Welcome to the Huberman Lab podcast where we discuss science and science-based tools for everyday life. I'm Andrew Huberman and I'm a professor of neurobiology and ophthalmology at Stanford School of Medicine. Today we are discussing meditation. We are going to discuss the science of meditation, that is, what happens in the brain and body while we are meditating, and we will talk about the science of meditation as it relates to how the brain and body change as a consequence of meditation. That is, what you export or take from a meditation practice that can impact everything from your sleep to your mood. For instance, meditation has been shown to alleviate symptoms of depression. And we will also talk about how meditation can be used to enhance focus and other states of mind that are useful for work and other aspects of life. Now, of course, most of you have probably heard of meditation and when we think of meditation, most often we think of somebody either sitting or lying down. Even if they are sitting, we might imagine them in the so-called lotus position, sitting with legs crossed, upright with hands on the knees, or crossed in our lap or something of that sort. Typically, we think of somebody who is in a very calm state, eyes closed, focused on their so-called third eye center. The third eye center is the area just behind one's forehead. There is no third eye there. At least there shouldn't be. But I will tell you why it is called the third eye center and what the origins of that are and why it is relevant to actually for a meditative practice. With all that said, it turns out that meditation encompasses a huge variety of different practices. Some of those practices, indeed, are done sitting or lying down with one's eyes closed, focusing on the third eye center. Other of those practices are focused on a body scan, really focusing on one area of the body and its contact with whatever surface you happen to be sitting or lying on. Or can be done walking. In fact, there are walking meditations done with eyes open. So there are many different forms of meditation, but today we are going to focus mainly on how specific types of meditation and specific areas of the brain that are activated during those meditations. Change our way of being in fundamental ways, not just during the meditation practice, but afterwards as well. So if you're somebody who's interested in changing your default state of mood or of thinking or enhancing your ability to focus or improving your sleep or improving performance in some cognitive or physical endeavor, meditation is powerful, but you want to make sure that you pick the right meditation practice. So we will talk about picking a meditation practice that isn't just feasible because you'll do it, but is actually directed at the goal specific to you and what you need most. So to give you some sense of the contour of today's episode, first I'm going to talk about some of the underlying biology, the mechanisms and the brain areas and also the areas of the body that are activated during certain forms of meditation, and equally important, which areas of the brain and body are shut down or reduced in their activity during specific types of meditation. Then I'll transition into how to best do a meditation practice, how to get the most out of that meditation practice. And then I will talk about how to change or alter your meditation practices according to your specific goals and as you get better in meditation. And this can get a little bit counterintuitive, but in a positive way. What I mean by that is, for instance, a lot of people think that as you meditate and get better at meditating, you need to meditate more and more and more. Sort of like if you get better at running endurance races that you need to keep running longer and longer, you know, first of 5K, then a 10K, then a marathon, then ultras. With meditation is actually quite the opposite. The better that you get at dropping into a particular brain state, and the more you're so called traits of brain state shift, not just states as there are sometimes referred to, but traits. This is a theme that I've picked up from a terrific book that I'll refer to later. But the more that you can get into specific neural circuits quickly, actually the less you need to meditate in order to drive the benefits of meditation. So that's a wonderful aspect of meditative practices that's unlike a lot of other forms of mental exercise and cognitive enhancing exercises. So I'll talk about all of that today, and I promise that by the end of today's episode, you will have a rich array of meditative practices to select from. You'll know why each of them work and why they can be directed toward particular goals and how to do that. And you'll also know how to modify those meditation practices under conditions where you might get busier or where you're suffering from lack of sleep. I think a lot of people will be excited to know that today where you're going to discuss a specific form of meditation that can, indeed, reduce your need for sleep, and still allow you to enhance your cognitive and physical abilities. Before we begin, I'd like to emphasize that this podcast is separate from my teaching and research roles at Stanford. It is, however, part of my desire and effort to bring zero cost to consumer information about science and science-related tools to the general public. Let's talk about meditation. As I mentioned earlier, we are going to talk about what areas of the brain and body are active during meditation and after meditation and why that can be so beneficial. We will also talk about when and how best to meditate. This is a topic I've long been interested in. I was first given a book on meditation when I was in high school because to make a long story short, it was a bit of a wild one early in my high school years. And as a consequence of a program that I was in, somebody handed me a book on meditation. That book is still available now. That book is called Wherever You Go There You Are by John Kabat-Zinn. It was one of the first, not the only, but one of the first people to really start popularizing meditation and mindfulness practices in the United States. This was in the late 1980s and it was really only until recently that there were very few studies of meditation, although those really picked up in the 90s. Now you can find many, many thousands of studies on meditation and their mechanistic basis of brain imaging studies, changes in hormones in the body. But in the late 1980s and in the early 1990s, because functional imaging of the brain, so-called MRI or FMRI, was really just starting to emerge as a popular tool in laboratories and hospitals. There really wasn't that much mechanistic understanding about how meditation worked. But of course there was a deep understanding from cultures outside the United States that meditation was extremely useful. As you just mentioned, as long as we're talking about the history of meditation, any discussion about meditation is going to be a discussion about states of mind. In any discussion about states of mind invokes the word consciousness, a kind of a dangerous topic to get into in any format because a lot of people talk about consciousness, but people use consciousness the word to mean different things. It doesn't have one standard operational definition of scientists call it. However, discussions about consciousness are often part and parcel with conversations about things like psychedelics and kind of alternative therapies. And so in the 1960s and especially in the 1970s, meditation and psychedelics were actually close cousins in the conversation about consciousness and states of mind. That conversation started to split into two different divisions, and I'll explain why in a moment. It gets to a little bit of interesting academic sociology. But what happened was there were a couple of guys at Harvard, including Timothy Leary and others who got really interested in psychedelics in particular LSD, like Sergio Casas-Dietlomide. And at that time, that was part of the whole counterculture movement. It was considered very anti-establishment, and they were really encouraging students at Harvard to take LSD. They were also very interested in meditation. But what ended up happening is they essentially got kicked out or fired from Harvard. And there's a book that I'll refer you to in the show note captions if you're interested in learning more about all this, but they got kicked out and fired for their emphasis on psychedelics. Now nowadays, there's a lot of interest in psychedelics. We've had episodes with Dr. Matthew Johnson from Johns Hopkins University who's running clinical trials on psychedelics like psilocybin and LSD for the treatment of depression and PTSD. We've also had Dr. Nolan Williams on the podcast, my colleague at Stanford, who's doing incredible studies on some of those compounds as well. So nowadays, the conversation about psychedelics is coming back, and it's somewhat divorced from the conversation about meditation. But in the 1960s and 1970s, the conversation about psychedelics and meditation was sort of one in the same. That changed in the late 1980s and early 1990s when people like John Cobbott's in started writing books that were purely about meditation and suggesting that people explore meditative practices for the utility to bring calmness, suggest stress, improve sleep, etc. Divorce from the conversation about psychedelics. Now that's not to say that the scientific community immediately embraced the conversation about meditation. In fact, it took quite a long while for schools like Harvard and Stanford and other universities around the world to start embracing and funding studies of meditation, asking what sorts of brain areas are involved, how it changes the body, and perhaps most importantly, how a meditation practice can shift the brain and body when somebody is finished meditating and is off in their life, doing their work. In their life, doing their everyday things. In the late 1980s and especially within the 1990s, the advent of brain imaging technology like magnetic resonance imaging, MRI or functional magnetic resonance imaging was a way to look at the brain while it was active, not just to get an image of its structure, but also how it's functioning, the areas that so-called light up. When all of that technology became accessible and popular, will that allowed a large number of laboratories to start asking how specific patterns of thinking and breathing, maybe people sitting in the lotus position, but more often than that, it would be people inside of an MRI magnet because it is a magnet or put you into a little tube and push you into the tube, not against your will, of course, but put people into the tube, have them meditate and then look at how the brain changed and to do that over time. When those studies were done, what was discovered was really quite miraculous, really, and now we don't think of it surprising, but what was discovered was a huge laundry list of brain changes. And then when people were evaluated in their outside life, so when they would fill out reports of their subjective feelings of happiness or they would report their sleep, or even if objective measures were taken with changes in hormones or markers of inflammation, etc. A large list of information fell out of that, which revealed that indeed there are many, a dozen or more clear benefits of a regular meditation practice, and some of those meditation practices could be quite short. So nowadays we think of meditation as pretty commonly accepted, and in fact that has a lot to do with the fact that many of the major tech companies in the Bay Area during the 2000s, such as Google and Apple, and any number of different social media companies and other companies and business ventures, etc. So now we think of meditation as this thing that almost everybody understands can benefit us, but we now sit at an interesting frontier where most people think of meditation as one thing, sort of like the word exercise, which of course could be weight training, it could be running, it could be high intensity interval training, all of which as you know, we'll get you different results depending on what you do, how often you do. And the specifics of what you actually do, so to meditation can give you very specific results, it can give you more focus, it can give you better sleep, it can give you a combination of results, just like exercise can, depending on the exercise. So what we're going to talk about next is the specific changes that happen in the brain with specific aspects of meditation, that is what happens when you close your eyes, what happens when you focus your attention inward versus focus on the body. And what happens when you focus your attention inward versus focusing your attention outward, because as I mentioned before, there's third eye meditation where you close your eyes and focus on that spot just behind your forehead, and you focus on your breathing. There's also meditation practices where you're focusing on what you're eating with a lot of so called mindfulness, being very present to whatever's happening, not letting your mind wander or think about yesterday or tomorrow, what's happening next, but really focusing on the present. And also meditation practices, of course, where you are in a format of interpersonal communication, where you're really listening very intensely, that too is a formal mindfulness. So we're going to parse each of these things, and we're going to ask what's happening in the brain and body during each of these meditation practices, so that you can develop specific meditation practices, that you can invoke in your real life on a daily basis, or thankfully, I would say for some who are pretty busy, that you could even do once a week or even once a month, and then you can also clearly benefit you in specific ways. I'd like to spend the next 10 minutes or so talking about the neuroscience of meditation. I promise you I'm not going to just list off a bunch of different brain areas that are active during meditation. That wouldn't be useful to you. In fact, I don't believe in throwing out a lot of nomenclature without also giving some mechanistic explanation as to what different brain areas do. And you could say, well, what good is it knowing what different brain areas do in their names if I can't actually manipulate those brain areas? As I'll tell you today, you can turn up the activity in certain brain areas and turn down the activity in specific brain areas with specific elements of a meditation practice. So that's quite exciting and quite different, really, from other aspects of neuroscience that we might discuss on this podcast. So there are a few different brain areas whose names I'd like to arm you with. And again, the names themselves aren't essential, but if you can grasp even the top contour of what I'm about to say, you'll be in a much better position to parse and use the information that follows. There's an area of your brain that sits right behind your forehead that's called the prefrontal cortex. Basically, it's the front bumper of your head just behind the bone. That area just behind your forehead that we call the prefrontal cortex actually encompasses a lot of different things. And actually, you have two of them. You have one on the right side of your brain and you have one on the left side of your brain. And they're connected to one another, but they actually do different things. The area that I'd like to focus on today for a bit is the so-called left prefrontal cortex. So if we were going to get really specific, we'd say the left dorsal lateral prefrontal cortex. Dorsal means up, lateral means to the side. So if you want to touch the left side of your head and move your hand just toward the midline toward the top of your head a little bit. So that's dorsal and then lateral as long as your hand is still on the side of your head, you're in the left dorsal lateral prefrontal cortex. So you got your hand probably right over your left dorsal lateral prefrontal cortex. That area of the brain we know from lesion studies where it's been damaged in animals or humans. And we know from stimulation studies where it's been selectively stimulated in animals or yes indeed also it's been done in humans has an incredible ability to control your bodily senses and to make sense. That is to interpret what's going on in terms of your emotions and your bodily sensations. So from now on, unless I say otherwise, if I say prefrontal cortex, I'm specifically referring to the left dorsal lateral prefrontal cortex. But I'm going to shorten that up just for sake of simplicity and ease of communication. If I'm going to talk about another area of prefrontal cortex, I'll talk about another area. But if I say prefrontal cortex today, what I mean is left dorsal lateral prefrontal cortex stimulation of left dorsal lateral prefrontal cortex, or I should say more appropriately when your left dorsal lateral prefrontal cortex is active, you are in a great position to interpret what's going on with you emotionally to interpret your bodily signals of comfort or discomfort and then make really good decisions on the basis of that interpretation. And that's because the left dorsal lateral prefrontal cortex is in direct communication with and is directly connected to another brain area called the anterior cingulate cortex or ACC. Now I'm just going to refer to it as the ACC. The ACC is an area of your brain that is interpreting a lot of different things about bodily signals. For instance, how fast you're breathing, whether or not your heart is beating quickly or slowly, and more importantly, whether or not your heart is beating quickly or slowly for the circumstance that you are in. So for instance, if you're running up a hill and it's even in great shape and your heart is beating very fast, it's unlikely that you are going to be concerned about your heart beating fast because that is appropriate for the circumstance. However, if you're just walking along and all of a sudden your heart starts beating very quickly for no apparent reason, well then you are going to interpret that as either pathologic or uncomfortable, inappropriate for the context that you happen to be in. The left dorsal lateral prefrontal cortex is the area of the brain that actually has some control over and especially can interpret what's going on in this ACC region. Now most of you probably haven't heard of the ACC. Most of you probably have heard of a brain area called the amygdala, it's an almond shaped structure on the two sides of the brain people talk about as the fear center, etc. But your ACC, the inter-cingulate cortex, gets input from areas like the amygdala, your threat detection centers, but it also gets input from an enormous number of other areas of your brain embody including your heart, your gut. So it gets information about how full that is distended or how empty your gut is. It gets information about how quickly you're breathing from input from your lungs and related structures. It's an absolutely critical station for making sense of what's going on in your body. And it works very closely along with one other structure and I promise it's going to be the third structure in this triad and then I'll stop listing off names. So the lateral prefrontal cortex, think of that as sort of the interpreter of what's going on inside of you. You have the ACC or inter-cingulate cortex which is the area of your brain that's bringing in all this information about what's going on inside your body, and you have been on the surface of your body. If you have any pain or an anchromoscheto bite on the surface of your body, your ACC would definitely register that. And then there's this other absolutely incredible brain structure which is called the insula, INSU LA, insula. And the insula has a bunch of different parts to it. But the insula is another area that is interpreting signals of what's going on in your brain and body. So the ACC and the insula are working together to try and figure out what's going on inside me. And in addition to that the insula is interpreting information about what's going on outside of you. So your insula is saying for instance, this is a steep hill that I'm running up. And as a consequence, whatever heart rate increase that I'm experiencing or heavy breathing or burning in my lungs, this all makes sense. I don't have to be worried. I don't have to be scared. I might want to slow down, but this makes sense. Whereas it for instance, in the example I previously gave where if you're sitting in a room and everything is pretty calm and all of a sudden you start feeling really uncomfortable like your stomach doesn't feel right or you start breathing quickly, you start having a so called anxiety or panic attack. In large part, that's because the shift in your bodily sensations doesn't match or doesn't correspond to something in the outside world. So there's this incredible triad, which includes the left or salato prefrontal cortex, the cingulate or enter a cingulate cortex and the insula. And those three are working together in a kind of conversation. It's a neural conversation, but a conversation nonetheless trying to figure out, okay, what's going on inside me? How do I feel? What am I thinking about? And this could be thoughts about the past or the future or the present. They are also in a conversation as to whether or not the sensations that you're experiencing, meaning how quick your breathing is or how slow your breathing is, how your heart feels, how your skin feels, any sensations of pain or pleasure for that matter. Whether or not that makes sense for the situation you're in and trying to determine whether or not you are doing the right things as a consequence of those sensations. Okay, so again, if you can't remember the names of these different neural structures in the brain, don't worry about it. It's really not that critical. What is critical is that you understand that there's a conversation that's constantly occurring as long as you are awake, trying to figure out what's going on inside of you, whether or not it makes sense relative to what's going on outside and around you. Now humans are smart. That is we are to some extent conscious of the fact that we have memories of the past, awareness of the present and anticipation of the future. So we do realize, for instance, that we can be seated at the dinner table, excuse me, and have a thought about something tomorrow, maybe an exam that's stressing us out or something like that. And that will change our bodily state in a way that is not optimal for what we're doing in the moment, but that can still make sense to us because that exam is important. Maybe we're feeling some pressure about a hard conversation we have to have or maybe we are very excited about the next day and we can't eat because we're so excited. And that can make perfect sense to us because we do have access to this knowledge about self that we can think about the past, the present, or the future. So that makes the conversation these three structures are in, even more interesting and dynamic because what it means is that we can be doing something, eating, talking, running, any number of different activities. And our bodily state may or may not match what we are doing in a way that's adaptive for that. And yet that can be completely okay or at least understandable for us. Now, a major emphasis of a meditation practice is to make us so called more mindful. What is mindfulness? Well, again, there isn't one perfect universally accepted operational definition of mindfulness. That's basically nerd speak for saying people can't agree exactly what mindfulness should be is and means for everyone. But most people assume and I think agree that mindfulness includes something about being present. And when I say present that doesn't necessarily mean present to one's surroundings because of course a lot of meditation practices that are designed to make us more mindful and present are designed to make us more mindful and present to what's happening internally while ignoring everything that's happening externally. But they are designed to make us more present to our bodily sensations and in particular our breathing and our thoughts in the moment. So let's now explore what a generic meditation practice looks like and let's evaluate how that tends to change the activity of these neural circuits in the brain and body. And then from there we can split the conversation into a couple of different bins. That is meditation practices that are ideal for enhancing focus, meditation practices that are ideal for improving mood, meditation practices that are ideal for improving sleep, and meditation practices that believe it or not benefit all of those things in one fill swoop. Okay, so what happens during a meditation practice at the neural level? In order to answer that question we are going to be scientists. That means you and I are going to be scientists now. We are going to break down a practice into its different component parts and address what we know for sure about the brain activation states that occur with those different component parts. In order to do that let's use a somewhat generic form of meditation but it's generic and pretty far reaching because I would say that for most people about 75% let's say a meditation practice is going to involve stopping meaning getting out of motion, sitting or lying down. And in most cases closing one's eyes although it is absolutely not required to close one's eyes during meditation. There are many forms of meditation that are done eyes open. But for most people it's going to involve stopping our movement that is not ambulating, not walking or running. So seated or lying down with eyes closed. When we do that meaning when we sit or lie down and close our eyes as trivial as that shift might sound to you it actually is a profound shift in the way that your brain and other neural circuits in your body function for the following reason. When we close our eyes we shut down a major avenue of what's called extra reception. What do I mean by extra reception? Well very briefly we are sensing things on our body and in our body all the time. We are also sensing things from outside of us all the time so these could be sites or sounds touch on our body sensations within side of body etc. Now sensation is distinct from what we call perception. Perception is put simply the sensations that we happen to be paying attention to. So at any given moment you are sensing many many things. There are sound waves hitting your ears, there are pressure receptors on the bottoms of your feet sensing your shoes or your sandals or the floor etc. But you are not perceiving them until you place your attention on them. Now the way perception works is that you have so called spotlights of attention. You can't perceive everything all at once, every sound, every sight, every touch. That would be overwhelming in fact that would be terrible. Rather you have spotlights of perception that can either be very narrow so for instance you could focus all of your perception right now on your big toe of your right foot and really pour all of your awareness, your attention into what you are perceiving there, what it feels like, if there is tingling or pressure, heat or cold etc. Or you can broaden that spotlight to include both feet or all your toes on both feet and then your legs and your whole body or the entire room. Perception is like a spotlight and I should mention, they are very good data that we can split our attention into two but probably not more than two spotlights. And we can make those spotlights of perception either very broad and diffuse or very narrow. You can practice this now if you like, you can pick a spot on the wall away from you anywhere or if you are driving you can look at some location and you can focus intensely on one small location for instance a tree in the horizon or a person on the street or any number of different things outside of you. Or you can broaden that spotlight to include the entire scene at once you can also focus a spotlight of perception on your body say on the left upper portion of your chest and of course you can focus on the left upper portion of your chest and something outside of you can split your attention between those two perceptual spotlights. It's very hard although not impossible to have three perceptual spotlights but most people can split to two points of attention or perception pretty easily. The other thing that most people can do pretty easily is merge those two spotlights or rather to have just one spotlight of attention so you don't always have to have two spotlights of attention on and here I'm using the word attention and perception interchangeably. You could for instance have two points of attention so you're talking to somebody and you're paying attention to whether or not somebody's walking in the door or not so that's two or you could be completely focused on the person you're talking to or you could be completely focused on the stomach ache or the great sensation of hunger that you have in your belly while talking to somebody in fact you're not even listening to what they're saying at all. So you have two spotlights of perception you can split them or merge them into one and this is very important those spotlights of perception can intensify or dim and there I'm using analogy what I mean by that is your perception of what's happening within those spotlights can be very very high acuity that is you can register very fine changes in detail like tingling on one side of your big toe of your right foot versus the other or it can be somewhat more diffuse. You're just thinking about your whole toe which in that case seems like a small area but the point is that you can consciously adjust the acuity that is the fineness of your perception all of this is under your power because of the incredible ability of a brain structure whose name you now understand and know which is the left or salateral prefrontal cortex although there are other areas of your brain involved as well your ability to direct your attention to specific things in your environment or within your body. Or within your body or to split those points of attention or merge them or dial up the intensity of how closely you're paying attention to every little shift or ripple and change in sensation there or to kind of dissociate if you will for lack of a better word to disengage from that perception all of that is under control because of your ability to engage this area that we call the prefrontal cortex and in particular the left dorsolateral prefrontal cortex. Okay, so now if we look at the example of what happens when you sit or lie down and close your eyes and decide to meditate you should immediately realize that that's a tremendous shift in your perceptual ability why because that spotlight of attention while it can be oriented toward for instance what you hear in the room or maybe the feeling of wind moving trees in the environment that you happen to be in when we close our eyes we shut down one of the major avenues for sensory input which is vision. And when we do that there's a tendency for those perceptual spotlights to be focused more so on what happens at the level of the surface of our skin and inside of our bodies and that informs us about something very important which is that they're actually two axes are two ends of a continuum of perception up until now I've been talking about perception and attention is kind of the same thing and indeed they are at least for sake of this conversation but within that word perception or within that word attention there's a continuum and that continuum has on one end something called interoception interoception spelled within I is everything that we sense at the level of our skin and inward so the sensation inside our stomach the sensation of our heart beating some people can sense their heart beating pretty easily other people have more challenge doing that what we are feeling on the surface of our skin how hot or cold we feel that's interoception in contrast at the other end of the continuum is so called interoception spelled within E exteroception is perception of everything that's outside or beyond the confines of our skin so by shutting our eyes and in particular in a meditative practice where we direct our attention toward our so called third eye center this area right behind our forehead which not so incidentally is the prefrontal cortex or in some cases where people will focus on their breathing so the movement of their stomach or the movement of their diaphragm or the lifting of their chest or the extension of their belly while they breathe by doing that we are taking what ordinarily is a perceptual state that's split between the outside world exteroception and usually also toward our interstate you know most people are generally in touch with how they are feeling from the skin inward while they are also paying attention to what's outside of them you can think about somebody for instance at a restaurant or sandwich shop about to order a sandwich you're reading the menus so that's exteroception right the menus outside the confines of your skin and little ideas or maybe big ideas come to mind about what the roast beef sandwich or the vegetarian sandwich will taste like what it will do for you what what's in it what you like what you don't like etc that's splitting interoception and exteroception but when we close our eyes we stop we slow down we focus on our breathing or that third eye center the majority of our perception then shifts to interoception when we shift down to that end of the continuum of interoception something very important happens what happens is that those two regions the ACC the interusingulate cortex and the insula really ramp up their levels of neural activity and that should make perfect sense to you because those are areas of your brain that are registering and paying attention to the various sensations of how full or empty your stomach feels whether or not the surface of your skin feels hotter cold and on and on so by just sitting down or lying down and closing your eyes your brain undergoes a massive shift from exteroception to interoception now that's not to say you can't be distracted by external events and in fact many people are but the early stages of transitioning into a meditative state involve this shift down the continuum or I should say to one end of the continuum because there's no down up there's just the continuum shift along the continuum to heightened levels of interoception now I mentioned this briefly before but many people are very interoceptively aware just naturally even if they don't do a meditation practice other people are not and there's a pretty good measure of whether or not you have high levels of interoceptive awareness or capability and that is your ability to count your heartbeats without placing your fingers anywhere with any pressure to take your pulse you can do this if you like you can actually try and estimate your number of heartbeats simply by trying to feel your heart beat some people are very good meaning they're very accurate doing this other people are not it does seem to be an ability that can be trained up quite a bit and in fact meditative practices will improve your interoceptive awareness but and this is a very important point heightened levels of interoceptive awareness while that might sound attractive oh but to really really in touch with your body that is not always beneficial why because many people who for instance have excessive levels of anxiety have excessive levels of anxiety because they are very keenly aware of any subtle shift in their heart rate or breathing or change in their sensations within their stomach as other people who are less aware of their bodily state that can be beneficial right it can be adaptive or not depending on the circumstances it's probably not adaptive to be very very aware of your internal state if for instance you're doing public speaking you don't want to be thinking about what's going on in your stomach or how quickly you're breathing I'm certainly trying to ignore all those signals those sensations now but for somebody who has no awareness of what's going on very little interoceptive awareness that can be problematic too because these are the very people who can ignore the fact that they're having a heart attack or can ignore the fact that they have high blood pressure and are caring about life focused on everything external with no awareness of their own body they're quote out of touch with their body so we want to be very careful about placing valence which is a sort of value of good or bad on interoceptive awareness versus extra of awareness more importantly we want to emphasize that when you undergo a meditation practice if it's of the sort where you stop your movement and close your eyes you are training for interoceptive awareness this becomes important later we get into discussions about meditation for reducing anxiety some people may opt in fact I would say some people ought to opt for a meditative practice which involves more extra of a awareness actually a meditation like a walking meditation or even a seated meditation where they are bringing their focus to a place outside their body as opposed to inside their body and in fact there are examples of people who have meditated quite a lot who develop such a heightened state or awareness of their interoceptive components that is just fancy again nerd speak for so aware of their breathing and of their heart and of their state of their gut that it actually is intrusive for daily activities so I will ask you to ask this question of yourself now are you somebody who tends to be very in touch with your bodily sensations so for instance from the skin inwards or are you somebody who tends to be less in touch with or aware of your interoceptive state there is no right or wrong answer you don't get an a or an a for a d or a c depending on your answer it's just a good question for each and every one of us to answer and I think most people answer that it depends it depends on whether or not you are in a social setting or whether or not you're alone but we are going to return to that answer so keep it in mind because it will become very beneficial in building an optimal meditation practice for you but for now just note there's this continuum of perception interception and extraception closing your eyes increases interception opening your eyes dramatically increases extraception just automatically just automatically because so much of your brain in fact 40% or more is dedicated to vision and this I should say for those of you there low vision or no vision and those of you that are blind or have poor vision this entire process is translated to the auditory to the sound domain so it's true for people that can see that's true for people that can't see of course people that can't see closing the eyes doesn't have this huge shift towards interception but there have been a few studies not as many as I would have like to find but a few studies of for instance people who are blind or have low vision don't see very well and when they close their ears and they can't hear the external world where they put headphones on or noise cancelling headphones then the world inside of them becomes very prominent relative to the world outside of them for obvious reasons so I asked you to ask yourself whether or not you are somebody who tends to be more interoceptively aware or not more exteroceptively aware or not and some of you might not be able to answer that question and if you can't chances are that you are effectively sliding along that continuum depending on the activities that you're doing so you're probably the kind of person where somebody comes over to you and starts talking to you you will engage in that conversation and you don't feel so inside your body that you're thinking about your heart beating and whether or not you're flushing red etc you're going to pay attention to what they say many people however when somebody talks to them if they have social anxiety or even a slight bit of social anxiety will be thinking about whether or not their cheeks are flushing or whether or not they look right or sound right or whether or not they have something in their teeth these are normal responses but they really speak to this issue of whether or not you tend to shift more towards interoceptive awareness or exteroceptive awareness and of course it's context dependent it will depend on whether or not you're out on a date with somebody that you know you would load to find out later that you had food in your in your teeth or whether or not you're with somebody you're more familiar with where that would not really matter much or the other person would tell you this kind of thing what does it mean to be at one location or another location along this continuum of interoception or exteroception well we know what it means normally right we know that if you are more interceptively aware your insulin a cc or active but that's not very useful that's not that's not helpful as a tool that's just a fact now there have actually been studies of what a meditation practice can do in terms of moving you along this continuum from where you naturally sit in order to help you function not just during the meditation but at all times and in order to illustrate this I want to start with a description of what is now a classic study it's a very cool study has a very cool name talks about something very important that will come up again and again in today's conversation that's something called the default mode network the default mode network is a collection of different brain areas that essentially are active when we're not doing much of anything and certainly is active when we are not focused on one particular task or conversation or activity the default mode network can be thought of more less as the network that generates mind wandering or our thoughts drifting from the past to the present to the future remember earlier I talked about how your perceptual spotlight can either be two spotlights or they can merge well similarly human beings can think about the past surely the present definitely and the future and it turns out we can also split our thoughts just like we can split our perception into two of those three things so I can think about the past a past event and I can think about the present I can split my thinking and my memory in that way I can also think about the present in the future I can also think about the future and the past although it's very difficult although not impossible to split ones thinking and memory into the past the present and future simultaneously not easily done but pretty easy to split ones attention and thinking into two of those three things either the past the present in the future or any two of those three things just like with attentional spot lighting you can place your mind your thinking and your memory your cognition onto one of those things would be very very present or the past and the present and so on and so forth the default mode network while it involves a lot of different brain areas can be thought of simply as the network of brain areas that are active when your mind is wandering between these different time domains and the paper I'd like to share with you as I mentioned before is now a classic paper has a wonderful title which is a wandering mind is an unhappy mind now that sounds almost like a news article or a news article about the scientific paper that's actually the title of the scientific paper which was published in the journal science which is one of the three apex journals you scientific publishing is competitive but it's especially competitive to get manuscripts accepted into science into nature and into the journal cell so it represents kind of the one of the super bowl and the eight championships and Stanley Cup if you will for you sports of the sea and autos of scientific publishing this is a paper from Matthew killingsworth and Dan Gilbert it was published in 2010 but it's still considered a classic and this paper a wandering mind is an unhappy mind has a number of very important points I'm going to paraphrase certain elements of it for you because they say essentially what I would like you to know far better than I could and I could say so first of all they start out with a statement which I confess I disagree with which is unlike other animals human being spend a lot of time thinking about what is not going on around them contemplating events that happened in the past might happen in the future or will never happen at all I agree with their assertion that human beings do that that certainly my experience although I must say I don't think there's any evidence whatsoever that other animals don't do it also so my apologies killingsworth and Gilbert but I'd be happy to go toe to toe with you on that I am not aware of any data that prove one way or the other what other animals are things. So let's set aside other animals and let's focus on the human animal now their point is still a very good one which is that humans have this wandering of the mind that they call stimulus independent thought that is there's nothing happening to create these thoughts or anything happening in the immediate environment these thoughts are just happening on their own internally that's the default mode network. So it was important in fact it was a landmark study because they did it right about the time that smartphones became a widely available and in use so again 2010 so they basically pinged people they contacted people on their iPhones many times per day and they did this for well over 2,200 adults they had a mix of male and female people in this study the mean age was 34 years but there was a rain mean of course being average but there were a range of different people. So they were looking for the match or mismatch between what people were doing and what they were feeling they were essentially trying to probe what people were thinking about and they also addressed that and they came up with a kind of a bubble chart if you will where the bigger the bubble the more answers came back about one particular thing and they assessed whether or not people were happy or not in that moment or sad or not whether they were going to be a good example. Or sad or not whether or not they were focused on what they were doing or not there are a lot of bubbles in this chart so I'm not going to read them all but the important points that came from the data and again there's a very large data set was that and here again I'm paraphrasing first people's minds wandered frequently regardless of what they were doing in nearly half of the samples taken people were generally thinking about something else except it turns out there's just one little bubble sitting way far out on the horizon here. People claimed and I'm inclined to believe them that they tend to be very focused on making love if they were making love in the moment where they were pinged on their iPhone now why their iPhone was there with them at that moment I don't know that's wasn't included in this description of the study but all the other activities grooming and self care listening to the news watching television relaxing working etc. during all those activities people claim that their mind wandered a lot and then they also assessed of course their mood and how those people felt at any given moment depending on what they were doing and how well their mind and their emotions matched what they were doing and what they say here is second they reveal that people were less happy when their minds were wandering then when they were not and this was true during all activities and then third what people were thinking about what they were doing is not. People were thinking at a given moment was far better a predictor of their happiness than what they were doing so this is interesting and I think matches a lot of people's experience in fact I think as you hear about this study many of you will probably just say well done I mean if you're working and you don't like your work and you're thinking about something bad that happened well then of course you're not going to be happy but the key point of this study is that it did not necessarily have to be the case that people were thinking about something on pleasant. In fact if people were working and they were thinking about something else that was pleasant that also made them feel unhappy in other words the mismatch between being in an activity and having our mind elsewhere led people to report themselves as feeling more unhappy in that moment and when you total this up what you find is that people are often not present to what they are doing and that is a great source of unhappiness even if their thoughts are those people who are not happy and they are not happy. Are those of happy joyful thoughts this is interesting and I think runs counter to what most of us have heard or been taught which is you know think good thoughts you know trying to press bad thoughts have a good internal landscape you know create a good narrative that is all true but equally if not more important is to have the ability to be fully engaged in what you are doing at a given moment that is the strongest predictor of being happy and there were several other studies. There were several other studies that followed up on this but their conclusion that they put in the final short paragraph of this paper I think really captures it beautifully they say and here I'm quoting directly in conclusion a human mind is a wandering mind and a wandering mind is an unhappy mind the ability to think about what is not happening in a moment I added the in a moment part is a cognitive achievement that comes at an emotional cost. I'm not alone in believing that this paper a wandering mind is an unhappy mind and we will provide a link to this paper in the show not captions is absolutely key in understanding why a meditation practice is so important because a meditation practice is really about adjusting your place along that interceptive extra receptive continuum to what you happen to be experiencing in that moment and while most people think of a meditative practice as focusing on what's going on internally. With your eyes closed third eye center focusing on your breathing etc for any number of minutes or maybe even an hour longer. There are other forms of meditation in which your extra reception dominates in which you are actively focusing on things outside or beyond the confines of your skin and internal landscape and that too is meditation and if we are to take the work of killings worth and Gilbert this a wandering mind is an unhappy mind seriously and I know a number of people are not interested in this. I know a number of other laboratories have and have supported this research with their findings again and again and again what this means is that meditating is not necessarily a practice that we do divorced from the rest of life. Meditation and mindfulness in particular being present to what we are doing in a given moment is one of the essential keys to happiness and improved mood even if what we are doing is unpleasant. So that brings us to a tool and it's a tool that any and all of us can use whether or not you tend to be interceptively dominant that you tend to pay more attention to your bodily sensations or extra-acceptively dominant. And again if you don't know the answer to that question there's a simple test that you can do you can just sit down or lie down close your eyes and you can ask yourself or assess whether or not your attention tends to fleet to things outside of you. Cars honking or going by people in the room or whether or not you tend to be able to focus on your internal landscape to the exclusion of extra-ception and attention to things outside the confines of your skin easily. Now of course this will depend on context and situation even how well rested you are etc but that's exactly the point. This is the sort of thing you want to do every time you decide to do a meditation practice in fact I would suggest that you use this to determine what meditation you do at any given moment. So let's say you are somebody who is a regular meditator or let's say you're somebody who's never meditated and you'd like to develop a meditation practice. So let's say you're on a plane or you're in the car if you're in the car please don't close your eyes while driving that sort of obvious but do this in a safe way please but stop close your eyes and assess whether or not you can access and focus your attention primarily on your body. So if you're in your car or you're in the car you're going to be able to focus on your attention primarily on your internal state or whether or not your attention and perception gets pulled to something external to extra-ception. And again that will vary depending on circumstance and who you are. Then I suggest opening your eyes and trying to focus your attention to something external to you and seeing or evaluating the extent to which you can divorce your perception from sensations that occur at the level of your skin or internally. Now I should say that there's no technology at least not that I'm aware of absence of FMRI machine in which case you are inside an FMRI machine while you do this but unless you are in that experiment and most of us aren't. There's no technology that can tell you for instance whether or not you are interceptively dominant or extra-acceptively dominant and whether or not the ratio is 75 to 25 or what have you at any given moment you have to assess this subjectively. However if you sit down for instance and you notice that you can equally split your attention between internal sensations and external sensations or whether or not you find yourself pulled into external sensations when you're trying to focus inward or you find yourself pulled inward when you're trying to focus outward. Well that will dictate the sort of meditation that you perhaps ought to perform in that moment. Let me give an example of how you would do this. You would stop in some way so sit or lie down close your eyes and evaluate whether or not you can essentially rule out or eliminate attention to all outside events. Most people won't be able to do that entirely but try and focus your attention for instance on your breathing or the typical third eye center focusing at a spot right behind your forehead. If you feel you can do that reasonably well to the exclusion of what's happening around you well then an important question arises should you meditate in a way to enhance that intercept of awareness or rather should you meditate in a way for instance with your eyes open and your attention on a particular portion of the landscape you're in like a tree or or maybe even a you know an object or a plant or something else in your immediate environment to try and cultivate or enhance your extra-acceptive awareness. That's up to you but my bias would be one in which you work against your default state again the default mode network is where you land on this interceptive extra-acceptive continuum is going to lead to more mind wandering whereas when you encourage or we could even say force yourself a little bit to anchor your attention to either inside your body or outside your body. And you make that decision according to what you are doing less easily well then you are actively training up the neural circuits you are engaging so called neuroplasticity the brain's ability to change in response to experience you are deliberately engaging a shift along that continuum to make this crystal clear what I mean is this let me give an example if I were to sit down and I want to do some meditation let's just say three minutes of meditation there's good evidence that even three minutes of the day. Even three minutes of meditation can be beneficial for a variety of things including enhanced focus and enhanced anxiety management let's sit down and I notice that I can really focus inward on what's happening at the level my skin and my internal organs and I can rule out everything maybe that's because the room is quiet or maybe it's just because my brain is in a state that I'm particularly good at that at that moment. Maybe it's just a natural ability well then I would opt for three minute meditation practice in which I deliberately extra set that I build up the circuitry to focus on something external to me because I want and I think most people would like to have an adaptive mechanism within them so that they can slide along that continuum and they don't default to whatever happens to be easiest for them in that moment. Now if I were to sit down and try and focus on what's going on internally and I kept getting distracted by things happening outside of me opening my eyes are feeling like I need to reach for my phone or paying attention to the sounds in the room well then I would actively engage a meditation practice in this case a three minute example but it could be longer where I'm deliberately trying to focus my perception on events at the level the confines of my skin and internally why do I say this well you know I love to use the phrase anytime with kids you know when they say this. This is really hard or something's challenging or adults will say that's really tough well as my graduate advisor used to say that means you're learning if something were easy if you can perform any activity or thought etc well then there is absolutely zero reason for your neural circuits to change it's the friction it's the feeling that something is hard that turns on the enormous variety of mechanisms at the level cells etc that allow you to potentially change your neural circuitry so challenge and discomfort. Is the signal to your brain embody that something needs to change so I'm encouraging you to embark on meditative practices that are not your default okay to essentially go against the grain of where your interceptive bias or your extra bias happens to be at a given moment and again this will change for some of you this will change across the day where early in the day you are very very good at doing an interoceptive biased meditation and later in the day you aren't I actually believe based on the data that I've covered and we'll get into a few more papers about this and my lab is actively working on this as well that meditative practice can be made far more effective that is it can invoke more neural plasticity more shift in brain states and brain circuitry if we do not take the easy path that is we go against the grain of what our brain would naturally do in a given moment so if you're in a crowded airport in your finding that everything is very distracting well then that would be a great time to do some interoceptive focused meditation whereas if you are really in your head you know your looping thoughts about the past and present maybe you're even an obsessive thought well that would be a terrific time and ideal time really to do a short meditation focused on something external to you in both cases whether not you're focused on interoceptive bias or extraoceptive bias you are going against or I should say you're pushing back against your default mode network I would argue it's going to be far more effective that is you're going to reduce or shift the activity of that default mode network far more and in a far more beneficial way if you actively try and suppress your bias toward being more interoceptive or extraoceptive now I think that's immensely beneficial both for the immediate changes that you experience what others have called a state change because that's what it is and it also can lead to as we referred to earlier more neural plasticity more changes in the brain circuits that underlier default mode network and lead to what are called trait changes and I want to be very clear that I am not the first to make this state versus trait distinction that's a distinction that was raised in a really wonderful book in fact I can't recommend this book highly enough the book is altered traits science reveals how meditation changes your mind brain embody this is a book by Daniel Goldman and Richard Davidson have done terrific work and many writings and many TED talks etc about meditation I would say that circa 2016 2017 this book really captured what I believe to be the most essential elements of the science of meditation a lot of the history of it as well today we're focusing on much of what's covered in this book but also a lot of things that have happened excuse me since 2017 in fact most of the papers that I'm going to talk about are papers that were published after 2017 again there's a wonderful book where they very clearly distinguish between state changes and trait changes being the more long lasting ones my read of this book and the literature that follows is again that when you sit down to meditate it is going to be most effective to do that interceptive extra receptive bias assessment ask yourself whether or not you are more in your head or outside your head if you will and then to do a meditation practice that runs counter to where you happen to be at that is that pushes you more externally if you're in your head and if you're more focused on what's going on around you that pushes you more internally now I think most people are familiar with how to do an interoceptive biased meditation again that would be setting a timer maybe you don't be in set a timer you just sit or lie down close your eyes focus on that third eye center behind your forehead or focus on your breathing or your bodily sensations that's typical and often discussed extra receptive based meditation you pick a focal point outside or beyond the confines of your skin so that could be for instance a point on the wall if you are indoors could be a plant it could be a point on the horizon far away what you will find is that your visual system will fatigue a little bit when you concentrate your visual focus of that location I want to remind you that it is perfectly okay and in fact necessary to blink so you should blink you can relax your face you can change your expression there is no rule that says that you can't do those things this is not you know just be a particular location in space and holding your eyelids open I've been accused many times of not blinking very often that's for other reasons it's part of the way I access memory about what I want to say I don't use a prompt or here so I'm accessing from a sort of an internal image in my head that's how my memory works but in any case if you're going to do an extra receptive bias meditation there is absolutely no reason why you wouldn't look away from that location every once in a while in the same way that if you're focused on internal thoughts with your eyes closed and focused on your breathing every once in a while your thoughts will skip away from that breathing or from your third eye center in fact and this is discussed in the book alter traits but by many other people as well one of the key elements of any meditative practice whether not it's interoceptively focused or extra-oceptively focused is that it's really a refocusing practice the more number of times that you have to yank yourself back into attending or perceiving one specific things in other words the more times your mind wanders and you bring it back actually the more effective that practice is again if you can just focus on one location with laser precision and your mind never darts away from that and you don't have to bring it back well then there's no neuroplasticity nothing needs to change because your nervous system will effectively know it's performing perfectly so if you're somebody who tries to do meditation you find your mind just wanders just remember every time you scruff yourself and pull yourself back to focusing on some location externally or focus back on your breath or your third eye center each one of those tunities to do better they are essential to the improvement process think about them as ascending a staircase of refocusing every time you refocus you're going up one more level another stare another stare another stare and I think that will move you away from the kind of judgmental process of thinking like I can't focus on anything pretty soon what you'll notice is that the refocusing process will happen so quickly that you don't even perceive it and again this is something that's born out in the neuroimaging data a lot of people think that they can focus with laser precision but actually what they are better at doing is refocusing more quickly and consistently over time there's a classic study of about this in very experienced meditaires that was done in Japan where they had people with varying levels of meditation ability so they never meditated others who are really expert meditaires with many hundreds if not thousands of hours of meditation under their belt and they had those people listen to 20 tones repeated over and over the same tone and they found that the expert meditators could really focus and they did this by brain imaging they could really focus on all 20 tones whereas most people kind of a tenuator what's called habituate to the tones that by the 10th or 11th tone their mind is really going to something else now that's wonderful but that really just tells us the expert meditators have better focus but it turns out that the more modern neuroimaging studies have shown that they don't have better focus such that they're staying in a very narrow trench of focus what they're doing is they're exiting focus and going back in more quickly more quickly more quickly over and over again so rather than think about your ability to focus think about your ability to refocus and the more number of times you have to refocus the better training you're getting so earlier I mentioned doing this interoceptive bias or extra-oceptive bias meditation for three minutes why did I say three minutes well three minutes seems like a reasonable number for most people to do consistently once a day and in fact there are some studies of one minute meditations and three minute meditations and 10 and 60 my laboratory has been studying a five minute a day meditation and that clearly has benefits but I think it's also clear that by three minutes many of the benefits are starting to arrive and so well I'm not pointing to any one particular data point here it's very clear that forcing oneself to direct one's perception that is your attention to your internal state or to something external to you is immensely beneficial if you do it consistently and is again especially beneficial if you're focusing your attention on the portion of your experience either internal or external to you that is not the one that you would default to in that moment and some people have taken this to the extreme to say that you can even just move about your day and then every once in a while just do a one breath meditation to be honest when I look at the whole of the data seems as if it doesn't really matter in order to derive most of the benefits of a meditation practice now I'm a big fan of some of the newer meditation apps that are out there one in particular that I've been using and that actually I started using because my dad is a big fan of it and he does now fairly long meditations he's doing about 10 or 20 minutes at least every other day and often every day he convinced me to check out the waking up app that Sam Harris has put out I looked at it I think some of it sits behind a paywall but you can access much of it or at least do a trial and try it out without having to get behind that paywall they're not a sponsor of this podcast I should mention but I decide to use the waking up app I think it's terrific and I think one of the reasons it's terrific is that Sam includes short descriptions of what meditation is doing and what a specific meditation can do for you just prior to doing that meditation so those meditations can be quite brief some of them are a minute long two minutes long some are longer or even quite a bit longer that app I think includes a variety of meditations that really encompasses the huge range of possibilities that are possible with meditation and that at least by my experience of the waking up app has led to my most consistent meditation practice and of course I would love to get Sam on the podcast as a guest so we could talk about the sort of underpinnings of the waking up app and his views on everything from meditation to I know he's big in the discussion about free will and consciousness some of the very deep and somewhat abstract discussions really hope to get Sam on the podcast at a time not too far from now meanwhile we've never met in person but I absolutely love the waking up app Sam and I know my father does as well and I know many of you already use it if you haven't tried it already I really do encourage you to check it out I want to talk just briefly about this third eye center business because it turns out to be pretty interesting the third eye is actually a name that's been given to another neural structure or I should say structure because it's not strictly neural and that's the pineal gland and this has an interesting history I promise I'm not taking off on a tangent here that isn't relevant to meditation so you have a brain of course and on both sides of your brain you tend to have mirror symmetric representations of the same things what do I mean by that? Well you have a prefrontal cortex on the right you have a prefrontal cortex on the left and they actually do slightly different things language is sometimes laterally as to one side but in general for every structure you have on one side of the brain you have the same structure on the opposite side of the brain there's one clear exception to that and that's the pineal gland the pineal gland is the gland that makes melatonin which at night when it gets dark secrete melatonin and that melatonin makes you sleepy it helps you fall asleep but not stay asleep the cart right the philosopher de cart asserted that the pineal was the seat of the soul because it was the one structure in the brain that he saw was not on both sides of the brain it was only one of them and in the middle now I don't know if it's the seat of the soul or not I'm not in a position to make assessments like that but what do we know about the pineal? The pineal as I mentioned is evolved in releasing melatonin it does a few other things as well but it is also considered the third eye for a couple of reasons one is that it responds to light although in humans not directly so in birds and lizards and snakes they actually either have a thin skull or believe it or not two holes in the top of their skull they allow light to go directly in if you look at the head of a snake light can go directly into their brain through these holes and activate the pineal to suppress melatonin and control their wakefulness sleep rhythms in birds they don't have holes in their skull but they have very thin skulls and believe it or not light can penetrate the thinness of those of the skull and many birds and can communicate information about time of day and even time of year and that's translating to hormonal signals such as melatonin release from the pineal and so the pineal has been called the third eye because it's a light sensitive organ inside the brain in humans the pineal sits deep deep deep to the surface and light cannot get in there in fact if light can get into your brain unless you are part of a specific experiment where that's the intention or you're having neurosurgery or something of that sort then you've got serious issues happening that pineal sits deep deep deep near what's called the fourth ventricle and it absolutely should not see light directly so the idea that the pineal is the third eye in humans is not true it just isn't true so anytime someone says oh the pineal is your third eye that's not the third eye center that people are referring to when they talk about meditation now you'll see a number of different forms of art where somebody will be a picture of a face and the eyes will be closed or sometimes open they'll be literally a third eye like a cyclops eye in the middle of the forehead that has been proposed for many thousands of years to be quote-unquote the seat of our consciousness now that's interesting because that real estate behind the forehead actually turns out to be the prefrontal cortex which we know from lesion studies and stimulation studies if you remove that brain area people become very reflexive they are not thinking intentionally they don't become deliberate in fact and this is kind of an eerie result but if you inactivate you turn off the prefrontal cortex and you give somebody the opportunity to play a shooting game for instance their accuracy goes through the roof they become essentially like a machine they see a stimulus they shoot at they see a stimulus they shoot at it their accuracy is exceptional but their ability to distinguish between enemy and friend completely disappears so they become at a highly effective motor or I should say sensory motor machine but their assessment and their judgment about right or wrong completely disappears this is also true for people that have prefrontal damage they often will have inappropriate behavior or a hard time suppressing behaviors etc so the third eye center as the seat of consciousness and our intention is something that makes sense generally with what we know about the neuroscience and neurology but there's something more to it that I think is especially important for all of you that goes beyond anything about ancient traditions or pineals or birds or snakes and pits in the top of the head and here's what it is the brain itself meaning the brain tissue does not have any sensory neurons what do I mean by that well if I touch the top of my hand I can feel that if I want to sense my heartbeat if I work at it I can feel that if I want to sense how I feel internally at the level of my stomach is it full is it empty and my hungry is it acidic it does it acre does it feel pleasant etc I can sense that and that's because we have sensory neurons on our skin and in our body etc we also have sensory neurons in our eyes that let us perceive things externally we have no sensory neurons on our brain this is one of the reasons why you can remove the skull and do brain surgery on somebody who's wide awake and be poking around in there and they don't need any anesthetic on the brain itself they need an aesthetic for the incision site but they don't need an aesthetic on the brain because it has no feeling you have emotions but there's no feeling so normally we are perceiving and paying attention to what we are sensing either externally sites and sounds again external or internally interception touch etc but by focusing our perception are in and our attention not on our bodily surface like a body scan but to a point a couple centimeters or inches behind our forehead we essentially are bringing that attentional that perceptual spotlight to a location in which there is no sensation there's nothing to feel there and when we do that by closing our eyes and focusing on that quote-unquote third eye center which is the prefrontal cortex to be quite honest when we do that something else happens and what happens is when we are not thinking about and perceiving our sensations because there are none there our thoughts and our emotions and our memories sort of mushroom up they more I better way to put it would be that they guiser up and take on more prominence in our perception what I mean by this is that normally I'm not thinking about the contact point between me and this chair but as I'm speaking I'm in contact with the chair and those neurons are firing but if I focus my energy and attention on them they're going to fire the same but more of my perception goes there similarly I'm thinking things all the time you are too and I'm perceiving things all the time and I'm remembering things all the time and I'm anticipating things all the time about the future but by focusing my attention on the one organ for which I have no sensation that is my brain well then thoughts, feelings and memories feelings meaning emotional feelings start to grow in their prominence in my awareness and in my perception and so this is why when you sit down to a meditative practice if it's a meditative practice where you close your eyes or you're focused on that third eye center where you're focused on your brain as opposed to your bodily surface or something external to you the thoughts seem to come by in waves and they can almost be overwhelming it's very hard to as it's often described just sit back and watch your thoughts go by because there are so many of them actually the best way to stop thinking is to really focus on something external or to focus on sensation that's less thinking than it is perceiving senses okay so I don't want this to get too abstract when people talk about the third eye center they're not talking about the pineal they're talking about prefrontal cortex and when you direct your own attention to the very area of your brain that directs attention there's nothing to sense there the only things that will become present to you are feelings emotions that is thoughts and memories and they will often arrive in what seems to be a very disorganized fashion and the reason they arrive in somewhat disorganized fashion is because normally we just don't perceive things that way normally we are splitting our attention our perception that is to multiple things our sensation and our thoughts when we put all of our perception into our thoughts we see how disorganized how wandering they are and how in fact how random and intrusive those can be again random and intrusive and much of what we talked about in that paper earlier the one where they asked people what are you doing and what are you feeling and how happy or how unhappy or you are what they discovered was that most people are sort of in their head a lot they're not really present to what they're doing which leads me to the statement that I believe at least based on the data that paper included that most people have an interoceptive bias they're focused more on what's going on internally than they are focus on what's happening externally there are certainly people who for the opposite is true but I think that this is an issue because we hear so often about the need to do a meditation practice that allows us to focus inward and that we're getting yanked around by all the stressors of life etc etc and we are we're getting yanked around by all the stressors and demands of life but as we do that we tend to be very focused on what's happening with us the data clearly point to the fact that being mindful and being aware can enhance one's level of presence and happiness but we can go so far as to say that being mindful and aware of what's happening not just with us but external to us in our immediate environment that includes what other people are saying and doing that also can really enhance our sense of well-being and happiness at least that's what the data point to let's briefly recap where we've been so far we've talked a little bit about the brain networks that are activated during meditation which include prefrontal cortex, ACC, the insula we also talked about the difference between interoception and extraoception and the importance of assessing where you are along that continuum and I should mention of course that you can be right in the middle of that continuum you might sit down to do meditation and find that you are smack dab in the middle of being able to attend to things outside of you but also attending to things inside of you in which case I suggest doing a meditation that is either extraoceptive biased or interoceptive biased but as I mentioned earlier if you find that you are more quote unquote in your head or in your body will then focus on an extraoceptive biased meditation to build up that set of circuits whereas if you are more extraoceptively focused at any given moment well then I encourage you to do an interoceptively focused meditation practice and as I mentioned earlier there is this issue of how long to do a practice there are a lot of different data on these but some of the practices we've covered on this podcast before when we had guests for instance highlighted the 13-minute meditation that Dr. Wendy Suzuki from New York University's laboratory has popularized and they popularized it because they have a wonderful paper that we will provide a link to which shows that a daily 13-minute meditation which is of the traditional third eye interoceptively biased focus on breathing and focus on that location directly behind one's forehead or both that meditation done daily for about eight weeks maybe shorter but in that study eight weeks greatly improved mood improved ability to sleep improved cognitive ability and focus memory a huge number of metrics were looked at very specifically so that's a terrific one and you may be asking yourself do you need to do the full 13 minutes could you get away with five minutes or three minutes well my laboratory has shown benefits and stress reduction improvement and sleep etc with a five-minute a day meditation however in trying to establish how long you should meditate I would ask yourself a couple of questions first of all what is a practice that you can do consistently and by consistently that doesn't necessarily mean every day if you answer the question about consistency honestly and you find that you can only do one meditation session per week well then I would encourage you to go a little bit longer maybe 10 or 15 minutes maybe even 30 minutes again understanding that you're going to have to refocus repeatedly throughout that meditation regardless of whether or not you're focusing on internal perceptions or external perceptions if however you can set aside five or 10 or 15 minutes per day and you can meditate every day well then I think you have a little bit more flexibility in terms of how long you meditate maybe it's three minutes one day one minute the next day 10 minutes and so on and so forth just like with exercise the key component is consistency and this is born out in all the data that's covered in altered traits it's also born out in all the recent studies that have come out since that book was published consistency is key so ask yourself what you can do consistently and also don't necessarily burden yourself with always having to do the same amount or duration of meditation so earlier we decided we were going to parse or find slice the meditation practice and indeed we've been doing that we've talked about interoceptive versus the extra receptive bias and we've been talking about where you place your perception or your focus another key component of meditation is the pattern of breathing that you embrace in fact the pattern of breathing that you embrace during your meditation practice can itself be its own form of meditation what do I mean by that well these days we hear a lot about breath work breath work has really grown in popularity in the last five 10 years and there are a number of reasons for that first of all we need to credit Wim Hof or can we call him I think appropriately the great Wim Hof you know certainly there were people before Wim who were doing deliberate breath work and talking about deliberate breath work but it was really about 2015 or so that Wim Hof started to grow in recognition and popularity for a particular style of breathing which in the laboratory we call cyclic hyperventilation I know there are other names for it that come from ancient traditions he named it or people named it after him a Wim Hof Wim Hof for those of you that don't know is a Dutchman who is known to hold many world records for deliberate cold exposure including swimming under icebergs long as period of time buried in ice up to his neck etc. but who's also expert in the use of breathing in particular ways in order to manage and maneuver through those challenges and he started speaking about different patterns of breath work in particular the use of cyclic hyperventilation deep deliberate breathing so big inhales exhales big inhales exhales in the laboratory again we call that cyclic hyperventilation it's very clear from studies both done on Wim specifically but on the general population as well by my lab and other labs that that pattern of cyclic hyperventilation a deliberately breathing deeply and repetitively typically in through the nose out through the mouth generates a lot of adrenaline or causes a adrenaline release from the brain and body it quote unquote heats up the body indeed it raises body temperature but the liberation of adrenaline does a number of things to shift the state of the brain and body that more or less is what Wim Hof breathing is although Wim Hof breathing or some people call it tumo breathing or cyclic hyperventilation is not a pattern of breathing typical of most meditations that have been discussed at least not in the research literature now that's not to say that cyclic hyperventilation can't be incorporated into a meditation practice but Wim Hof breathing aka cyclic hyperventilation tumo is typically considered its own practice okay its own breath work practice divorced from meditation it might have a meditative component but it's not often discussed as meditation or as part of meditation more typically a meditation practice involves slowing one's breathing and this could be in the form of cyclic breathing of inhale exhale inhale exhale which is cyclic or in some cases doubling up on inhales and then exhaling so inhale inhale exhale inhale inhale exhale or controlling the duration of inhale breath hold exhale breath hold repeat so called box breathing where the inhale the hold the exhale and the hold are of equivalent durations any number of different breathing patterns slow cyclic breathing box breathing a cadence of three to six seconds in holding for two seconds and seven seconds out regardless of what cadence of breathing one uses there is a tendency during most meditative practices to slow one's breathing and or control one's breathing in deliberate fashion this is essential because when we default our breathing that is when we don't pay attention to how long we are inhaling relative to our exhales when we don't deliberately exhale that is normally we just passively exhale but we actively inhale I repeat that normally when we're not thinking about breathing we deliberately inhale there's a motor command that's sent to inflate the lungs and then we passively exhale but in many breath work practices or meditation practices we actually actively exhale as well when we do that a number of things happen first of all it forces us into interception why because the diaphragm the muscle that helps and move the lungs essentially and create a specific cadence of breathing or depth of breathing as one would with box breathing or deliberately slow breathing well that muscle resides inside of us and so when we focus on our breathing more often than not we aren't focused on the actual air leaving our nasal passages or mouth maybe a little bit but more typically we are forced to focus or we just default to focusing on the movement of our diaphragm or of our belly or the rising and falling of our chest all of that is to say that by deliberately focusing on our breathing we shift to interoception breathing and specific patterns of breathing sort of along for the ride in meditation but the reverse can also be said that when we focus on our breathing we shift to interoception and away from external events doesn't mean we can't still pay attention to external events we can still extra-ocept but at least some portion of our perception of our attention shifts to interoception so we of course need to breathe to stay alive we have to breathe at least every so often in order to stay alive so of course breathing is part of any meditative practice just like it's part of any living activity even sleep but if the first component of meditation is to direct our perception in a deliberate way using that prefrontal cortex to a specific location either on the surface of or within our body or external to our body or both but typically one or the other then we can say that the second element of a meditative practice is the pattern of breathing and we can ask ourselves can it and should it be deliberate or not in other words we just default to however we happen to be breathing or should it be deliberate that is should we be controlling the depth and the cadence and I do believe that based on what we know about the capacity for specific patterns of breathing to shift our brain state that controlling one's pattern of breathing during meditation can be enormously useful and that is true regardless of whether or not one is focusing on interoceptive perceptions within our body or extra-oceptive perceptions so that raises the question how should we breathe during meditation well there's again no simple one-size-fits-all rule there but there are some general rules of respiration physiology that can help us access and develop a meditation practice that is going to best serve our goals and since this is not an episode all about respiration and we will do one but I simply want to give you the basics of what respiration can do to shift your brain and body state before I do that however I want to give a very specific instruction which is when you sit down to meditate or if you're going to do your meditation walking that's fine too I should just say when you are about to begin your meditative practice you need to ask yourself a question do you want to be more relaxed than you are at present or do you want to be more alert than you are at present when you exit the meditation practice do you want to calm down or do you want to become more alert simple question you can decide from session to session you could even switch within a session but just as you need to assess whether or not you are leaning more interoceptively or extra-oceptively you also need to ask yourself do you need to calm down or want to calm down or do you want to be more alert at the end of your meditation session or maybe you want to go into a state of deep relaxation and then exit with more alertness the way to do that is very simple using breathwork and specific patterns of breathing and here is the general rule that is supported by all the respiration physiology that I'm aware of I'm oversimplifying here but I'm oversimplifying intentionally so you can simply apply the tool and then as I mentioned before we will do an episode all about respiration physiology in the future essentially if your inhales are longer and or more vigorous than your exhales then you will tend to be more alert or you will shift your brain to brain body towards a state of more alertness this is simply based on the way that the neural circuits like the pre-botsing or nucleus and the paraphacial nucleus they govern respiration physiology and alertness simply the way they work they communicate with brain areas that release nor adrenaline nor epinephrine etc. in contrast if you emphasize longer duration and or more vigorous exhales relative to your inhales you will tend to relax more you will tend to calm your nervous system now you might be saying okay I understand what it is to make an inhale longer than my exhale but how do I make it more vigorous what simply means drawing more air into your lungs more quickly than you allow yourself to exhale that air so an example of inhale biased breathwork would be so there's an active emphasis on the inhale and it's a little bit longer than the exhale which is passive conversely if you want to relax then you want to extend your exhale relative to your inhales and you can even make them active exhale so it can be inhale exhale that's going to shift your nervous system in a direction of more calm and of course if you would like to stay at the level of alertness aka calmness because those are two sides of the same seesaw or the same continuum if you'd like to be right where you're at at the end of your meditation as where you started at least in terms of levels of alertness and calmness well then you would just keep your inhales in your exhales relatively balanced in terms of duration now the introduction of things like breath holds with box breathing or Wim Hof breathing typically it's 25 or 30 deep inhale exhales deep inhale exhales and then exhale all your air hold your breath for 15 to 60 seconds and then repeat and so on sometimes some inhales and holds well that's a whole business into itself but for sake of meditation the key thing to understand is that if you are going to do a complicated breathing practice it will by design by necessity shift much of your attention to the breathing practice especially if it's not cyclic if it's not inhales follow exhales cyclic breathing is where inhales always follow exhales follow inhales follow exhales actually relies on a specific brain center called the pre-bought senior complex discovered by Jack Feldman at UCLA he was a guest on this podcast previously however if you are doubling up on your inhales so two inhales and then an exhale a pattern of breathing my laboratory has studied extensively well that that relies on a different brain center the paraphrasial nucleus the point is that if you are engaging in non cyclic breathing or you are deliberately emphasizing inhales or exhales or the vigor of inhales and exhales etc well then some portion of your attention will be devoted to making sure that you follow that breathing practice we are very good at going into cyclic breathing practices by default our attention can drift to other things interoceptive or extraoceptive doesn't matter we can just drift into you know how our body feels or something we see or hear in the room etc when we are focused on our breathing and the breathing pattern is non cyclic or complex in some way in that it involves deliberate voluntary commands again from those so-called top down mechanisms of the prefrontal cortex well that by design requires some portion often a significant portion of our attention to be devoted to the breathing practice itself so what does this mean this means that breath work itself can be a form of meditation and meditation can involve breath work but one should know that the more deliberate and unnatural that pattern of breathing is the less you will be able to focus on other things now this isn't necessarily a bad thing you can actually leverage this so for instance if you are somebody who is very much caught in your own head we talked about this earlier you have to be or you are in a moment where you are really stuck in your head and you want to get out of your head well then that meditation practice that you do really should be focused on extraoceptive bias you should really focus on something external to you and I would encourage you to use a natural cyclic pattern of breathing where exhales follow exhales follow exhales if however you are finding that you are sort of caught in the landscape of things happening around you and you want to ground yourself as it sometimes called that's a loose language not a scientific language I know there is this practice of grounding and that's a whole thing people always writing to me is grounding a real thing walking barefoot on the earth and magnetic fields and gravitational fields will gravity is real but grounding there is a lot of science for it to be frank does feel nice to walk on the ground however but if you are somebody who is feeling pulled out of yourself a lot or in a moment and you want to bring your awareness into your body and sort of calm down well then I would encourage you to yes use a deliberate somewhat unnatural or non-default pattern of breathing which by definition will force you to attend to what's going on interoceptively again I'm not aware of any place that this has been discussed in detail such as this before if there is a research literature on this please let me know my laboratory has been working on this extensively I'm always looking for new colleagues and collaborators we meaning Dr. David Spiegel who is an expert in hypnosis again who has been a guest on the human lab podcast and my colleague is Stanford Psychiatry, Pakistan is our associate chair of psychiatry, a world expert in hypnosis he has been on this podcast before we have an active research program focused on these issues we are very much of the belief that a breath work practice itself can be meditative meditation practice can include breathing but the more that that meditative practice focuses on the breathing itself the more interoceptive biased it will be now it's very important to understand that an interoceptive biased breath work practice will have a specific effect which is to make you more interoceptively aware and if you think back to the earlier in the episode for many people that will be a wonderful thing and something that they are actively seeking or ought to seek because it can help people gain awareness for instance if you know if they're stressed and they're not realizing it till the end of the day they're just exhausted more interoceptive awareness throughout the day can be very beneficial if however you are somebody who is overly focused on your bodily sensations well then more extraoceptive awareness is important and this brings us to a yet larger theme but a theme that I think really emphasizes what particular types of meditative practices are going to be best for certain people especially people who are using meditation to combat certain challenges in particular mood based challenges or sleep based challenges or focus based challenges I haven't listed off all the positive benefits of meditation yet in this episode but they are many many many in fact there are now tens of thousands of scientific studies showing for instance there are known benefits of doing meditation for enhancing sleep there are known benefits of a regular meditation practice for enhancing focus there are known benefits of a regular meditation practice for reducing inflammatory cytokines even improving outcomes in cancer reducing pain, improving mood, reducing the symptoms of ADHD and clinically diagnosed ashy and on and on and on and again rather than focus on all those beautiful studies today which all basically point to the fact that some meditation practice done regularly even if it's very brief has tremendous even outsized benefits on our health even relative to some drug treatments that's been shown rather than focus on all that I've been more focused on what sorts of brain and body changes occur when we do a meditation practice and perhaps more importantly what really constitutes a meditation practice we have this thing about a continuum of perception we also now are talking about breathing well there's another component that I'd like to raise now which we could say is the third major component if the first one that I raised was interoceptive versus extraoceptive bias or continuum second being breathing is it going to be default or deliberate breathing is it going to be natural cadence or unnatural cadence again no right or wrong it just depends on what your goal is there's a third component and this is a component again that hasn't really been formalized in the literature but that Dr. Spiegel and I are working hard to formalize through some research and through an upcoming review that we will provide links to once it's out and that's a separate continuum which is the continuum between interoception and dissociation so now all of you know what interoception is but most people probably don't know or don't realize what dissociation is often we hear about dissociation sometimes called disassociation some people pronounce it dissociation guess what despite being corrected many times for each of those pronunciations I checked with my colleagues who are experts in dissociation or disassociation and guess what they're the same thing tomato tomato potato potato so I'm going to say dissociation some people say disassociation like I disassociate other people say I dissociate okay both of those refer to essentially the same thing disassociation is often talked about in the context of a negative event and indeed dissociation is unfortunately or I should say is adaptively associated with traumatic events in particular violent or sexual trauma people report feeling out of body or out of the experience during the experience or during a recollection of the experience dissociation has also been described in terms of people who are in a traumatic accident or they see someone killed right in front of them first responders will talk about dissociating when they arrive on a scene I don't want to provide you know gruesome imagery here because I know people can be pretty sensitive to this but you know showing up on a scene of a car crash and just seeing carnage or incredible damage to bodies or you know this sort of thing dissociation lies at the opposite end of a continuum with interoception now earlier I said the interoception is on the opposite end of a continuum with extra reception but it also is on the opposite end of a continuum with dissociation we can provide some better definitions perhaps to make this crystal clear and here I'm actually reading from an upcoming review I feel comfortable reading from it because I'm an author on the review but nonetheless interoception refers to a process by which your nervous system meaning your brain and connections with your body senses interprets integrates and regulate signals originating from within the body and thereby provides moment to moment mapping of your internal landscape at both a conscious and unconscious level okay that's a lot of words to describe basically the process of perceiving what's happening at the level of the surface of your skin or inward dissociation can be thought of as the opposite of interoception it's a lack of bodily awareness or a removal of one's conscious experience from one's bodily experience and awareness again this is most often talked about in the context of something traumatic but really if we think about health and mental health and physical health the optimal place to reside on the continuum between interoception and dissociation is somewhere in the middle we don't want to be dissociated from life's experiences but we also don't want everything that happens in the world to profoundly impact our heart rate and our breathing we'd be yanked around by every experience okay there are instances in which being yanked around or pulled into an experience is something that we desire and want like seeing a movie that we want to see or for instance clinical hypnosis or falling in love wonderful experiences and sometimes also sad experiences right being able to feel one's feelings depending on life's events is important but being too dissociated or being too feeling that is feeling so much in response to everything that happens is also problematic there are certain people for instance that have challenges with what's called narrative distancing that is they see someone in a movie getting hit and they almost flinch as if they are getting hit they see someone who's scared or happy in a movie and they feel scared or happy in a way that seems like they're along for the ride a little bit too much this is important because what it speaks to is the ability for that remember way back to begin the episode that ACC that intersingulate cortex and the insula we've got a prefrontal cortex that can say hey let's be rational that movie that person who's happier sad that person in your environment who's breaking down crying yes they're sad it's important to be sympathetic maybe even empathic towards them but let's not get pulled into the experience so much that we lose ourselves and then of course there are areas of your brain that are also leaning on and here I'm using metaphor but they're leaning on the insula in ACC and saying hey there's somebody that I care about that's upset I'm also going to be upset or somebody I care about is happy I'm also going to be happier they're scared so I'm also going to be scared so it's a push pull between our recognition that we are each distinct entities and also of course the very healthy desire to be attached to others experiences and the experiences around us so why am I raising yet another continuum right we already have the one continuum of interceptive extraceptive awareness well if we want to think about how meditation can serve our mental health and our ability to focus there's a very particular mental model that we can arrive at that incorporates this interceptive dissociative continuum again if you are extremely interreceptive you're feeling everything in your body and those feelings in your body nearly completely account for all of your experience if you're that far into the continuum and the dissociative end of things you can see what's going on you can react to what's going on but your bodily response to that is essentially shut down you can either be paralyzed shut down so it kind of no movement or you could still be engaging in behaviors but you're dissociated again sadly this is often what victims of trauma report that they are able to just go through the motions but just shut off their emotions or their emotions just shut off they aren't feeling the elevated heart rate or breathing sometimes they can even be quite scared but they're not even perspiring or showing any signs of autonomic arousal that is right or stress or panic so let's talk about this model of interception and dissociation and then a meditative practice that can be used to try and anchor us at the right location or the healthy location along that continuum let's first imagine the ideal mental health state and here I want to acknowledge nobody achieves or at least maintains this mental health state once you do imagine that where you are along this interoceptive to dissociative continuum is like a ball bearing or you represent a sphere that can roll back and forth along the continuum at one end you have pure interception you're just feeling everything at the other end you're completely dissociated well in this one version of the of mental health we take that continuum and we fold up the sides so that it looks like a V on one end you have interception the other and you have dissociation I realize a number of people are listening to this not watching this on YouTube so they can't see that my hands are now the heal my hands are together my fingers are my hands are apart so it looks like a V and you are like a ball bearing your state is like a ball bearing at the base of that you are in a trench of perfectly balanced interception and dissociation you can feel things you can register what's going on in the outside world but your feelings are not overwhelmed or overtaken by what's happening in the outside world you are in a perfect place of being able to make rational decisions and yet still feel your feelings wouldn't that be lovely wouldn't that be lovely if we could be like that whenever we wanted to and frankly nobody is like that all the time more typically the model of mental health and mood and well being and perception of self versus others and internal versus external states is one of more of a you a you shape where at one end we have interception and at the other end we have dissociation and it's kind of you shaped and your state is more or less like a ball bearing at the base of that you that can you know it gets pushed from side to side maybe your you know your heart races a little bit because of something bad or good and that ball bearing shifts towards interception a little bit more you notice that your heart is racing or perhaps at any given moment you know your mind drifts a little bit while watching a movie or while talking to your partner or while your child is complaining about something and you're thinking about something else and that ball bearing shifts towards the dissociative state a little bit that is a mild form of dissociation and I think most people agree that being mentally healthy would involve this kind of you shaped model as well where it's kind of can shift back and forth but it's not extreme you're not going from an iriseptive biased all the way to dissociated in any kind of extreme way the ball bearing stays down your the base of that you then of course there states that we all frankly go into from time to time where the continuum of interception and dissociation is essentially flat where you are ball bearing at one location or another depending on whether or not you're watching a movie that you're very engrossed in or you're in a conversation with or in an activity with your partner or a friend etc that you very engrossed maybe matching their state right there are a number of states you can imagine we're matching one state is actually healthy and good and there are a number of conditions in life and situations in life where being matched to someone else's condition like you're getting yelled at and they're angry so then you're getting angry and then pretty soon you know you're not in the best place along that continuum and I think that for many people they find themselves somewhere along that continuum and a number of practices including meditation including exercise including getting a good night sleep including therapy including journaling including just doing activities like social engagement that you enjoy are designed to sort of bring up the edges of that flat continuum into more of a you or concave shape so that that ball bearing meaning your state of awareness and your state of feeling your own feelings versus paying attention to what it's going on around you is somewhere again biased toward the middle by curling up the edges of that continuum on either end it biases that state toward the middle and then of course there's the extreme that I think almost everybody would agree is more or less pathologic which is one in which that continuum is no longer shaped like a deep trench like a V it's not shaped like a U it's not flat with the edges curled up a little bit or even flat it's actually now convex it looks like a mountain shape a peak and that little ball bearing at the top can either drop all the way to one side of pure interception feeling beyond any ability to pay attention to anything else just feeling one's feelings being angry being sad being or even happy right being so extremely happy or manic that you can't pay attention to the fact that it's totally out of context you're right inappropriate for what's going on around you or dropping to the other side of the continuum where you're so dissociated that you're not engaged with what's going around you you're truly quote unquote checked out that shape is one that I think almost all clinicians if not all clinicians and most people would say is pathologic because you are either completely checked out or you are completely absorbed in what's going on within you or around you that mental model that I just created is a simple mental model it is by no means exhaustive but it does incorporate a lot of what we think about when we think about mental health and we talk about the ability to be mentally stable to feel one's feelings but to still be actively engage what's happening around us and again it's a continuum that spans from interoceptive awareness to dissociation where the extremes are pathologic and somewhere in the middle is healthier and then there are practices that bias us toward being in the middle by default what are those practices well we know for sure that being sleep deprived for instance tends to take us away from that trend shape or you shape continuum or even flat continuum and starts to make that continuum more convex it tends to make us either feel like we're completely checked out and exhausted or that we are completely lay by all we are yanked around by whatever experience is happening we're just not able to manage so sleep is as I always say the fundamental or foundational layer of mental health physical health and performance because it tends to put us in a healthier place that is when we're getting enough quality sleep consistently it tends to put us in the middle of that continuum sleep deprivation does exactly the opposite it pulls us apart when I say pulls us apart that's not a real term what it does is it tends to make that continuum less concave right less bowl shaped and more confects more hill shaped if not a peak mountain shape where it drops us to one side or the other in addition a meditative practice done regularly because it can allow us to become more interoceptively aware or it can allow us to become more extra perceptively aware which is really just another form of dissociation again dissociation isn't always bad provide it's not at the extreme a meditative practice can actually teach us to deliberately move along this continuum so this is something again that hasn't been discussed a whole lot in the literature it's been discussed I should say in pieces in different literature if you look in the clinical psychiatry literature there's a wonderful collection of studies and reviews that will say that interoceptive awareness is terrific except for the person that is so aware of their internal functioning that they are not able to engage in the world similarly you'll find a beautiful literature research and clinical literature that will say that dissociation is terrible in the case of trauma in fact it can put people in positions of repeating a behavior over and over that's damaging to them but because they can disengage or they're dissociated from it that they continue the behavior or dissociation can be very adaptive and beneficial if it allows people for instance to create some narrative distancing so they're not getting pulled into every argument or if someone screams at them they don't necessarily think that it's their fault they are able to say hey wait use their prefrontal cortex and say hey wait just because you're upset does not mean that I did something wrong let's look at the evidence rationally okay so in thinking about the positive effects of meditation on mood there are two aspects that are important the first one we talked about earlier which is being present to one's experience correlates with increased happiness having your mind wander having your default mode network be one of mind wandering actually is correlated with being more unhappy now was the earlier study that we talked about that study published in science now of course meditation can make us more present but if we do not pay attention to whether or not we are becoming more present to interception or extra reception that is to interception or dissociation and we don't pay attention to whether or not our biases one of dissociation versus interception we don't know where we are in the continuum well then the meditation actually can make things worse not better in other words if you're somebody who has a tremendous amount of interoceptive awareness well then meditating on your internal state may not be good and actually there's some evidence that it may actually be bad I'll give you one little tiny example I've talked about this previously the podcast but in that very study from Wendy Suzuki's lab showing that 13-minute day meditation is beneficial for focus mood etc. it's also very clear that for a number of people that do that typical third eye meditation for 13 minutes a day if they do that too close to sleep or when they want to go to sleep they have a hard time falling asleep which makes perfect sense because they are becoming more interoceptively aware they are ramping up their level of focus a meditation practice typically is a focus and refocus practice and falling asleep involves turning off your thoughts and your focus and focusing purely on sensation and then your thoughts kind of fragment and you drift off to sleep this is why I'm a big fan of using non-sleep deep rest or yoga knee-dra we will provide links to non-sleep deep rest and yoga knee-dra protocols I've talked about the me on the podcast before but those protocols are not meditation per se they tend to to have people defocus they are anti-focus practices whereas meditation tends to be a focusing practice along those lines a meditation practice that is one that is extra-oceptively biased where you focus on things that are outside your body can be wonderful for somebody who tends to focus too much on their inner landscape and their inner narrative etc can help get them out of their head and body which can be very beneficial but for people that are not in touch with their emotions aren't in touch with how they feel it actually can drive them down the exact path that's wrong for them so today's discussion is about meditation and we want to make sure that we are parsing meditation in a rational way that matches the neural circuitry involved and more importantly for sake of practical purposes that you are asking yourselves the right question are you interoceptively or extra-oceptively biased do you tend to dissociate or do you tend to feel everything in a big way I've heard this term of hypersensitive people or things that sort and some of those are clinical terms some of them are not but you need to assess this and you also need to assess where you happen to be at on a given day which will be dictated of course by how well you slept life experience etc so this interoceptive to dissociative continuum is one that you need to address prior to any meditative practice and again the solution or the answer of what to do in response to your answer of whether or not you are more inward focused or outward focused again is very simple just do the opposite of where your bias lies that is if you're tilted towards interoception do an extra-oceptive focus practice if you are more dissociative and you're that sounds sort of pejorative it sounds bad right but again this if you are somebody who is more focused on events outside your body and you want to gain more interoceptive awareness and feeling state if you will then you want to do a practice that's third eye center practice or breathing focused one of the reasons that many people meditate is that they've heard before or they've experienced that meditation can replace sleep or can reduce one's overall sleep need that's an interesting set of questions and it's one that I dove into the literature to pursue an answer to and I came up with an answer that was frankly a little bit complicated on the face of it boils down to some very simple protocols that I think any and all of us can leverage in order to sleep better and maybe even reduce the total amount of sleep that we need something that I think most people would want I you know I realize that we all probably should enjoy sleeping I certainly do but that it's hard to get enough sleep and wouldn't it be wonderful for instance to be able to get by on a little less sleep and still feel alert and rested first of all I want to point to the recent study and then again this is one that I've raised a few times and we'll post a link to it entitled brief daily meditation enhances attention memory mood and emotion regulation in non experienced meditators this is the work again from when he says isuki who was a guest on the human lab podcast who is now the dean of arts and sciences at New York University and has run a laboratory focused on memory for a long times terrific neuroscientist and researcher and teacher etc and was a terrific guest on the podcast I keep returning to this paper because they used so many measures they were very thorough and the results were really interesting again this is the 13-minute day guided meditation session I should be able to see the information that the control group in this study listen to a podcast for 13 minutes that did not improve attention memory mood emotion regulation etc as much as meditation did which is not to say that podcasts aren't useful I won't mention which podcast they use fortunately it was not the human lab podcast which I like to think at least increases understanding of certain key concepts of science and science based tools look at the paper and see which podcast they used it's a quite well known podcast which is an interesting podcast but it didn't change the brain in any fundamental way in this 13-minute session whereas 13 minutes of daily meditation did and again something I mentioned earlier but very important to reemphasize now is that they mentioned that if people in the experiment meditated too close to bedtime they had trouble sleeping again which makes sense because meditation at least in its most common form used in this paper is a focusing and refocusing exercise falling asleep involves focusing less there are other studies however that have shown or that asserted rather that doing two 20-minute sessions per day of meditation can reduce the need for sleep those results are debated first of all understanding what sleep need is is very individual and determining what people can manage on meaning some people can manage to get by with six hours of sleep but would do better with eight some people would actually manage probably better in terms of focusing and alertness if they slept a little bit less because they might be waking up midway through a sleep cycle if you want to learn more about this you can check out any one of three different episodes that we've done one is master your sleep you can find that at huberman lab calm everything is time stamped in that episode the other is perfect your sleep and then of course we've done episodes on sleep with expert guests like Dr. Matthew Walker from UC Berkeley all of those can be found at huberman lab calm and all formats they're all time stamped with that said this assertion that has been made many times over and certainly in the popular press that regular meditation can reduce ones overall sleep need is controversial for the following reason some groups find that indeed that is the case and the interpretation is that the stress reduction that's brought about by regular meditative practice and in this case very regular tends to be one or more typically two 20-minute per day meditation sessions that's quite a lot I think for most people if you think about 40 minutes is in that much time overall but very few people will stick to that twice a day 20-minute meditation practice very consistently well the idea is that the stress reduction which is clear and not debated brought about by that type of meditation practice is good at offsetting some of the cortisol increases associated with reduced sleep and leading people to be able to function cognitively and physically better on reduced sleep than they would have a not been doing the meditation practice so the simple way of putting this is that if people meditate regularly that's reducing stress the reduction in stress is reducing cortisol again cortisol is healthy but it should be restricted to early part of the day you don't want too many peaks in cortisol especially not late in the day by meditating you get the healthy pattern of cortisol release you sort of inoculate yourself somewhat against the unhealthy pattern of cortisol release and as a consequence either the sleep that people get is deeper and or the total amount of sleep that they need is reduced now a lot of people took that result and interpreted as saying well if you can't sleep then you can just meditate so one night you don't sleep or you have trouble sleeping you just meditate the next day and you'll be fine certainly that is not supported by the literature however there is a practice and again it's one that I've talked about on this podcast many times before but if you haven't heard me talk about it there's a practice called yoga needra which literally means yoga sleep it is a practice of doing not so much a focus meditation but more of a body scan focusing on the sensation of the body and actually trying to turn off that prefrontal cortex or reduce its activity yoga need your scripts can be found on YouTube and elsewhere they are paralleled by a similar practice that I've talked a lot about called nsdr non sleep deep rest I put one out into the world a short one that's 10 minutes long you can just simply go to YouTube and put in nsdr in my last name he never meant there's one there again all of this is completely zero cost yoga needra nsdr have been shown in a fair number of studies not as many has been done on traditional meditation or I should say third eye centered meditation or mindfulness meditation but have been shown to replenish levels of certain modulators like dopamine and reduce cortisol reduce a stress hormone at least as much and by my read of the literature significantly more than with traditional meditation and there's a nice paper that we will provide a link to which is entitled yoga needra practice shows improvement in sleep in patients with chronic insomnia a randomized troll trial basically this study looks at as the title suggests people with chronic insomnia although the results certainly carry over or would carry over for people who don't have insomnia the key result I believe in this paper although there are many is that quote salivary cortisol reduced statistically significantly after yoga needra what do I mean by that there was a statistically significant reduction in cortisol levels the stress hormone immediately after the yoga need your practice that we believe would be paralleled by very similar if not equivalent practice of nsdr nsdr is a lot like yoga needra but removes a lot of the kind of what's just called the sort of mystical language and the intentions it focuses more on the physiology and the body scans there you know I want to acknowledge that yoga needra has been around for thousands of years and was certainly there before nsdr I also want to acknowledge that in this was brought up also in altered traits that sometimes language can be a barrier toward people embracing practices fact this was recognized by john kabat's in when he created what he called mindfulness based stress reduction practices or mbsr which was simply mindfulness meditation to reduce stress but he called it mbsr mindfulness based stress reduction as a way to bring it into the clinics that would otherwise perhaps be averse to something called mindfulness meditation again this gets more to the sociology and the cultural aspects then it does to any specific utility of one practice versus another here's the takeaway point if you want to get better at falling and staying asleep or falling back asleep if you wake up in the middle of the night or if you are generally challenged with sleep issues an excellent behavioral practice for which there are terrific data meaning data that show that a stress hormone cortisol can be significantly reduced as well as certain neurotransmitters can be replenished as well as and this is key uncovered in this paper that I mentioned a few moments ago on yoga needra that the total amount of sleep that you need can be reduced at least somewhat well then yoga needra or an nsdr practice done frankly any time of day is going to be beneficial whereas if your goal I believe is to increase your ability to focus to improve your mood and perhaps most importantly to be able to maneuver yourself in a deliberate way along that interoceptive or interoceptive dissociative continuum that we've talked about so much and to really shift your default mode network from one of being a mind wander to somebody who can focus and who frankly is happier will then a more traditional third eye center typed meditation or a more traditional extraoceptive focused meditation would be beneficial again which one of those you choose either focusing inward or focusing on a point outside of you again should be dictated by whether or not you tend to be interoceptively biased or extraoceptively biased but if you want to get better at sleeping you want to get better falling asleep and you want to replace sleep that you've lost I put that in quotes so that my colleagues like Matthew Walker don't come after me with what would you come after we met probably within alarm clock and I don't know blankets in a pillow or something of that sort in all seriousness it's very clear that replacing sleep that we've lost is an area of research that still active on ongoing but nsdr and you're going to need you are very promising if not down right useful for replacing sleep that you've lost certainly the small amount of data that exists now point to the fact that they are not the least of which is a beautiful study published out of skin and a via showing that a 30 minute yoga nidra aka nsdr practice can replenish levels of dopamine which puts people in a position to be more action oriented and focused etc when they come out of the yoga nidra so certainly very useful practice it's a form of meditation we could call it meditation ish but yoga nidra and nsdr not typically what people think about when we talk about meditation of course this is an episode about meditation the reason I bring up yoga nidra and nsdr is that many people meditate to enhance their sleep ability to reduce their total amount of sleep need it appears that meditation is probably not ideal for that in comparison to yoga nidra nsdr but meditation is excellent if not superb for adjusting the default mode network toward more happiness by being more mindful and present and for placing oneself in that healthy model of interoceptive dissociates of continuum so we covered a lot of information and I like to think that I've given you some key decisions to make in developing a meditative practice the most important one of course being what will you do regularly and maybe you're somebody who just answers that question by saying look I'm not going to meditate regularly I just want to do the thing that's going to allow me to feel rested when I'm tired and it's going to allow me to adjust my state of mind when I'm not where I want to be for whatever reason to anxious or too exhausted etc and for those people I would say a practice like nsdr yoga nidra will be immensely beneficial as will a more traditional form of meditation I also want to just remind everybody that an app that guides meditation also with some information and some intention setting such as the waking up app from Sam Harris can be immensely beneficial I've certainly found it to be beneficial I know millions of other people have as well so I encourage you to check that out. We talked about determining where you are on these continuum of interoception and extra reception in order to dictate what particular type of meditation practice you should do in a given moment whether or not you should focus your vision inward with eyes closed or focus your vision and your attention outward being a key component whether not you should do cyclic breathing which will allow your focus to be off your breathing somewhat easier than if you do non cyclic breathing if you're doubling up on in and hills or excels whether or not your breathing is going to be natural or not and of course you need to determine whether not your meditation practice is designed to enhance your level of focus or to relax you I would say that if it's designed to enhance your level of focus that doesn't necessarily mean that it won't be relaxing you could be very relaxing and yet it's a focus and refocus practice where something like yoga needra and NSTR is going to be more along the lines of replenishing yourself replacing sleep that you've lost or maybe even reducing your sleep need on previous podcasts I've talked about hypnosis and particularly the episode with Dr. David Spiegel or associate chair of psychiatry I don't want to get into hypnosis now but just understand that hypnosis is distinct from breath work from yoga needra from NSTR and from meditation even though it includes some of those components like focusing your attention it involves actually directing your visual attention outward than inward to go into the hypnosis involves some breathing of a particular kind involves a specific imagery etc but hypnosis is distinct because hypnosis is really designed to fix or address a specific problem whereas meditation NSTR yoga needra etc typically are not they can help fix problems such as anxiety sleep issues etc but they generally are not directed toward a particular line of thinking they can be but typically they are not whereas hypnosis almost always especially in the clinical context not stage hypnosis but the clinical context for which there's a lot of research to show it can for instance help with quitting smoking literally a quadrupling of the effectiveness for smoking cessation with something like the reverie app then if people just try and go cold turkey or for reducing insomnia or for reducing pain or for any number of things including trauma etc hypnosis is really great at dealing with specific issues and problems and tackling those meditation tends to be focused on other things no pun intended I'm guessing some of you are probably wondering where to start or if you're already an avid meditator where to go with all this information for that reason I just wanted to offer you a particular form of meditation that incorporates all of the features that I've talked about up until now in a single meditation practice and it's a meditation practice that for lack of a better name I called STB or space time bridging and the time component has to do with a very simple fact which is when we focus our attention visual attention or otherwise on things close to or within our body we tend to be fine slicing time you can sort of think of your breath as more or less the second hands on your clock of existence whereas when we tend to focus on things far away from us we tend to parse or carve up time with in bigger bins if you've ever seen a airplane flying at a distance it looks like it's moving very very slowly if you were right up next to that airplane it's probably going five or six hundred miles an hour it would go by very quickly this is not a coincidence believe it or not how you slice the time domain of your life and your experience has everything to do with your vision and the closer things are the more finally you slice up time the more closely your attention is placed on yourself the more closely use slice up time if you focus your visual attention very far or you think about the other side of the world for instance and you envision that well then you're actually slicing time more broadly hopefully that makes sense fine slicing would be like slow motion higher frame rate looking in the distance you're actually taking bigger time bin so even though things look like they're moving more slowly it's because your fidelity your precision of measuring time is actually not as good as if you only have the hours hand on the clock so it seems like it moves very slowly hopefully that makes sense to you so there's a meditation practice that I call space time bridging that incorporates everything that I've talked about today it balances interoception and extraception it balances interoception and dissociation and it crosses the various time domains that the brain can encompass using vision and it's a very simple meditation it's one that I've been doing for years and it's one that we're starting to do some research on but I'm just going to share with you because I think it's actually quite fun and can be quite informative in fact people have told me that it can even lead to some interesting insights both during the meditation and be and outside the meditation it's very simple what you do ideally you would do this outside or at a window but what you do is you essentially close your eyes I'm not going to do this now I'm not going to close my eyes and do the meditation but I'll describe it you close your eyes and you focus your attention either on your third eye center or your breathing and you try and put 100% of your perceptual awareness on to your breathing or your third eye center for the duration of three breaths so you're 100% or trying to be 100% in interoception then you open your eyes you focus on the surface of your body someplace I find that holding out my hand at sort of arm's distance and focusing on the palm of my hand and focusing there visually so I'm splitting my attention now between my hand and I'm also going to pay attention to my breath for the duration of three full inhales and exhales while also focusing on my hand so you're splitting interoception and extra reception as best you can about 50-50 then you subsequently look at some location in your immediate environment maybe 10-15 feet away and you focus your attention on that location while also splitting your attention so that you're still paying attention to your breathing you do that for the duration of three breaths but now you are in extra reception and interoception then you focus your attention at some distance further away maybe the furthest distance you can see now this is why it's useful to do out of a window or on a balcony or outdoors you focus on the furthest point maybe a horizon some furthest point for the duration of three breaths while also paying attention to your breathing and sort of imagine a bridge between the two if you if you find it to be challenging to focus on both and then and this is where it can be a little tricky but then what you actually focus on is the fact and this is not an imaginary thing this is a fact that you are a tiny speck on this big ball that's floating out in space right the earth that's floating out in space and you try and focus on your three breaths while also acknowledging that you are a small body literally on this very seemingly large body the earth but that's floating in a much larger, larger, expansive place the universe and you do that for three breaths and then you close your eyes and you go right back into interoception and you might want to and you do that for three breaths focus on your interoception for three breaths and you might want to march through these different locations a few times or back and forth if you like but typically I will just do it for one segment at pure interoception palm of hand some distance in front of me horizon whole globe universe thing back into body etc. why is this useful why would this be useful why is it at all interesting or is this just some crazy idea well the reason it's useful I believe is that it has you deliberately step your awareness your perception through every position along that interoceptive extra you can see that the most effective continuum now I did say to remain connected to as they'll say in the yoga classes aware of I guess would be the more scientific way to state it aware of one's breath but if you wanted you could actually try and put your awareness completely outside yourself but most people will find that challenging to do if they're already paying attention to their breath is just hard to do so I find it easier to just split my awareness from interoception to extra by stepping through these different locations and then deliberately placing your perception your awareness back into pure interoception what you do is you essentially are practicing or exercising this incredible ability that the human mind has to deliberately place your perception at specific locations along the interoceptive extra receptive continuum and I think this is very useful because many of us including myself tend to get locked at one location along that continuum for instance if you're scrolling your phone for a long period of time you may forget about your bodily sensations but you generally forget about other things going on in the world or if you're very focused on things out in the world you oftentimes can forget about your internal sensations and what's going on internally and being functional in work and life in relationship and in all aspects including your ability to fall asleep involves stepping yourself along these different locations which again are not just physical locations of third eye center or your breathing or your hand or horizon those are just stations within space but remember each one of those just by way of how your visual system and the time domain are interlocked with one another sets your mind in a particular time domain and so much of what involves being a functional human being involves dynamically adjusting our attention from what we are doing on our computer to a question somebody asks and then back again or from text messaging to listening to a lecture or a podcast or from listening to a lecture or a podcast and then going back into a mode of commuting but making that commute either relaxing or maybe do work on your commute or connect with family or friends etc so much of the fatigue of life and the I should say the maladaptive behaviors and emotions that show up in life are really not about any set of behaviors or emotions being wrong or right but rather inappropriately matched to the space time domain that we're in which again is just fancy nerd speak for saying being present and being mindful is a wonderful byproduct of a meditation practice but it is but one of those stations along that space time continuum the key element here is to step yourself through practice deliberately so that you are flexibly and dynamically able to engage in conversation then disengage and focus or focus and then disengage from the work you're focusing on and actually have a conversation or be in the world and move out of that interceptive awareness to one in which you are dynamically engage with the things around you realize this might sound a little bit vague for that reason I encourage you not to think about it too much but rather to try the practice see if it works for you if it doesn't that's fine I think it is a good one for people that find that a third eye center or breathing focus and the concept of meditation might be enjoyable to them or very beneficial to them but they might want to try something new and other people might find that that tends to put them too much in their own head I think it also ought to be very useful for people that tend to be overly extra active more than the dissociative end of the continuum and need to bring in a bit more of interceptive awareness but either can't do that or uncomfortable doing that because they're simply not interested in or comfortable with feeling so much of their internal state because that can either be overwhelming or that's just simply not the way they want to feel now as we round up I do want to acknowledge that there are an enormous number of rooms within the house or rather I should say within the castle that is meditation including for instance in the intention including for instance intention setting and mantras and an enormous number of different features of meditation practices that we simply did not have time to go into and or for which the research on is not completely ironed out yet for that reason in future that's not long from now I'm going to be sitting down with experts in meditation that include neuroscientists and clinicians but other experts in meditation that certainly are versed in those topics and where they can't point a specific research studies can certainly point us toward the utility of things like mantras and intentions as they relate to getting the most out of a creative practice so I eagerly await those conversations and I hope you'll join me for those as well if you're learning from anyone join this podcast please subscribe to our YouTube channel that's a terrific zero cost way to support us in addition please subscribe to the podcast on Spotify and Apple and on both Spotify and Apple you can leave us up to a five star review if you have questions for us or comments or you'd like to suggest future guests for the YouTube channel podcast please put those in the comments section on YouTube we do read all the comments please also check out the sponsors mentioned at the beginning of today's episode that's the best way to support this podcast if you're not already following me on Instagram Twitter or Facebook please do so it's Huberman lab on Instagram Facebook and Twitter and all three of those places I cover science and science based tools some of which overlap with the content of the podcast but much of which is distinct from the content on the Huberman lab podcast thanks again for joining me for today's discussion about the science and practice of meditation and last but certainly not least thank you for your interest in science.