book, and then why did you end up continuing and hitting this agent for multiple angles? Why the book actually started when I was, I think I was like 11 years old, and I ended up talking to a rabbi, and I said, hey, you know, I've never understood what is the Jewish view of the afterlife? And he said. well, yes, three Jews, you'll get four opinions. And I thought that was so amazing because I've never heard someone say something like that before. And so that was actually the seed of the book, and that's the why. You know, and then again, as a lover of literature and a writer, I just, I found this concept of the afterlife such a great backdrop upon which to ask all kinds of guestions. And as you know from the book,

it's, you know, it's funny and it's, there's pathos and anyway, I do know exactly why I kept going. And that was because of a 16 year old kid that I met when I was at the Salkins too, with Francis Crick, actually. What happened is there was a high school science day and these kids came over and I talked to them about what I was doing. And one of the kids came up to me afterwards and said, can I work with you? This is what I want to do. Can I work with you? And I said, sure, write down your phone number on the dry erase board here. And he did. And the next day the dry erase board got erased and so I forgot about the kid. Okay. So then I get a voicemail from him saying, Hey, I'm the kid. And then I thought, oh, I got to call this guy back. And then I forgot. And then I get a letter from his high school teacher saying, Hey, there's just a letter to recommend the kid. Then I get called from again. Then I get an email and I thought, wait a minute, I don't want to miss this kid. This kid's amazing. And so he ended up working in my lab. And for the last 16 years has been my closest collaborator. His name is Don Vaughan. Amazing. That's incredible. And I call this the Don Vaughan method of just hitting someone over and over from different angles to make sure that they don't forget. So I was so impressed by this because, you know, I was busy and I couldn't remember to call him back and whatever. And so I was really impressed with this.

And so when I was trying to get some published at the end there, I thought explicitly, I'm going to do the Don Vaughan method and I'm going to hit this agent from every angle that I can. That's incredible. That worked. There it is. That's remarkable. Speaking of literature, I think this is from the New York Times a long time ago. But you've said that Gabriel Garcia-Marquez, Italo Calvino, Jorge Luis Borges, Toni Morrison and William Faulkner are among some of your literary influences, maybe heroes. Feel free to add more, but I'm curious, for someone who has not read, let's assume someone hasn't read anything from any of these writers, are there two or three books that come to mind that you might suggest people start with? Italo Calvino's Invisible Cities is an extraordinary book about Marco Polo talking to the great Khan, Kubla Khan, about different cities in the Khan's empire. And it's magical realism. And by the way, all five of those authors that you named, that I guess I named back in that article in 2011, all five of them, they're all magical realism, which means it's not just writing about the day-to-day stuff, but just feeling free to go off in crazy directions about things that shouldn't be possible and you just make them possible. So I've always loved that style of writing. All five of those are really still my favorites all these years later. A hundred years of solitude if someone hasn't read that, Borges' Labyrinths, Tony Morrison's Beloved, essentially anything by Faulkner, the bearer is a great one. So I'll add one more to the list. For people who are looking for something very strange, it's also very short,

but I think it's The Baron in the Trees by Italo Calvino,

which is about basically a young boy who gets in a fight with his father, comes from the Sistine family, escapes into the tree in his yard and never comes down for the rest of his life and he builds this entire life in the trees, in the canopy. It's about as strange as it sounds. The word hypothesis has come out a bunch in this conversation and you've said in, I think it was Smithsonian Magazine, that you encourage your son to do hypothesis testing. Could you speak to this and just explain what that might look like? It's anytime he says like, hey, yeah, how does this work? And I've got a daughter now too. And so you say, hey, how does this work? I say, well, how do you think it works? They come up with an idea and I say, okay, cool. Can you come up with another idea? They come up with another. Okay, great. And how would we test that? How would you distinguish those two ideas? So that's what it is to come up with something on your own and figure out how to test it. Because whether or not they become scientists, I mean, they probably won't for all I know, but definitely want them to be good thinkers and be able to figure things out. So they're not dependent on dogma or what their neighbor tells them is the answer, that sort of thing. If you were giving advice to say, let's put you back in the realm of academia. So you've got super promising postdoc, one of the smartest you've ever met, maybe has some IP that has spun out or something that has spun out into a for-profit company. And they come to you to ask for time management, advice, prioritization advice, iust general life management advice, because they fear that they're going to get overwhelmed. They look at your life. They say, this is the guy who can do anything. He's the decathlete of business and science.

And put in that situation, what advice might you give them or what might you say to them? I would only be able to give what I do. And that is the Lazy Susan method. So do you know what Lazy Susan is? You know, it's the circular thing that sits in the middle of the table. Okay, not everyone knows what this is. And you can spin it around to get different dishes around the table. Exactly, exactly. So it turns out I learned a long time ago that Walt Whitman would do this with his writing projects. Each segment in the Lazy Susan, he'd have a different writing project. And he would work on something until he was slowing down. And then he'd spin it and randomly pick a different project and work on that. And that is precisely what I do. I love seeing that story about him, because that's my life. I work on whatever I am maximally resonating with at that moment. As soon as I start slowing down or get stuck, I just jump to a different project. And when I come back to the thing I had been working on, I'm sort of, you know, more refreshed in a sense. So I thought of a new idea about it, that kind of thing. Where do you keep this Lazy Susan? Presumably it's not a physical Lazy Susan. Not physical, just in my prefrontal cortex. Yeah, spin it around there. If we could take a closer look at this prefrontal Lazy Susan for a second. Let's just take this upcoming week. So we're talking on a Monday. And I don't know what your calendar looks like. Maybe you could just describe the architecture of your week a little bit. That would actually be very helpful. Okay, so a lot of it is work meetings with my company, Neo Century. Some of it is meetings with VCs about that. Then I have various lectures I'm giving. It happens that this week several of them are virtual lectures.

So that's a lot easier for me.

Then working on how to do B2B stuff, business to business stuff. Because we're now selling the wristband, not only to customers, but directly to big businesses with big warehouses for their deaf employees. But then let's see, I'm giving a talk to a bunch of Stanford students. Then I run the Center for Science and Law, which is where neuroscience and legal system intersect. So I'm having some meetings about that. I also just finished a book about... This is a little embarrassing because it's so unusual. It's so different than anything else I've written, but it's a young adult book or middle grade. But it's about a brother and sister team who solve mysteries, like Hardy Boys or Encyclopedia Brown. But all the mysteries have to do with the brain. So it's really, I think, educational and lovely. So I'm having a meeting about that. And then it happens that tomorrow is my birthday. So unfortunately... Happy birthday. Thank you. Unfortunately, I'm looking at my calendar. It turns out I have zero time on my calendar to do anything that would resemble birthday-ness. Maybe that is the quintessential David Eagleman birthday as a calendar that's completely full. That sucks. Then I teach neural law at Stanford on Thursday. Then I'm having dinner with a startup that I'm advising. Then I'm doing my podcast actually twice this week on Tuesday and on Friday. I'm doing a three-hour recording session. Okay. So this is very helpful, the glimpse behind the curtain. And what I'd love to know is, if you had to pick something in there to use as hypothetical the lazy Susan, is there anything that you could walk us through? So let's say you're getting ready to do the podcast, you're prepping for hours and you're just like, vou know what? I am fucking exhausted.

And it's my birthday. I don't want to be doing this right now. Is that the type of case that you might have or then you would switch to something else? In which case? Which is not to throw the podcast under the bus. It's just to say, I'm trying to find something where you're not fully obligated to other people. Because I imagine when you're in a Zoom meeting, if you're 30 minutes into 60 minutes, you're probably disinclined to be like, you know what, guys, my heart's not in it. I'm going to focus on my new young adult book that I'm working on. But is there anything in this week where you might be able to hypothetically describe how the lazy Susan might work? Unfortunately, the lazy Susan can only get spun on the weekends or something when there's opportunity to think. This week happens to be a pretty tough one, so I'm constrained in every moment. And I just have to perform. But the lazy Susan comes in when I say, well, I've got a four hour chunk and I'm going to sit down at IHOP. By the way, I've written all my books at IHOPs. I don't know why, but I love that. I love that. Yeah, it's bottomless coffee. And it's quiet. It's not like a Starbucks where attractive people are walking in and out all the time, whatever. It's just like quiet and boring. You can just drink coffee and write. But that's where I spin it. Because what happens is I'll work on something and then I'll say, oh, yeah, you know, I really want to get to this other thing. And so I'll spin it and do the other thing. And yeah, that makes sense.

Do you think about how much of that solo time you want to block out on a weekly, monthly, quarterly, annual basis, anything along those lines? Because I would imagine otherwise it's a slipperv slope and you end up committed to a large chunk of your waking life involving other people. So there's a social pressure expectation that you will not cancel or move things around. So it maybe creates a degree of inflexibility. Do you think about that? Yes, I do think about that all the time. And I really admire, Tim, your four hour work week. As an example, I'm working on the 400 hour work week and it sucks because I'm totally constrained on all fronts. You seem to be having a good time. I'm having a good time and it's my own fault. And my wife accuses me of, I choose it, obviously. The thing is I can't read this new shiny objects. So every time some student says, hey, I want to start a company. Will you help me and be an advisor? I'm like, heck, yeah, that sounds amazing. And I do that. Every time I come up with a new idea for a screen player book or whatever, I'm like, that's the greatest idea. And I jump in on it. So you may not want to start a venture capital firm. Just you'll end up saying yes to everything. It's actually one of my mentors, Ed Schau. Incredible entrepreneur also was a competitive figure skater than a congressman and took a couple of companies public. He taught computer science. I think he was the first or maybe the second to ever teach computer science at Stanford. And he tried to become a venture capital street did become one at one point. He realized I'm not any good at this. I get too excited. Let's talk about LiveWired. And this guestion was cued for me in a way by Annika Harris,

who's an incredible writer and has written a lot on consciousness,

the topic we covered at the very beginning of this conversation on some level. Infotropism, am I getting this? Term, right? Could you walk us through the premise of LiveWired, the reason for writing it, and then unpack Infotropism, if you wouldn't mind. Okay. So LiveWired in general is about this issue of how you can't really think about the brain like hardware or software, but instead it's what I call LiveWired, where it's reconfiguring itself all the time. This thing I mentioned earlier, brain plasticity. So there's something like 30,000 papers a year coming out on brain plasticity now. But I wrote this book to sort of synthesize and build the framework for understanding what it is for the brain to absorb the world around it and do that. But what I surfaced that way were some principles that were interesting to me. And one of them is about, yeah, Infotropism is a term that I coined about what the brain is trying to do at all times. It's reconfiguring its circuitry so that it can maximize the information that it brings in from the world. So just as an example, if you're watching a waterfall, you know, we've probably all had the experience of you're staring at a waterfall for a while, and then you look over to the rocks and trees at the side, it looks like everything's moving up. This is called the motion after effect, where you see motion moving in the opposite direction. I make a long argument, but I'll just say in a sentence here that what the brain's trying to do is say, okay, I'm going to reset my zero, I'm going to recalibrate so that I can see if there's more information here. Essentially what it would be trying to do is cancel out the downward motion. Because it says, okay, there's lots of that, but there's no new information there.

So I'm trying to cancel that out,

and it does it by, you know, having this upward motion. There's more sophisticated arguments about how it does this. And early, I'm just doing that to maximize the information. Same if I change the color of the lights in the room. Let's say I make it all red. Your brain will quickly stop seeing the red, and it will adjust itself so that it's seeing other things so that it can maximize what it's pulling out at all times. Of course, you know this if you put on, let's say, yellow sunglasses or something. Everything looks normal after a moment until you take them off again. Anyway, so this is a general thing that the brain's always trying to do is say, how can I pull the most useful information out of the world by recalibrating everything else around me? What was your hope for or hope in publishing that book? What would you like people to take from that? Or what would you like people to grab and run with from that? I think the notion of how plastic the brain actually is is something that's totally underappreciated. There's sort of an idea that I think many people have, which is, oh, you're just born with the brain, the brain kind of unpacks, and then you're who you are. But really, we are totally functions of our culture and our society. And one of the things that's amazing to me is like, imagine, Tim, that you and I were born, 10,000 years ago, exactly the same DNA. But we wouldn't be anything like what we are now. Even though with the same DNA, we might look vaguely like we do now. But my god, the culture, everything we're pulling in would be so different. And that's what actually shapes a human being. I actually started off the book with a quotation from Heidegger who says, every man begins life as 10,000 men and dies as a single one. And what that means is you've got all this potential, all these directions you could go in your life,

but as you move through life and you make choices and stuff happens to you, you end up as exactly who you are. Yeah, I'm looking at Martin Heidegger. I just wanted to find it. Tell me if this sounds right to you. Anyone can achieve their fullest potential. Who we are might be predetermined, but the path we follow is always of our own choosing. We should never allow our fears or the expectations of others to set the frontiers of our destiny. And then there's the pop-up to continue with Facebook. Thank you, Goodreads. Your destiny can't be changed, but it can be challenged. Every man is born as many men and dies as a single one. Right, right, right. Nice. So let me ask you then about just a thought exercise. If we look through the telescope into the future, and probably the scrying ball, look into the scrying ball and try to figure out what might be coming down the pike, knowing what you know and having the breadth of exposure that you have within science and outside of science, let's just say in the next 10 years, the next decade. what current assumptions about the brain perception or reality do you think potentially going to be overturned or that might be ripe for challenging? Is there anything? I think the main thing has to do with technology as opposed to theoretical ideas. So what I mean is we've got plenty of theoretical hypotheses all about how the brain might be working and so on, but we actually don't have any good technology for measuring what's going on inside the brain. So, you know, we've got brain imaging where you see these fancy images of brains with the, you know, false color images on it and so on. But it's really crude. That's fMRI. That's just measuring where the blood flow goes and you're measuring cubes of millions and millions of neurons at once. And all you can say is, oh, there was some activity there somewhere in that cube.

So what we really need is a technology

that allows us to measure the spiking activity of every neuron in the brain, let's say 86 billion neurons all at once in real time, ideally, and then do massive computational analysis of that to understand what is the language of the brain. Somehow we know it involves these spikes, but we haven't cracked the neural code yet. So in the same way that Francis Crick and James Watson cracked the genetic code, oh, it's ACTG. And the whole thing is just about keeping the order of the base pairs and all the rest is just housekeeping. We haven't figured out what the neural code is yet. So what we're facing, I don't know if it'll be 10 years, hopefully, maybe it'll be 20 or 100, but what we're facing is a giant leap in understanding that we know is coming, but we just don't have the trick cracked vet. So that's one thing. Was your question about any kind of invention or neuroscience in particular? It could be broader than neuroscience, but I was thinking related to the brain, the mind, perception, really anything that checks any of those boxes, but we can go beyond that. What I find so mesmerizing and frustrating about humans, and of course I'm one of those, so I put myself in the same group, it's just how certain we are at so many points. And I know you have guoted Voltaire before saying uncertainty is an uncomfortable position, but certainty is an absurd one. But if you look back, especially in the history of medicine, let's just say, at how certain humans are, including, let's just call them top specialists in any given field, that what they know to be true or think to be true is true. And then it gets overturned, and then it gets overturned again, and then it gets overturned again, which is not to create a sort of relativism

that we can't know anything.

I think that's sort of a learned hopelessness, it's not very helpful. But I'm wondering sort of as someone who has experience as a practitioner of science, also an observer of science, a communicator of science, a deep thinker on these subjects, what might be worth stress testing or things that we currently take to be true that may, in fact, not be true. It doesn't need to be contained in neuroscience, though. This is the beauty of science, is that it's always willing to knock down its own walls. And so this is what the scientific method is about, and it's the most special thing that humans have ever done. Because everything else is about, how do I sort of establish my throne and I set this up and no one can question this, but there's nothing in science that isn't vulnerable to getting knocked off its pedestal. And so, in fact, much earlier in the podcast when you asked me about whether you have consciousness, whether it's emergent property or whether consciousness is a fundamental. who the heck knows? And I think as you get older and more mature as a scientist, you feel like, okay, I don't know. I don't know, we'll see, we'll do experiments, we'll figure it out, but there's no need to pretend certainty on things. And in fact, that's always driven me crazy. And one thing I know, I walked into a bookstore, this was many years ago, about the time that some came out, actually, walked into a bookstore and there was a table of books on the front and one was by a religious fundamentalist, one pile, and the other pile was by the neo-atheists. And the table was set up as this battle between these. But as you know from reading some, it's all about shining a flashlight around the possibility space.

It's all about saying, God, who knows what's going on here?

Let's just make up a bunch of stories. Let's make up 40 stories and we can make up 400 more. And so, that idea, you may know this, but years ago, I proposed this new movement called possibilityism, which really caught on and actually is still moving around the planet. Well, but the idea with possibilityism is avoiding, committing to something with certainty if you don't need to. And really, this is just an expression of the scientific temperament. Science is always, we want to say, look, what we can have is the weight of evidence at any given time. We can say, oh, that supports this, more than this. Okay, great. So we'll sort of provisionally believe this to be true. But it's not about pretending certainty when we don't have enough data. And when it comes to some fundamental questions like our existence here, what the heck? I mean, we don't have any data on that. We don't have enough to know if we should be, I mean, certainly religion, we have enough data to know that all those biblical stories are completely made up and wrong in a thousand ways. But we certainly don't have enough evidence to say, oh, therefore there's nothing interesting in the cosmos besides us. I mean, who knows? And my very limited muggle experience of science and life really, the best people, the true outliers in terms of intellectual horsepower and performance say, I don't know a lot. And I remember going on a walk with someone recently and they wanted to get my two cents back channel, reference check on someone. And my commentary was pretty simple. It was, well, clearly very smart in a lot of ways, but almost no low conviction statements. And that makes me a little nervous.

Everything is a high conviction statement. And that gives me some pause. So you're right. I think the reserving a space for uncertainty. And to the extent possible for me, at least trying to find that exciting, the fact that there's still so much unmapped territory, as opposed to debilitating. David, I'm going to ask you a question that is sometimes a terrible question, but I'll throw it out there anyway, and we can delete it if it doesn't pan out, which is the metaphorical billboard guestion. If you could put anything on a billboard non-commercial, of course, to get out to hundreds of millions or billions of people, could be a quote, could be a word, could be an image, could be someone else's quote, anything at all. Does anything come to mind? I think I would put a billboard next to an elementary school or maybe a junior or a higher high school. I don't know. I'd have to think about this. It's something like question your truth, because this is the issue that we're always in, is I've been fascinated by this issue. So the brain locked in inside of this darkness comes up with an internal model of the world, with all of its truths, political truths, all that stuff. And the funny part is that when you look at someone else, let's say on the opposite side of the political spectrum from wherever you are, you think, oh, that person's misinformed. They're a troll. If I just talked to them long enough, they'd come to agree with me and so on. It's weird. Everybody believes this. And everyone on all sides of the spectrum thinks, okay, I clearly see the truth,

and I don't know why those other people don't.

And so I've just been fascinated by this issue about how completely we believe our internal models. So that's what I would try to do with young people anyway, is just get them to guestion this issue, to minimize their high conviction statements. So how would you, let's just use the elementary school or high school example. This applies to more than that, but let's just say in this case, how would you try to frame this or spin it so that there's some self-interest? In terms of not just the maybe more general, become a better thinker, a better human, a better member of society, is there a way that you could position that cross-examination of one's own thoughts and beliefs in maybe a sort of a crasser way for self-interest just to get more people to do it, right? Okay, I don't know if that's gonna answer the question directly, but one way to get people there is to, for example, if you admire Sherlock Holmes, or if a kid watches the Benedict Cumberbatch version or whatever, you think, wow, that guy's really noticing things. And that's when you start realizing the limits of your own internal model. And you think, wow, I would have never noticed that. Why? Because I didn't pay attention to that. I didn't care about that. But if you admire people who can do things and solve things, then I think it's in your self-interest to say, I want to expand my internal model. I'm not satisfied to say, okay, I've got it. I know the truth. I'm not gonna do any more work. Yeah. So something along those lines of inspiring people that way. I suppose House would fit in there. but he's kind of a dick as a character. So I'm not sure if you want your kids modeling that. What's the impetus? And I mean, maybe this is part of the impetus behind the book

that you're working on for kids. Oh. the one for kids. Is that? Oh, well, wait, maybe you're like, you've got so many projects I can't keep track. Maybe there's another book. The one for kids is done. And that's off to the publisher. But the one that I'm working on, the big one I'm working on is called Empire of the Invisible. And it's gonna take me another few years to finish this. But it is. Nice title. Thank you. It's all about this issue of all the stuff we don't see and don't understand. So I start off with some examples like we talked about with the electromagnetic spectrum and all the light you don't see, but forget it. It's all about the stuff that you think your model is complete and you know everything out there to know. But fundamentally, your perception is like a Potemkin village where you just see the facades of things. And if I scratch the surface on anything, like if I were to ask you, hey, do you know how the Electoral College works? You'd say, yeah. And I say, okay, can you explain it to me? And I'd say no. Yeah. exactly. So you start scratching the surface on things. Most people are like, oh, I thought I kind of knew. And maybe I don't really know. So that's what it's about and how we can expand our perception by asking questions all the time, by not taking our truths so seriously, by understanding there's more out there. That's what it's about. And I'm really jazzed about this book.

Right now, it's already 120,000 words. And so I've got to, as I'm finishing it, I'm gonna really crunch it down so that any human will read it. Yeah. So for people who don't make any sense of word counts, I mean, I'd say a lot of books that get published are around 50,000, 60,000, something like that. So you're punching them about your way. Yeah, exactly. 75. How many words was some? Oh, that was like 30,000. Very, yeah, much shorter. I wonder if, just to bring up the term that one cannot escape these days, but I wonder if AI, in the cultural conversation context, as people learn more about AI's, plural, and large language models and training data, if more people will become aware of their own blind spots since we all have our own training data. Yeah. I wonder if, as more of these topics become mainstream, find their way into scripted television and so on, if people will become more aware of their own limitations. I mean, that would be a lofty hope. Not sure if that's gonna be the case. I love it. I'm not sure I see how, though, because we're still stuck in our internal models. So even if I'm talking to chat GPT and it tells me all kinds of things I didn't know, now I know those. Each time I add something new to my internal model, I think, okay, now I'm complete. I didn't know that. Now I know it. Great, I got it now. Well, what I mean by that is, for instance, we've been experimenting on my team with summarizing past episodes using chat GPT,

which I think is an incredible tool. But what happens in some instances is the chat interface, or I should say the backend, won't interact just with the training data. Because I'm curious to see how it behaves with different parameters. It won't base its summary strictly on the transcript that's available on my website. It will also pull from, say, Google. But much of what has been translated or interpreted or even summarized elsewhere is completely inaccurate. So I'll go through, or a team member will go through, and they'll find all these mistakes. And it's like, okay, interesting. If we're looking at this as the all-seeing, all-knowing, sort of monolith of tech that provides us with answers, we have a lot of problems to solve. It's been a useful tool for me to explore sort of the limitations of sets of training data. I wouldn't expect it to have that effect across the board. Well, remember, it's not all-seeing and all-knowing in terms of knowing the truth. All it is is it's read everything, and it's giving you a summary of everything. So if there are people with different interpretations of what you talked about, that's what it'll know. Yeah, but it'll serve it up as a summary. But we don't need to believe it at the point. I found it to be an interesting exercise. So let me ask this, and this is in some exploratory bullets that I have listed in front of me that I was hoping to get to. So the one that I would love to talk about before we start to wrap is how to make it seem as though you're living longer. And perhaps you could provide a little connective tissue to this in context. In reading about your history, the story of the construction site when you were eight years old also, I thought, gave a very interesting case study, perhaps, of how perception of time can differ depending

on what you're experiencing.

But where do you think it would make sense to take this? So when I was a kid, I fell off of this house under construction, and I fell 12 feet, and it seemed to take a long time. And I got really interested in this issue of, does time run in slow motion when you're in fear for your life? I mean, I got interested in that question. once I became a neuroscientist and had grown up. And so I did this experiment, I think you know about this, where I dropped people from 150 foot tall tower in free fall, falling backwards, and they're caught in a net below, and I measured the speed of their perception as they're falling. Because everybody either has this experience or knows somebody with this experience, where they get in a car accident, and things seem to run in slow motion, and they can report all these details of what happens. Anyway, long story short, it turns out that the whole thing is a trick of memory. People don't actually perceive faster during a scary event. It's just that they lay down more memory. So when they read this back out, they say, what just happened? What just happened? It seems like they've got much more memory than they would in normal circumstances. So they say, you know, I watched the hood crumple and the rear view mirror fall off, and the expression on the other quy's face, and then blah, blah, blah. Okay. So anyway, that got me thinking about this issue about how we lay down memory, and it turns out that we touched on memory a while ago, but most things in your life you do not remember. The number of cracks in the sidewalk and who was wearing what, and what was on the menu on the wall. We just don't remember almost everything

because the job of memory is to write down stuff that matters, that's emotionally salient or informationally relevant. And so, you're just writing this tiny fraction. But anyway, when you're estimating how long it's been since some event, the way you estimate that is by drawing on the footage that you have, saying, oh, well, this happened, this happened, this happened. Okay, so that must have been two months since I saw my friend, or it must have been two years since I saw this other person, that kind of thing. So anyway, this was a whole bunch of research in my lab over the course of a decade that came together, but the point is, if you're laying down richer memories, you won't necessarily live longer, but you will make it seem as though you've lived longer because when you're asking what just happened or how long has it been, you've got more data, more footage to draw on. And of course, we all know this feeling when you go on some super exciting trip on the weekend and you come back and you're back on a Monday, you think, oh, my gosh, it's been forever since it was Friday, there's so many things that happened. But if you just have a normal weekend, you think, oh, my gosh, it's Monday. It was just Friday. There's nothing to write down. And so you don't feel that there was much duration that happened there. So this is why I think one of the most important things in life is about seeking novelty and always putting yourself in new situations such that you're laying down dense memories. The last thing I'll say on this is, when you get to the end of a childhood summer, it seems that the summer lasted for a long time. Summer, it seems that the summer lasted forever and it's because everything is new.

So you're writing stuff down in your memory. But when you're older, you've seen it all before and you get to the end of a summer and you think, wow, I can't believe it's over already. I don't really remember it at all. It seems as though the summer didn't last long. So is it fair to then take from that the key criterion for rich memory as novelty, doing new things? Exactly, exactly. And by the way, this is one of the tiny silver linings to the pandemic which otherwise sucked. But the one interesting part from the point of view of brain plasticity was that it knocked all of us off our hamster wheels and we were finding that the world wasn't what we expected. It was just unbelievable. Like if we had talked in 2019 and said, hey, could this ever happen? We'd say that's a great sci-fi story, but there's no way that it would be that weird. But it was actually that weird and we all locked ourselves in our houses for 10,000 years. And so this is the kind of thing, you know, when you go to the store and there's no toilet paper there on the shelves, it takes your internal model and it totally says, whoa, I didn't even know that could happen. You start thinking about supply chains, you start thinking about how the world works. You're thinking about, wait, is the barber shop going to be open? Can I get a haircut during pandemic? Is this coffee shop going to be open? I mean, it just forced us to think about the world completely new. And I think if 2019 had continued and it had just been the same old world, we'd actually be less smart in a sense because our internal models just would have never gotten challenged in that way.

Here's my idiothesis, which is an idiotic hypothesis. I think that, I come up with these a lot, but I think that we might actually see a tiny decline in dementia some decades from now just because we had this opportunity in the middle of our lives to actually kind of restructure everything and have to rethink everything going on. Did you say idiothesis? Yeah, yeah. So with what other idiothesis do you have? Are there any that come to mind? Two a day at least, yeah. Really stupid hypotheses that might just be right, but they could just as well be wrong. Maybe I would define an idiothesis as the kind of hypothesis where I'm not really attached to it enough to fight and die for it, but it's interesting enough that I'm going to keep an eve on it and see if I can collect data on it. I love this term and I love the idea of sharing some of them because I imagine that you might come up with a lot of hypotheses that might be in some fashion worth examining because you're also not applying pressure to yourself to sort of identify all the scaffolding, apply all the constraints and the filters and so on. Okay, idiothesis, I'm into it. So David, people can find you on Eagleman.com. Certainly on social, David Eagleman on most things. TikTok, Dr. David Eagleman. And we'll link to everything in the show notes, so books and so on. People can find your new podcast, Inner Cosmos, with David Eagleman. I imagine wherever fine podcasts are to be found. Right, right. And you have many books. I started with some. I think it's a great book, but people can start anywhere. Is there anything else that you would like to mention, call attention to?

Any formal complaints you'd like to lodge publicly?

Anything at all that you would like to add before we wind to a close for this conversation? I can't think of anything else. That's great. I think we covered a lot of ground. All right, it sounds good. Well, David, thank you so much for the time. And to everybody listening, as mentioned, you can find links to everything in the show notes as per usual at tim.blog.com. And until next time, be just a little bit kinder than is necessary to others and to yourself. And keep experimenting. Experiment, experiment, experiment, explore, explore, explore. Novelty, folks. Get after it. Thanks for tuning in. Hey, guys, this is Tim again. Just one more thing before you take off. And that is Five Bullet Friday. Would you enjoy getting a short email from me every Friday that provides a little fun before the weekend? Between one and a half and two million people subscribed to my free newsletter, my super short newsletter called Five Bullet Friday. Easy to sign up, easy to cancel. It is basically a half page that I send out every Friday to share the coolest things I've found or discovered or have started exploring over that week. It's kind of like my diary of cool things. It often includes articles I'm reading, books I'm reading, albums, perhaps, gadgets, gizmos, all sorts of tech tricks and so on that get sent to me by my friends, including a lot of podcasts. Guests and these strange esoteric things end up in my field and then I test them and then I share them with you. So if that sounds fun, again, it's very short. A little tiny bite of goodness before you head off

for the weekend, something to think about. If you'd like to try it out, just go to tim.blog.friday. Type that into your browser, tim.blog.friday. Drop in your email and you'll get the very next one. Thanks for listening. This episode is brought to you by Viori Clothing, spelled V-U-O-R-I, Viori. I've been wearing Viori at least one item per day for the last few months and you can use it for everything. It's performance apparel, but it can be used for working out. It can be used for going out to dinner, at least in my case. I feel very comfortable with it. Super comfortable, super stylish, and I just want to read something that one of my employees said. She is an athlete, she is guite technical, although she would never say that. I asked her if she had ever used or heard of Viori and this was her response. I do love their stuff, been using them for about a year. I think I found them at REI, first for my partner. T-shirts that are super soft, but somehow last as he's hard on stuff. And then I got into the super soft cotton yoga pants and jogger sweatpants. I live in them and they too have lasted there. Stylish enough, I can wear them out and about. The material is just super soft and durable. I just got their Clementine running shorts for summer and love them. The brand seems pretty popular, constantly sold out. In closing, and I'm abbreviating here, but in closing, with the exception of when I need technical outdoor gear, they're the only brand I bought in the last year or so for yoga running loungewear that lasts and that I think look good also. I like the discrete logo. So that gives you some idea. That was not intended for the sponsor read. That was just her response via text. V-O-R-E, again, it's called B-U-O-R-I, is designed for maximum comfort and versatility. You can wear running, you can wear their stuff training, doing yoga, lounging, weekend errands,

or in my case, again, going out to dinner. It really doesn't matter what you're doing. Their clothing is so comfortable and looks so good and it's non-offensive. You don't have a huge brand logo in your face. You'll just want to be in them all the time. Their Men's Core Short, K-O-R-E, the most comfortable lined athletic short, is your one short for every sport. I've been using it for kettlebell swings, for runs, you name it. The Banks Short, this is their go to land to see short, is the ultimate versatility. It's made from recycled plastic bottles. And what I'm wearing right now, which I had to pick one to recommend to folks out there or at least to men out there, is the Ponto Performance Pant. And you'll find these at the link I'm going to give you guys. You can check out what I'm talking about. But I'm wearing them right now. They're thin performance sweat pants, but that doesn't do them justice. So you got to check it out. P-O-N-T-O Ponto Performance Pant. For you ladies, the Women's Performance Jogger is the softest jogger you'll ever own. Viori isn't just an investment in your clothing, it's an investment in your happiness. And for you, my dear listeners, they're offering 20% off your first purchase. So get yourself some of the most comfortable and versatile clothing on the planet. It's super popular. A lot of my friends have now noticed are wearing this. And so am I. VioriClothing.com forward slash Tim. That's V-U-O-R-I clothing.com slash Tim. Not only will you receive 20% off your first purchase, but you'll also enjoy free shipping on any U.S. orders over \$75 and free returns. So check it out. VioriClothing.com slash Tim.

That's V-U-O-R-I clothing.com slash Tim. And discover the versatility of VioriClothing. This episode is brought to you by AeroPress. I love AeroPress with more than 45,000 five-star reviews and customers in more than 60 countries. It might be the highest rated coffee maker on the planet. Let's rewind just a bit because back in 2010, 2011, I tested the entire gamut of coffee brewing and filtering options alongside a former Barista World Champion. This was for research for the four-hour chef. That concluded with a statement that the AeroPress was, quote, far none my favorite brewing method. End quote. I even mentioned it and made a cup of coffee on late night with Jimmy Fallon using the AeroPress. Here is the back-back story. Remember the aeroby, the amazing UFO-like disc that you could throw farther than a football field? Alan Adler, a mechanical engineer and Stanford University lecturer created that. Then, after conquering the 1980s toy market, he began to obsess over one thing, coffee. The result was the AeroPress, which debuted in 2006. It was quickly adopted by the specialty coffee community, and it became so popular with the Barista community that someone in Oslo, Norway started a World AeroPress Championship. Because the AeroPress combines the best of three brewing methods, you get a cup that is full-bodied like a French press, smooth and complex as if you were using a pour-over method and rich in flavor like espresso. Best of all, it's super small. You can pack it in your bag when you travel. It takes literally five seconds to clean. It is all practical, no fuss, and you don't have to drink mediocre coffee at your office or Airbnb, and now they have a new crystal-clear version, sleek enough for display and tough enough for the road. You can pick one up at AeroPress.com slash Tim. That's A-E-R-O-P-R-E-S-S dot com slash Tim for less than \$50.

That's AeroPress.com slash Tim,

and my listeners, that's you guys, can get 15% off. Just use the link AeroPress.com slash Tim. I highly encourage you to try it out. You will not be disappointed. AeroPress.com slash Tim. AeroPress.com slash Tim