TPWKY_Special Episode_Clayton Page Aldern

EW: [00:00:00] Hi, I'm Erin Welsh, and this is This Podcast Will Kill You. You're listening to the latest episode in the TPWKY Book Club series, a series featuring interviews with authors of popular science and medicine books. We've really gotten to showcase a wide variety of topics on this series, from the story of leaded gasoline to the spread of disease in institutionalized settings, from the discovery of a cure for tuberculosis to the pervasiveness of syphilis in early modern London. There truly is something for everyone in these episodes. And if you'd like to see the full range of titles that we featured on this series, as well as ones that we're planning to cover in future episodes, head on over to our website, thispodcastwillkillyou.com. There, in addition to finding other goodies like transcripts and references for all of our episodes, you'll find a link to our bookshop.org affiliate page under the Extras tab. On Bookshop, you'll see several podcast-related lists, including one for this book club and one for the TPWKY Kids Book Club, which Erin Updyke posts on our socials. So if you're not already following us there, you really should be. We always say it, but it's always true. We love hearing from you all, so please don't hesitate to reach out. Whether it's a book suggestion, episode suggestion, first-hand account, or just random thoughts you want to share, send them our way. The best way to get in touch is through the Contact Us form or the Submit Your First-Hand Account form on our website. Two last things before moving on to the book of the week, and that is to please rate, review, and subscribe. We'd love to keep making this podcast forever, and that really helps us out. And finally, you can now find full video versions of most of our newest episodes on YouTube. Make sure you're subscribed to the Exactly Right Media YouTube channel so you never miss a new episode drop.

The word unprecedented has taken on an almost menacing tone. Rarely does it mean that something wonderful has happened. More often, unprecedented or record-breaking seems to signify a grim outcome, a new low for our society or our planet. I read this week's book club pick while in the midst of an unprecedentedly warm and record-breaking dry winter in Denver, Colorado, where I live. Wearing a T-shirt and shorts to walk my dog during months when I'm usually shoveling snow off the sidewalk, uh, lost its novelty pretty quickly. It turns out it's tough to enjoy abnormally warm, snow-free, sunny winter days when you know what it means for wildfire risk and drought conditions in an already parched region of this country. I wasn't alone in this. Everywhere I went, people remarked on the record-breaking weather, each conversation steeped in concern. As this week's book reveals, the climate anxiety that we

were feeling is just one way that climate alters how we experience the world. In The Weight of Nature: How a Changing Climate Changes Our Brains, award-winning journalist and trained neuroscientist Clayton Page Aldern explores the profound impact that warming temperatures have on our decision-making, our cognitive abilities, our exposure to certain pathogens, even our propensity for violence. Aldern, who is a senior data reporter at Grist, an independent nonprofit news source for climate change and the environment, travels beyond the well-trodden ground of climate anxiety to bring readers a richly detailed perspective of the intersection between brain, behavior, and climate. How do hot days impact legal immigration decisions? What do hurricanes and wildfires do to our memories and trauma response? Where might we see more disease as temperatures warm? The Weight of Nature takes readers on a journey spanning disciplines and decades to present an eye-opening account of this public health crisis and offers some hope for ways that we can better bear this weight. I am very excited to share my conversation with Clayton with you [00:05:00] all, so let's just take a quick break and get started

Clayton, thank you so much for joining me today.

CPA: It's so lovely to be here, Erin. Thanks.

EW: In your book, The Weight of Nature, you explore how our changing climate is profoundly impacting our brains beyond climate anxiety. From the worsening of critical thinking skills on hotter days to the association between depression and degraded landscapes, this is a relatively unexplored, yet truly eye-opening and alarming aspect of climate change. Can you take me through the journey of this book? Like, how did it take shape?

CPA: Yeah. Yeah, happy to, and, and thanks for your kind words. This is some, uh, occasionally frightening territory, but as I hope I make clear in the text, I don't think this needs to be a, a story of, of doom. You know, the book arose from a sense of curiosity that I kind of couldn't jettison, right? I was working initially as a neuroscientist. I was a lab tech in a computational neuroscience lab, and across my desk were coming these papers, this is back in 2015 or so, uh, both from Stanford behavioral economists and also from the Department of Defense. These really interesting reports that suggested there was this relationship between climate and conflict, which again, if you have these types of authors correcting for all of the relevant sociodemographic confounders under the sun, right? Income and race, et cetera, et cetera, it seemed to be the case That there was this marginal effect that stuck around that illustrated some kind of relationship between temperature and violence. And as a neuroscientist

at the time, I just kinda couldn't get this out of my head. This was kind of an alarm bells moment, right? Like, what could possibly be going on here?

And we, we have, as folks who navigate this world, a general intuitive sense that this kind of thing might be true, right? When it's, when it's hotter outside, we maybe all feel a little quicker to the trigger, for example. I certainly do. And yet I hadn't seen a lot of research into the mechanism underlying how that behavioral effect might come to manifest. That moment for me kicked off a multi-year research project. I ultimately left academic neuroscience and went into journalism. I work for an environmental magazine now, and the marriage of those fields effectively is this book for me. And, and it's a book that seeks to account for, you know, both a, a kind of cataloging of the effects in question, uh, as well as a mechanistic understanding thereof to the extent that we can get there, right? So as, as you suggested, this is not necessarily a book about climate anxiety, per se, uh, which is not to suggest that climate anxiety isn't real or isn't important. But I've sought to go beyond that framework and really dive into what it means for a changing environment to bear on our neurobiology, our behavior, our cognition, et cetera, et cetera. And The Weight of Nature is an argument for indeed the fact that this weight is all around us, kind of forcing our hand in ways that we might not otherwise imagine if we're not paying attention to it.

EW: Early on in your book, you introduce the, this essential framing of climate in relation to memory and expectation. Mm. You know, we can only describe our climate as changing if we have a baseline by which to measure that change, and when we detect that change, it, it disrupts our memories. You know, are the winters of our childhood truly the winters of our childhood? Have things changed, or are we just misremembering things? And I was hoping you could say more about shifting baselines and climate change and amnesia and how these things are all kind of intersecting.

CPA: There's a lot of kind of strange epistemological- ... fluidity here. Uh, and I, I think we can kinda ground ourselves by reminding ourselves what it is that brains do, what they're for. Why do organisms have nervous systems at all? And the first point to make is that we ought to understand the brain as a statistical model of the environment. We ought to s- understand it as a generative model that allows the organism that has access to this nervous system to represent that outside world in such a way that they can navigate it successfully. We need to understand what constitutes normal. If we are to continue persisting in time. And given that biological imperative, what you see across the [00:10:00] board in terms of what it is that organisms with brains and brain-like structures and, uh, frankly, organisms that persist in time but don't even have brains do. And

what they do is they measure the distance between what they expect to happen any given moment, what their model suggests is going to happen, and indeed, what actually happens. And when there's a mismatch between those things, when there's a mismatch between expectation and perception, well, you can do one of two things to get your model in line. You can either update your model to match the perception, or you can act, right? You can change your perception effectively, whether through movement or by exerting some additional pressure on the world, whatever it may be. But the point is, you have this action perception loop that necessarily interfaces with the world, and you sense that world and you act on it, and the world receives your actions as its own sensations, right?

That's part of the kind of beautiful reciprocity of this framework, this modeling framework. Let's just put a pin in that and say, yes, the brain is a model. What's the other thing that we need to do here to kind of wrap our heads around this climate question? And the other move is arguably to, to suggest that there's no real thing as the climate. The climate doesn't exist in the sense that we can put our hand out there and touch it, right? When rain falls on our hand and we feel those raindrops from the sky, that's real. That's happening, right? Weather is real. It may be ephemeral, but it's a tangible thing. Climate, on the other hand, sounds a lot more like this modeling stuff that we were just talking about. Arguably, it's a cultural construct, right? It's the definition of normality for any given point in time and space, right? Climate, as understood both in common parlance and literally by definitions offered by places like the World Meteorological Organization, suggest that it's an average, right? It is an arbitrary human construct Over a given period of time, let's say 30 years, over a given period of space, let's say, I don't know, 10 kilometers by 10 kilometers, and expectation as it were, right, our model of what's happening in that chunk of time and space is what helps us calibrate how we interact with that chunk of time and space.

So, you know, if we didn't have a model of the world that was grounded in this climatological sense that we call quote unquote climate, we wouldn't be able to make plans as a function of our experience with the natural world, right? We wouldn't be able to plan agricultural seasons, for example. We need to have these grounded generative expectations about the environment if we want to navigate this world successfully. So those are the two really important building blocks here, that we can understand our brain as a model and we can understand the climate as cultural, right? We can understand the climate as an expectation. And if you have neurological machinery that is all about calibrating expectations relative to perception, and if the climate as commonly understood is changing, which indeed it is, it should be no surprise that your generative

model, right, that your nervous system changes in kind to reflect that reality. And this is where the memory stuff and the amnesia stuff enters into play.

If you just remembered everything that had ever happened to you, especially climatologically speaking, right, you wouldn't be able to adapt to the new world as it unfolds, right? So in fact, we ought to be forgetting the ways that the world currently isn't if we want to navigate the new world successfully. And so you kind of have this little voice in your ear whispering these little tidbits of amnesia as you move through a climate changed world, kind of suggesting in this insidious manner, "Well, it's actually always felt like this. This is the definition of normal. This is the thing that we need to prepare for." And so we're kind of fighting the climate battle on two fronts, right? There's the real exterior world, and then there's the stuff that that exterior world does to our representation of that world, our definition of what constitutes normal.

EW: Let's take a quick break, and when we get back, there's still so much to discuss.

Welcome back everyone. I've been chatting with Clayton Page Aldern about his book, The Weight of Nature: How a Changing Climate Changes Our Brains. Let's get back into things I feel like that is so important in raising awareness of the impact of climate change and what is actually happening rather than falling [00:15:00] prey to the, the boiling frog syndrome where just like, yeah, things are changing gradually and gradually, but you know what? We're here now, so we forget that what it was like. Yes. But moving on to one of the, the other aspects that you talk about and that you touched on earlier is this impact of heat on our cognitive function. So when it's hot out, we feel like our brains don't work as well. Our thoughts are sluggish. We make mistakes. Our memory suffers. It feels more effortful overall than when it's cooler, and as you describe in your book, this is a real measurable phenomenon observed as early as the 1940s, I believe. What did these early studies and then subsequent research reveal when it comes to the impact of rising temperatures on cognitive function?

CPA: If we go back to the 1940s as you suggested, there are these studies coming out of World War II wherein, you know, you had these telegraphy operators who are baking in a Cambridge lab, effectively being asked by a researcher to do their jobs or to s- to transcribe, uh, the Morse code that's coming in on these machines, and meanwhile, the guy in the hallway is kind of cranking the heat up. And, you know, lo and behold, these are experts at their job, and also as the temperature increases, they become less good at that job, right? They're making errors in their transcriptions, and it's that kind of study that has followed us from the '40s, you know, through to psychology labs in the

1980s where similarly again folks are tossing people into labs and turning up the heat and watching what happens. We've, we've done this for decades, and, uh, lo and behold, at higher temperatures, people are more impulsive. They're more aggressive. They're less critical thinkers, right? They're less rational, and it seems to be the case that there's a through line through a variety of behavioral effects that we observe that comes down to a handful, uh, of mechanistic explanations that, you know, tend to layer on themselves to produce what we observe. It's stuff like the fact that we have effectively a, a fixed amount of attentional resources, and one of the things that's really important to remember about the brain is that it's sensitive, right? The tissue itself is extremely sensitive. It's physical stuff. It operates within a narrow band of, you know, environmental ambient temperature, and therefore, when you see that temperature spike outside, you've gotta put extra metabolic energy inside into cooling that tissue so, you know, your brain basically doesn't melt.

When that's happening, you're necessarily sapping resources from elsewhere, right? Because again, you have fixed attentional load, right? There's only so much metabolic energy that you can devote to some of these kind of higher order principles like critical thinking or attending to things in space. And when you need to do more fundamental things like cool down your brain, some of that metabolic energy has to go to that job at the expense Of some of the stuff that has developed, uh, you know, more recently in evolutionary timescales. In practice, in terms of the, the systems neuroscience at play, what that means is, you know, basically you've, you've got a couple of regions in the front of your brain. There's dorsolateral prefrontal cortex, which is really all about some of the stuff we've been talking about, critical thinking, rational thought, all of these things that we love to imagine are hallmarks of humanity. Right next to it, you've got the ventromedial prefrontal cortex and, and this is still PFC, right? This is still evolutionarily new stuff that basically only humans have, but it receives inputs from elsewhere in the brain. It's not necessarily all about that kind of executive function situation. It's more about like emotion, right? And impulsivity insofar as it's receiving inputs from places like the limbic system, places like the amygdala. And when you make decisions in a healthy environment, those two brain regions in your prefrontal cortex, they're interacting, right? You're balancing quote unquote rationality with quote unquote emotionality and the best decisions come out of that balance.

But in extreme heat, as your blood-brain barrier is doing all kinds of things, as your metabolic energy is basically being rerouted such that you're cooling your brain down, as the connectivity between brain regions is starting to look a little scrambled, that balance becomes skewed and, and what we see in those moments is an outsized role of the VMPFC on decision-making. As the DLPFC is overworked, the VMPFC effectively takes over and in practice for decision-

making, what does that mean? Well, it means your decisions are gonna look more impulsive. You will literally be a less critical thinker. You're going to be quicker to the trigger. You're going to be just zooming through a test that you're taking in that hot room. You're going to be saying things that maybe with a more level head you wouldn't have said. And we see again this [00:20:00] play out across the income spectrum, across the animal spectrum. We see it in all kinds of roles, professional and otherwise, right? And I, I think it is a reminder of the, the human animal selves that we are. The fact that just like the monkeys in the zoo and just like the fish that are swimming around, you know, we're in a lab of our own and when you crank up the temperature, the same results manifest.

EW: Right, and this is not just something that we feel, something that is like a oh yeah, d- you know, I don't know why I said that. Maybe I was just like, it was so hot that day. This has been measured not only just like cognitive function impairment, but also violence being increased on days when it's warmer. Can you take me through some of the studies that show this link between increased temperatures and violence?

CPA: To go back to the, the '80s, one of the ways that folks, uh, tested this initially was basically by sitting in the bushes as cars rolled up to an intersection. And there was a, a test subject who was idling in a car when the light turned green, an observer in the bushes holding a clipboard watching the car behind the test subject. And lo and behold, on hotter days, in hotter moments, and especially for cars that had their windows rolled down, all of a sudden you saw honking behavior increase, right? These cars that were stuck behind the idling vehicle unwittingly were angrier more quickly. They were holding their horn for longer. They were more likely to kinda scream expletives. And again, there was this effect multiplier that showed if you had your windows open, which is to suggest probably you were exposed to the high ambient temperatures 'cause you didn't have air conditioning in your vehicle, indeed those folks saw increased, uh, effect sizes as well. So there, there are these breadcrumbs that start in the psychology labs around aggression. You see this play out today in studies that have looked at things like baseball pitchers who are more prone to retaliate in terms of throwing a pitch intentionally at a batter of the other team if a batter on their own team has already been hit by a stray pitch. So as temperatures increase, pitchers are more likely to aggressively retaliate This is true in a handful of sports. We see more aggressive penalties in football. It's true at the postal service, right? So a, a Harvard economist a year or two ago did this big study of harassment claims that were filed under equal opportunity at the postal service. Uh, and they looked at both indoor and outdoor workers. Again, at higher temperatures, you saw more harassment. So we see this in the professional environment. We see study after study

documenting that risks of things like online hate speech, things like what we might call intra-personal violence, things like domestic assault, domestic abuse, right? All of these really awful patterns tick up when folks are exposed to relative deviations in temperature.

EW: And it's not just our cognitive function that takes a hit as the temperature warms, it's also many other aspects of health as you describe. For instance, the associations between neurodegenerative disease and cyanobacteria blooms is a really compelling associations, and alarming, of course, as everything is compelling and alarming. What is the hypothesized relationship between those two, and where does the research currently stand in this area?

CPA: Right. Cyanobacteria, also known as blue-green algae, these things have been around for billions of years. And, uh, you know, you've seen them. They hang out in fresh and brackish water. They're these blue-green mats that appear on the surface. Uh, and perhaps you've heard that, you know, it's not a good idea to swim in the mats or let your dog near them or anything because they are toxic in some capacity. True, and there are a lot of different flavors of cyanobacteria out there. What we're learning about a handful of them is that in addition to producing a neurotoxin, uh, which is called beta-methylamino-L-alanine or BMAA, in addition to producing this neurotoxin that is indeed released into water It appears that the neurotoxin itself is probably airborne, and so folks who live on the perimeter of these lakes, the perimeter of this brackish water, may also be exposed to aerosols containing BMAA. And this is dangerous because heck of a lot of lab studies have shown relationships between BMAA exposure, both oral and through the nose, right, nasal, have these relationships with excitotoxicity, cell death, neurodegeneration. BMAA exposure is, you know, one of the primary causal predictors of rates [00:25:00] of amyotrophic lateral sclerosis or ALS, Lou Gehrig's disease, motor neuron disease.

It's been implicated in the development of things like Parkinsonism, Alzheimer's. And the real dangerous thing here, uh, when it comes to a changing climate is that, uh, these blooms are increasing in size and frequency as a function of climate change, right? What do they need to survive? They need sunlight. Well, we got that. They need a well-balanced pool of water, and it is being well-balanced by the fact that, you know, synthetic fertilizer is running off from agriculture operations and effectively fertilizing everything it touches as it, as it's loosed into streams and rivers and ends up, you know, in these lakes. That balances the nitrogen phosphorus ratio in, in a manner that the cyanobacteria love. And then you need warm water, and the climate is also warming the water. And you've got a little loop back as well that as a function of more and extreme storms, you're gonna see more and more of the fertilizer in

question loosed into the streams and rivers, blah, blah, blah, blah, blah. So we know globally that cyanobacteria blooms are increasing in both size and frequency. And what's been hypothesized, and for which there are very compelling studies underway looking at, is unfortunately we would expect to see an increase in ALS and Alzheimer's mortality as a function of bloom frequency. We don't know enough at the global level. We don't know enough even at the national level right now in terms of the epidemiology. But I'll tell you what, cyanobacteria are everywhere on Earth at a global scale could potentially wreak some real havoc over the next decades.

EW: Let's take a quick break here. We'll be back before you know it.

Welcome back, everyone. I'm here chatting with Clayton Page Aldern about his book, The Weight of Nature: How a Changing Climate Changes Our Brains. Let's get into some more questions In your chapter Spilling, you tell the heartbreaking story of Philip Gomf, which we actually featured on this podcast several years ago. Philip's death was due to Naegleria fowleri, uh, also known in the popular media as the brain-eating amoeba, and his death was an extremely rare event. Although research is suggesting that it's becoming less rare overall, in part due to a warming climate. How might climate change influence the incidence of this amoebic infection?

CPA: Yeah. And I was so grateful for your reporting on that front. By nature of, you know, primary amoebic encephalitis being quite rare, these stories are, are few and far between, but, you know, to go back to that storytelling component that we tipped at the beginning, they're essential, right? We need to be able to ground this conversation, uh, in reality, and it certainly inspired me to both look into Philip's story, but also, you know, other unfortunate members of his cohort, right? This is a rare disease, but it is not negligibly rare. Mm. And as you suggest, uh, it is only likely to increase. These are free-living amoebae, which is to suggest they swim around in water, and almost similar to the cyanobacteria case, they have these, these moments in their lives in which they almost enter a state of kinda suspended animation. People don't even know how long they can live in a state of suspended animation, but the point is they can. And all of a sudden, when that temperature gradient, that chemical gradient starts to look a little more like it's gonna cater to the stuff that they like to eat, they wake up. And Naegleria fowleri are one of these organisms that, as with most things in life, have a preferred thing that they tend to go after for nutrients. That thing happens to be neural tissue. And so if you as a young boy, as young boys are want to do in the summer, jump into a lake, you may be more likely, uh, with increasing temperatures, to end up with one of these things in your nose, and that's how they make it into the brain, right? They enter effectively through the

nasal cavity, through the cribriform plate. There's basically a route up to the optic nerve. They can hitch a ride such that they cross the blood-brain barrier in that manner, and then they start munching.

And the problem with, with Naegleria fowleri is that because these infections are considered to be quite rare, when somebody shows up at an ER with symptomology consistent with primary amoebic encephalitis, it often isn't recognized as such. It's recognized, you know, maybe as some kind of meningitis. They're gonna throw a bacterial assay at it. Meanwhile, if you're really coming down with this stuff, you've got maybe five days to live, and the cocktail of, you know, antifungal, [00:30:00] antibiotics, et cetera, et cetera, that seem to be the current best chance at keeping you alive need to be administered very quickly And so w- we've got kind of two problems here. One is that a rare disease is probably increasing in frequency, and two, it's doing so amidst this kind of medical education context that isn't really set up to recognize symptomology as it presents in the ER. So, so that's some double danger there. And the real unfortunate chunk of this story is that while this is rare, we're probably looking at an undercount because of that fact number two, because of the fact that we're not used to diagnosing this kind of disease.

I spoke with a researcher while reporting this chapter who, you know, mentioned the fact that there was a single ER doc in, I think, a, a hospital in Pakistan, you know, who recorded something like, I don't know, a dozen or, or 20 cases of Naegleria fowleri infection in one year. And that happened to be a place where somebody knew what they were doing, they were collecting good data, they recognized what was happening and wrote it all down. And, you know, the researcher I was talking to was like, "That's just not happening elsewhere." And it's safe to assume that infection rates are probably already a couple X higher than what we consider them to be today.

EW: And that is, that is just one still relatively rare but likely increasing pathogen. There's also the, the other diseases that can be transmitted by vectors, for instance, mosquitoes, ticks, midges, whose ranges are expanding. And then there are these disruptions with extreme weather events also changing the, the dynamics, the ecology of these vector-borne diseases. And a- as much as I would love to dig more into that, I do wanna also talk about the impacts of climate change on our mental health. Mm-hmm. You know, the scars that climate change is leaving on us are more than physical. There's PTSD you talk about as a consequence of living through traumatic events like hurricanes, wildfires, tornadoes, floods, all of which are, of course, on the rise due to climate change. What is the anticipated impact of climate change on mental health or mental health issues in the upcoming decades?

CPA: Yeah. Great question, and I don't know if anybody's put real numbers to it, but I'll tell you what. When folks looked at, for example, the Paradise Fire- Mm ... really awful California fire from a couple years ago, and set to assess the extent to which folks may be developing post-traumatic stress disorder or PTSD-like symptomology as a function of exposure to the fire, what they found was basically if you didn't- lose any personal property or experience the fire per se, you were probably something on the order of fine when it comes to PTSD. If you knew somebody else who lost personal property or, God forbid, a family member, uh, or, or you witnessed something happen, your PTSD rate relative to that first group goes up by like 3X. If you then, in the final bucket here, lost personal property or a family member yourself, like directly experienced the fire in question, your rate of PTSD was up another 3X relative to that middle group.

So direct exposure to extreme weather, direct exposure to climate disaster matters when it comes to the development of PTSD. This is probably not surprising, right? We, we know, for example, that something like half of low-income parents after Hurricane Katrina had symptomology consistent with PTSD. We see this with respect to earthquakes. We see it with respect to floods, with respect to drought. This is, this is kind of well understood. And, and so to me, it's almost beside the point to think about what's the net numerical impact going to be over a decade per se, and more a question of are we recognizing that these effects are real? Are we attributing the appropriate weight to the findings and to these experiences given the fact that indeed they're only going to become more frequent going forward, irrespective of what that actual number looks like. You know, and furthermore, there are knock-on effects here, right? I, I spoke for a long time, uh, with a colleague of mine named Yoko Nomura, uh, who's a neuropsychologist at CUNY. And one of her studies, which takes place kind of in the context of Hurricane Sandy, right, Superstorm Sandy, you know, effectively looked at the difference between children who were conceived after Hurricane Sandy or born before it relative to those who were in utero when the storm hit.

And when these children were born, [00:35:00] she followed them for the first, you know, 10 years of life or so. And it turns out that by age six, right, preschool age The cohort of children who had been in the womb when the hurricane struck were intensely more likely to exhibit cognitive behavioral deficits, things, you know, or neuropsychiatric symptoms associated with things like anxiety, depression, OCD, conduct disorder, ADHD, right? And we're not talking like, oh, 15% more likely. It was like 10X, 15X, 20X more likely for very, very young children to be showing signs of something like depression relative to those who'd not been exposed to that hurricane in the womb. So that's a hint that when we talk about, quote unquote, mental health, yes, phenomenologically these experiences manifest as mental experiences. They

feel real in the way that all experiences do. There are also physical effects, right? Because you kinda can't get that cross-generational trauma transfer without the physical mechanism. And, and what Dr. Nomura suggests is while there's probably something epigenetic going on, and that's the kind of stuff that to me we just really don't have a bead on, right? There's no good study out there that tries to estimate the burden of what we're looking at over the next 50 years or so. But, but you can kind of run the numbers in your own head and it's a little bit grim.

EW: Your book, The Weight of Nature, w- I feel like we've, at this point, we've touched on what that weight is, but was hoping you could tell me a little bit more about how we can push back against the weight of nature. Like, how do you push back or maintain balance or build the strength to carry that weight? What is the right strategy? Do we drop it? Do we carry it? Do we get stronger? Do we try to lessen the weight? How do we move forward?

CPA: Yeah. Well, gosh, I, I certainly try to remain something of a solutions-oriented optimist, as it were. I think what we can't do is ignore what's happening. We can't set it down. I think that the most important thing that we can do is indeed bear witness to this weight, carry it with us, acknowledge what's happening, maintain awareness of change, and witness our own reaction, both at the individual level and the societal level. I mean, I kind of think awareness is everything. If we go back to the studies of post-traumatic stress, for example, and, and the specific deficits that we see, you know, in the case of something like the Camp Fire that materialize post-exposure to really serious natural disasters. You know, one of the researchers I, I spoke with while reporting, you know, effectively showed that there's, there's a specific deficit in terms of responses to climate trauma that's all about the ability to ignore distractions. Basically, you get worse at that when you develop the kind of, uh, PTSD associated with climate trauma. You're, you're more distractable effectively. And one of the things she showed is that you can basically recover your undistractability. You can, you can regain that loss of function through a series of breathwork protocols, through these, like, mindfulness activities. And it's, it's one example among many, but one of the things that appears to be the case in terms of the, you know, contemporary cognitive neuroscience research on some of these questions is that awareness in its own right, attention as understood neurobiologically, is key to a lot of what's happening here.

And if we can get serious at the individual level about maintaining mindful presence, about reminding ourselves of the transience of experience, noticing our reactions to a given moment, and then noticing the next moment, for example, right? Moving through these protocols from contemplative traditions

that, of course, have been in practice for thousands of years and often these days are kind of packaged up into, you know, the cute webinar version If we can leverage any flavor thereof for the purpose of grounding awareness in both the environment and the self, it seems to be the case that that type of interaction with ourselves and with the world is that which unscrambles, for example, the randomness that I suggested earlier occurs in the heat, right? We see that there's this functional connectivity network structure that seems to be recovered under mindfulness. So there's something there. I don't think it's a be-all, end-all. But there is [00:40:00] something to be said about awareness, and I think it, it's also true at the societal level. We cannot ignore the effects in question. Awareness matters if we're going to garner any kind of response in terms of what happens next, in terms of what do we do about any of this. You know, currently there are a handful of intergovernmental bodies that think really seriously about climate change and health. It's pretty rare for, you know, a big climate policy cost-benefit analysis to take something like the recommendations of those organizations into account and indeed inject health considerations into their cost-benefit analysis.

Nobody across the board, health organization, policy shop, whoever it may be, is thinking about anything we've talked about on this call. There's, there's nowhere even in the climate and health literature that attempts to, for example, price the coming wave of presenteeism and absenteeism that we might witness in the workplace as a function of temperature increases, right? All of the neurological effects that we've discussed thus far, they're sitting on a shelf. They're sitting in conversations like these, but they are not part of the policymaking infrastructure yet. And I think awareness at the societal level Has something to do with an integration of research that is well understood into the decision-making protocols that actually govern our response to climate change. I really do cling dearly to the notion that this doesn't need to be a story of fear. We can, we can name our responses, identify ourselves as real as, as agents in this world. That's important. That's something, right? Climate change is really good at stealing agency. I think what the awareness story gives us back is a little bit of control. And for me, being able to understand your responses, being able to understand your actions, not just as some mechanical knee-jerk reflex, but indeed infused with agency and akin to the world's perceptions, right, akin to the world experiencing you, all of a sudden, you're, you're part of this reciprocal system. You're not removed from it. You're not just a pawn. You have a part to play. And, you know, we gotta, we gotta cling to something. For me, it's for me, it's that.

EW: I agree fully, and it's feels weird to say, but despite the incredibly grim nature of this conversation, I really enjoyed chatting with you today, and I just wanna thank you so much for taking the time.

CPA: Thanks, Erin. Thanks for the kind words and for reading and for having me on.

EW: A big thank you again to Clayton Page Aldern for taking the time to chat with me. Also, a big thank you to my friend Debbie for recommending this book to me. If you enjoyed today's episode and would like to learn more, check out our website, thispodcastwillkillyou.com, where I'll post a link to where you can find The Weight of Nature: How a Changing Climate Changes Our Brains, as well as a link to Clayton's website and one to the Neuroclimate Working Group, neuroclimate.org. And don't forget, you can check out our website for all sorts of other cool things, including but not limited to transcripts, quarantini recipes, show notes and references for all of our episodes, links to merch, our bookshop.org affiliate page, our Goodreads list, a firsthand account form, and music by Bloodmobile. Speaking of which, thank you to Bloodmobile for providing the music for this episode and all of our episodes. Thank you to Lianna Squillace and Tom Breifogel for our audio mixing, and thanks to you listeners for listening. I hope you liked this episode and are loving being part of the TPWKY Book Club. A special thank you, as always, to our fantastic patrons. We appreciate your support so very much. Well, until next time, keep washing those hands