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're talking all about goals and the science of goal setting and achieving your goals. There's a tremendous amount of information on the internet and in books and so forth about how to set goals and assess your progress towards goals and update your goals and so forth. In fact there are so many programs out there that include so many different acronyms that it can be a little bit overwhelming. Today's conversation about goals is going to be quite a bit different. Indeed we are going to talk about setting goals. We are also going to talk about how to assess progress towards goals and we are going to talk about goal execution. However we're going to do all of this in the context of neuroscience because it turns out that there are not hundreds or dozens or even several neural circuits in your brain that control goal setting and movement toward your goals. There is one and while it includes many different brain areas that one circuit is the same circuit that's responsible for pursuing all goals. It relates to some very basic neurochemical mechanisms that are understood. While there's a wealth of information out there about goals and goal setting and goal achievement and so forth, there's comparatively little information that's been available to the public about the neuroscience of goal setting and goal achievement. That's what we're going to focus on today. I promise that we're going to get into the neuroscience. We're going to touch on a little bit of the psychology and how the neuroscience relates to what's known in the psychology literature and we are going to establish several in fact four specific protocols that you can use for goal setting, goal assessment and goal execution in an ongoing basis regardless of what your personal goals happen to be. Before we dive into our conversation about goals and goal setting and goal achievement, I like to highlight some recent scientific findings that I think are going to be interesting and actionable for many of you out there. In earlier podcasts, we talked about neuroplasticity, which is the brain's ability to change in response to experience. In fact, neuroplasticity underlies all forms of learning, whether or not language learning or learning music or math or physical skill. All forms of learning involve the reorganization of connections in the nervous system, the brain and spinal cord and body. One of the key principles of neuroplasticity is this notion of making errors as a good thing toward neuroplasticity. There's a little bit counterintuitive, but what the scientific literature tells us is that whenever we're trying to learn something new, if we make an error, we know it feels frustrating, but that state of frustration actually queues up particular brain areas to be more alert so that on subsequent attempts to learn that thing, we have a heightened level of focus and a higher probability of learning the new skill. Regardless of what that skill is. I've talked about this before in various episodes as encouraging people to embrace errors or pursue errors, not as their own end goal, but errors as an entry point for making the brain more plastic. If you think about it, it really makes sense. Why would the brain change at all if it's performing everything perfectly? When you make errors, well, in the immediate seconds and minutes after those errors, you're in a better position to learn. A common question I get, however, is what should be the rate of errors, which is really just a way of saying how hard should the given task be that you're trying to learn or perform? And it turns out there's an answer. There's a recent paper that was published in a great journal, Nature Communications. This is a paper, a last author, Jonathan Cohen. The paper is entitled the 85% rule for optimal learning. This paper we will make available by a link in the show note captions. But basically what this paper shows is that when trying to learn something new, you want to make the difficulty of what you're trying to learn such that you're getting things right about 85% of the time, that you're making errors about 15% of the time. And the reason I like this paper is it really points specifically to some protocols that we can implement because people always say, okay, you want to set a high goal. You want to try and achieve something that's really lofty. But you don't want to make the goal so lofty that you don't make any progress at all. Other people say you really want to start with really small goals and making things very, very incremental. So only set out to do things that you know you can accomplish and then it will feed back on your self esteem and all these positive feedback loops and then you know, layer by layer, layer by layer, you'll eventually get where you want to go. Well, it turns out that neither is true. You need to set the level of difficulty such that you're making errors about 15% of the time. And I want to emphasize about 15% of the time because there's no way to figure out protocols for sport or language or math or anything else where you're going to have exactly 15% of errors. So anyway, this paper, the 85% rule for optimal learning. Again, we will supply the link, but it really points the idea of making things pretty hard, but not so hard that you're failing every attempt or even half of the attempts. Failing about 15% of the time seems optimal for learning. Hopefully that information will be useful to any of you that are trying to learn something. Hopefully it will also be useful to those of you that are teaching kids or other adults. If you're teaching, keep in mind that you want to keep the students reaching for higher and higher levels of proficiency in whatever that is that you're teaching and that 15% of the time they should be failing. If it gets to 20%, that's probably okay. If they start failing about half the time, then probably what they're trying to learn is too difficult for them at that point. Now of course this is going to be controlled by all sorts of external factors like whether or not they slept well the night before, whether or not you slept well the night before and you're being clear in your instructions to them, etc. But I think the 15% rule as we may call it is a good metric to aim for and it can serve both students and teachers. In other words, it can serve both those teaching and those that are learning. 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 the science, and in particular, the biology and neuroscience of setting and achieving goals. Setting and achieving goals is not a uniquely human endeavor. Other animals set an attempt to achieve goals. A honey bee attempts to collect honey and bring it back to the hive. A herbivore will go out and forage for plants, and will also have a need to reproduce it at some point in its life, so we'll need to find a mate and maybe even raise the young, depending on what species that is. Predators will have to hunt and kill and eat their food, and they have to avoid getting injured in that process. They also have to raise young, etc. Humans are among the other animals, or we could say the animals are among us, in the need to set goals and to make efforts to achieve those goals. Why do I emphasize this commonality of process? The reason I emphasize this commonality of process is that it turns out that there is one basic system by which all animals, including humans, set an attempt to achieve goals. Humans are unique in our ability to orient our mind toward immediate goals, moderately termed goals, meaning things that might exist on the scale of a week or a month or even a year, and very long term goals. Like a lifetime goal, or a goal that lasts a decade, or it takes a decade to achieve. That's what makes us unique. And of course, we don't have access to the mindset or the thinking or the emotions of other animals, but what we do know is that common neural circuits, meaning brain areas that are present in animal species and in humans, are responsible for orienting our thinking and our action toward particular goals. Another thing that's really unique about the human brain is that we are able to have multiple goals interacting at once. So for instance, we probably all have fitness goals, goals in relationships of different kinds, friendships, and romantic partnerships, as well as maybe scholastic goals, maybe you're in school, you're pursuing some kind of learning outside of the school environment, or you have business goals, or financial goals. We are able to have multiple goals at once. And other animals do this, but humans are unique in the ability to juggle a lot of goals. And actually one of the major challenges in pursuing goals is that goal pursuit often interacts, meaning if you can spend 100% of your time chasing one particular goal, that might be very effective for that goal, but then we tend to fall back on some of our other goals. You can imagine how this plays out. If you're working very, very hard, your solely focused on business often, your health will suffer. If you're solely focused on your health often, other things will suffer. And so we have to juggle both our goal setting and our goal pursuits. And today we're going to talk about a number of different ways to work with what could very well be called these interleaving goals by focusing on a common practice or common set of mechanisms that are present in all aspects of goal seeking. What is that process? Well, it turns out it's a neural circuit. A neural circuit is simply a collection of brain areas that when active in a particular sequence give rise to a particular behavior or perception. So for instance, when you feel happy, it's not because you have a brain area that's the happy brain area that is electrically active. Rather, it's going to involve numerous brain areas being active in concert and to different degrees in the same way that the keys on a piano together played in the appropriate sequence represent a particular song. You would never say that one key on the piano represents that song, but that key is necessary. Similarly, in the brain, we can say that a brain area might be necessary, but not sufficient to give us a particular experience or generate a particular behavior. So when we think about goal seeking and the pursuit of goals of any kind in the brain, it doesn't matter what the goal is. It involves a common set of neural circuits. And the neural circuit that I'd like to orient us toward today, and we will return to it a few times, involves learning a couple of names, but you don't have to worry so much about memorizing these. Just more important is to understand the logic of how it's put together, and I will explain that and make it very clear. If you want to learn the names, that's great. One of the brain areas is the so-called amygdala. The amygdala is most often associated with fear, so you might say, wow, how is that involved in goal directed behavior? Well, a lot of our goal directed behavior is to avoid punishments, including things like embarrassment or financial ruin or things of that sort. And so the amygdala and some sense of anxiety or fear is actually built in to the circuits that generate goal seeking and our motivation to pursue goals. The other areas are the so-called eventual striatum. The striatum is part of what's called the basal ganglia. The basal ganglia is a neural circuit that can very simply be described as a neural circuit that helps us generate go, meaning the initiation of action and no go. The prevention of action type scenarios. Let me make that even simpler. The ventral striatum is part of this thing called the basal ganglia. The basal ganglia has sort of two circuits within it. One circuit is involved in getting us to do things like I'm going to get up tomorrow and I'm going to run five miles first thing in the morning. I don't know if I'm actually going to do that, but I'm just using that as an example. Another circuit within the basal ganglia is a no-go circuit. It's the one that says no, I'm not going to go for the second cookie or the third cookie. I'm not going to eat that. And then the go circuit would be the one that's responsible for instead eating something else. We have go and no-go circuits within the basal ganglia. We've got a migdala. Think of it as fear and anxiety and avoidance. We've got the basal ganglia, which are for initiating action and preventing action. And then there is the so-called cortex. The cortex is the outer shell of the brain and there are two subregions of the cortex that are involved in gold directed behavior. One is the lateral prefrontal cortex. Prefrontal cortex is involved in so-called executive function, things like planning, thinking about things under different time scales, and not just what we want in the immediate term, but what we might want tomorrow or the next day and how our actions currently are going to relate to the future. And the so-called orbital frontal cortex. Orbital frontal cortex has a large number of functions, but one of the key functions of the orbital frontal cortex is involved in meshing some emotionality with our current state of progress and comparing that emotionality to where it might be when we are closer to a goal. So they're basically four areas. One involved in anxiety, one involved in emotion, one involved in planning, and another involved in this go-no-go action. So that's a bunch of detail, but if I wanted to make it really simple for everyone, I would say there are four areas. One is an area associated with anxiety and fear. See a migdala. The second is involved in action and in action. Remember go and no-go. So that's the basal ganglia. The other one is involved in planning and thinking across different time scales. So that's lateral prefrontal cortex. And then the fourth one is involved in emotionality where we sit emotionally at present compared to where we think we will be emotionally when we reach some particular goal. And that's the orbital frontal cortex. Again, you don't need to know all those names. You don't need to know all the details. Just understand that those different elements are involved in the decision making processes that lead us toward particular goals and have us update our goal seeking, et cetera. One key thing is it doesn't matter what the goal is. The same circuits are involved. So whether or not you're trying to build a company that's a billion dollar company that's going to go public, or you're thinking about planning a craft's day at home with the kids, or for yourself, or you're thinking about what movie to go see goals, goals seeking and assessing progress towards goals all involve the exact same neural circuits. It's really remarkable. It's also very convenient for our discussion today. What's going on in these circuits can basically be boiled down to two particular things. The first is value information, trying to understand whether or not something is really worth pursuing or not. Okay. So placing a value on a particular goal, the other component of this neural circuit is associated with action, which actions to take and which actions not to take given the value of a particular goal in a given moments time. I want to say that again, the other component of the circuit is involved in action, whether or not you should act or should not act based on your assessment of the value of a goal at a particular moment in time. And I want you're going to hear me say over and over again in this episode, the value information about a goal is so key. Here's why there is basically one neural transmitter or rather neuromodulator system that governs our goal set. Our goal setting goal assessment and goal pursuit and that is the neuromodulator dopamine dopamine is the common currency by which we assess our progress toward particular things of particular value in fact dopamine is the way that we assess value of our pursuits. And so as we take a moment and we shift our attention to the psychology of goal setting, the things that you've probably heard a bit more about about what sorts of goals are good and how to set goals and how to categorize goals. I want you to think about how dopamine could possibly be involved in these different processes. The reason I want you to do this is that all of the psychology of goal setting and goal pursuit is wonderful because it places things into different categories. It allows us to parse our thinking and organize our thinking. But what's not often seen in fact, I'm not aware of any literature out there, scientific or literature in the popular press or in popular books is an understanding of how the underlying neurobiology can be layered on top of the psychology of goal setting. And that's what we're going to do today. We are eventually going to arrive at a set of four practices that when performed on a regular basis will allow you to assess what is the value of this next particular action step. How worthwhile is it to do behavior a versus behavior B in order to achieve a particular goal. Any of this is vague now I'm going to make it all very clear for you. You're going to come away with some very specific lists of takeaways that you can put down on paper if you like and that you can use to set goals assess goals and execute goals more effectively using the neuroscience of the circuit side just described and an understanding of the neuromodulator dopamine. Let's take a look at the psychology of goal setting and goal pursuit. This is an enormous literature meaning there are tens of thousands if not hundreds of thousands of scientific papers about the topic of goal setting and goal pursuit. There's also a lot of information on the internet about goal pursuit. And in looking over this information one comes to appreciate pretty quickly that acronyms are a big thing. So acronyms seem to dominate the area of goal setting, especially as it relates to things in the business sector, but also in the relationship sector. Now acronyms are wonderful. They allow us to organize our thinking into lists and conceptually they can be very useful. But as I moved through this literature I started to see some redundant themes. And so what I've attempted to do is distill out the redundant themes that regardless of the person teaching or the scientific laboratory that happened to come up with these acronyms that they boil down to some common features. So let's talk about that literature and I think we'll come away with an understanding of some basic elements that are common to all goals. Now the modern science or the modern psychological science of trying to understand goal setting and pursuit actually dates back to the 1930s. And we have to be sure that members of our species were focused on goal setting and goal pursuit long before the scientific literature emerged. It just stands to reason that since the human brain hasn't evolved that much we don't think in the last 10,000 years that people would be thinking about these things. They just didn't get them down into papers that we could evaluate on PubMed and so forth. But now we can so we can look at those papers. And what you find is that acronyms abound in the psychology literature about goal setting and goal pursuit. So for instance, you'll hear about the work of lock and small for instance, these are the last names of various researchers. The so-called ABC method that a goal should be achievable, it should be believable and that the person be committed. It's sort of obvious ones you hear but the ABC method. Then people came along and expanded on that. They talk about the so-called smart method, smart being another acronym that it be specific, that the goal be measurable, that the goal be attainable, that the goal be realistic, and that it be time-bound meaning that you set up a certain period of time in which a given goal should be performed. And then people come along and modify these. This is the way that psychology research has done it. I'm not laughing at it. I'm just chuckling because it seems like the acronyms get longer and longer and longer. They developed the smart-er approach adding an ER to the acronym Smart to SMART-ER. They added ethical and rewarding, which fortunately are good things, I believe, ethical and rewarding. What does all this mean? Well, what it means is that any kind of goal pursuit, any kind of goal setting, really has to involve a number of different states and neural circuits in the brain and body. At least that's how I view this literature. Why would I do that? Well, let's think about the very modern version of the kind of acronyms that I talked about a moment ago dating back to the 1930s and extending into the 1990s. You can find beautiful talks online from people who have worked with some of the biggest companies and greatest high performers out there to achieve incredible things. And they will talk about generating a sort of objective mindset for goal setting. They'll talk about goals needing to be significant. There has to be a big goal. That has to be concrete. So you have to be able to describe what the goal is. It has to be action oriented. It has to be inspirational. It has to be time bound. You have to have reasonable, realistic, verifiable measures. You have to constantly up the ante. If it's trying to sound repetitive, it's because it is repetitive. There are basically only three or four elements to goal setting and goal pursuit. Basically, an individual or set of individuals has to identify a specific thing that they're going to attain in some communities. They talk about knowing what right looks like, meaning being able to define a very specific goal. You can't just say, you know, I want to be a champion athlete. You have to say what sport and you have to understand what the path to that is. So any big goal, of course, is broken up into a series of smaller goals. But the whole thing starts with thinking about the end in mind. And in a few minutes, we will talk about whether or not visualization of the end in mind is actually beneficial or detrimental to achieving goals. There's actually great neuroscience and psychology data on that now. So I mentioned all these acronyms not as an attempt to disparage them. I think they're wonderful. And I mentioned all that psychology literature, not in an attempt to disparage it. But rather to just say that goal setting is the first step assessment of what whether or not one is making progress towards those goals is a second, but necessary step. And then there's the business of goal execution. And that brings us back to the neural circuit components. Remember this neural circuit involving those four things earlier, the amygdala, stradim, or frontal cortex and the prefrontal cortex. They work together to divide the whole process, as I mentioned before, into two general categories. The first is assessing value, knowing whether or not where one is at one given moment relates to some external thing. Are things going well or are things going poorly and knowing how to gauge that accurately. And then action steps goes and no goes. Do more of this, do less of that, do this, don't do that, et cetera. So now we are going to shift back to the neuroscience. And we're going to talk about the practical applications of the information I just described, because I've given you a lot of kind of academic information. And as we do this, I'd like you to keep in mind, what are some things that you've either accomplished or that you'd like to accomplish going forward. Because as we do this, we can build toward a set of protocols that at the end, you'll be able to very quickly plug in your particular goals and a route to those particular goals that's grounded in the science that I think are going to be very effective in allowing you to reach those goals more quickly and with indeed less effort. In fact, let's start with a tool now, because as we move through all this information, I want to make sure that people are coming away with some practical things that they can implement and indeed some things that you can even do during the course of listening to or watching this podcast. The first thing to do is to understand the difference between peri-personal space and extra-personal space. Peri-personal space is all the space, literally, that's within side your body, the surface of your skin and in your immediate environment. Peri-personal space is a key concept in neuroscience because you have particular neural circuits and particular chemicals that are geared toward what are called consumatory behaviors, meaning using things and consuming things and enjoying things that are in your immediate peri-personal space. Let me give you an example of this for myself just to make it concrete. You can imagine similar examples for yourself right now. Within my current peri-personal space is my inter-oception, my understanding or perception of my internal body, so how quickly I'm breathing, my heart rate, the feelings on the surface of my skin, etc. But also within the confines of my peri-personal space is this coffee mug that if you're listening to this, you can't see this, but I'm lifting up a coffee mug and I'm going to take it to a coffee. That's a consumatory behavior. I have the coffee. I don't have to do much or motivate much to get it. I have other things here at Penn's and Computer, etc. Okay, so things in your peri-personal space and consuming those things is generally governed by a set of neurochemicals that center around the neuromodulator serotonin and there are a few others as well, things like oxytocin but mainly serotonin. Contrast that with the so-called extre-personal space. Extre-personal space is everything beyond the confines of my reach. It would be something in the next room, it would be something down the street, it would be something at some other location in space and time. And the neuromodulators and neurochemicals that are associated with any kind of thinking about anything in the extre-personal space are distinct from the neurochemicals and neuromodulators that are involved in thinking about or making actions towards the peri-personal space. And the molecule that's most associated with thinking about or orienting toward the extre-personal space, again things beyond the confines of my skin or your skin, is dopamine. And this is a vitally important concept to understand when you're setting goals and seeking goals. If we are to be good at goal seeking, if we are to be good at setting goals and assessing goals, if we are to achieve our goals, we have to be able to toggle back and forth between a clear understanding of our peri-personal space, what we have and how we feel in the immediate present. And our ability to understand what's out there in the extre-personal space and our ability to move into that extre-personal space. And a simple way to conceive of all this is that we evaluate our progress in the peri-personal space. We evaluate how we feel about some pursuit, even if we haven't initiated that pursuit yet. How we feel about a particular goal is truly a feeling that we experience in the here and now, even though the goal is in the future. If we are going to evaluate whether or not we made progress today or yesterday or not, that's an evaluation of how we feel in the immediate peri-personal space. However, moving toward any goal involves orienting our thinking towards the extre-personal space. And as we go through today's episode, I'm going to teach you a technique or rather a neuroscience-based tool that will allow you to continually transition back and forth between the peri-personal space and the extre-personal space in a way that will allow you to update and evaluate and better execute your goal seeking. The whole principle behind this is that human beings, like other animals, have to make evaluations about whether or not they are on the right track. However, the important thing to understand is that humans in particular can do this over different time scales. We don't just pursue food because we are hungry, we pursue food, excuse me, for a particular meal that we might be having with people tomorrow. We can modulate the time scale in a way that other animals don't. That's how we adjust our goal seeking to different time scales. In addition to that, humans are exquisitely good at biasing our behavior toward particular goals over very long periods of time. But there are a lot of mistakes out there. In fact, things that are outright wrong in the literature and in particular in the internet and in the kind of wellness and fitness and cognitive fitness space that send people down the wrong path. And those things, we will talk about in a few minutes, but things like visualization, that visualization and visualization of this big goal is the best way to achieve your goals. In fact, that's not the case. There's a much better approach to doing all this. So now I'd like to shift gears towards talking about a few of the things that most people get badly wrong in setting and assessing and executing goals. This is based on peer reviewed research, so I think it's very solid. I know it is very solid. And it runs counter to what many of us have been taught. Let's start with a simple one. We've all heard that multitasking is bad. We've heard multitasking is bad. It doesn't allow for focus. If you want to achieve anything, you want to accomplish anything you should not multitask. Well, turns out that's wrong. Turns out that there is a role for multitasking, but the multitasking has to be placed at a particular time within your goal seeking behavior in order to be effective. Really nice studies done at Carnegie Mellon University and the DaVish Lab evaluated how long people are able to focus in different environments. How long they are able to stay concentrated on their work. And it turns out that number is exceedingly low. Turns out that most people, whether or not they're doing computer work or whether or not they're doing writing or accounting work or anything of that sort, can hold their attention for about three minutes at a time before they shift their attention off. That's ridiculously low when you first hear it, but that probably reflects a basic state of brain function that harkens back to a time when we were hunter-gatherers. I doubt that we were maintaining focus solidly for hours and hours and hours unless we were under some particular threat or in some particular crisis. Rather, you could imagine that people collected seeds and nuts and berries for about three minutes and then probably stood up, looked around and then kept going or that they were hunting animals or in some sort of pursuit, fishing, etc. And focused focus focus, then every three minutes or so they might have looked up and taken a look at the sky or looked around to make sure that other people were there or not there, etc. It all stands to reason that that would be the case. Again, the neural circuits haven't evolved much. Now, multitasking has been shown to have a very interesting physiological signature. When we multitask, when we jump back and forth between things, there is an increase in the level of the neurotransmitter, also sometimes called a neuromodulator, but basically same thing for sake of this discussion. There's an increase in the neurotransmitter epinephrine, which is adrenaline. And so, there are really nice studies now pointing to the fact that doing a bit of multitasking prior to jumping into some focused, goal-directed behavior, whether or not it's mental behavior or physical behavior, can actually be useful because it gets us into action. So we've all been told that multitasking is terrible, but if you, for instance, find yourself cleaning up your house and also checking your phone and doing a number of things right at the point where you should be sitting down to write or do some focused work, it probably reflects some adaptive mechanism where you use action and somewhat varied multitasking action in order to generate adrenaline in your system because adrenaline just gets you into action. Now, that's great, but you don't want to multitask throughout any kind of goal-seeking or goal-per-suit behavior, because what's also very clear, and we're going to talk about this in exquisite depth today, is that visual focus, and in particular contracting your visual window, bringing the aperture of what you see to a very fine point, can absolutely increase your clarity of goal-seeking and the likelihood that you will pursue your goals. I've talked about this a little bit before on the podcast as a way of increasing focus for any kind of pursuit. I've talked about a practice whereby you can literally look at a dot or a line placed on a wall or on your computer in front of you for 30 to 60 seconds, and then moving into some dedicated work where you need to focus. And indeed, just looking at a narrow piece of the visual world, a small piece of the visual world, for some period of time, enforcing yourself to hold that gaze on that location as best you can, can increase your level of cognitive attention and your ability to focus and stay focused. And this is not magic, it is the consequence of the fact that most of your cognition follows your visual perception. For those of you that are low vision or no vision, meaning you're blind or you have trouble seeing, my lab does a lot of work with people who are low vision, no vision, they tend to use their auditory system, they're hearing as a way to anchor their attention to particular things. Okay, but most people out there can see and see pretty well and visual focus is the way to do that. Now, earlier we were talking about this notion of Perry personal space versus extra personal space. And I'm just going to see a little bit of the later conversation by saying that when we focus on an external point, we are in a process of extra reception is the focus on the extra personal space, not the Perry personal space. So when we focus on something, say, a line on the wall for 30 to 60 seconds or at our computer for 30 to 60 seconds and just look at it and then move into any kind of action, whether it's work action or physical action, we are at its very core, we are engaging in this pursuit of extra personal space. We are placing our focus outside our body and therefore we are placing the brain into goal pursuit mode work at NYU in particular in the laboratory of a phenomenal researcher in their psychology department by the name of Emily Balsettis B-A-L-C-E-T-I-S. Emily Balsettis has done really nice work on this. They've done is they've had people focus their visual attention on a goal line of some sort and then to engage in some sort of behavior that requires a lot of effort and they've done a lot of different experiments like this, but I'll just explain one. They always include a control group where people have to go through the same physical effort or mental effort, but they don't focus their attention just on one location. The long and short of these studies is that when people have to focus their attention on one location like a goal line, they are much more effective in reaching those goals and they achieve them with the perception that they expended less effort. I'll give you an example of one particularly nice study from the Balsettis lab. This particular study involves physical exercise, although as I mentioned before they've done similar studies looking at cognitive type work, and what they did is they had a group of people exercise wearing 15-pound ankle weights and they had to basically move a certain distance or run a certain distance to reach a goal line. One group was focused on the goal line, visually focused on the goal line, the other group was not told to visually focus on the goal line. What they found was that the group that focused on the goal line was able to achieve reaching that goal with 17% less effort, they measured effort, and it got their 23% quicker. That's a remarkable difference. Same distance traveled with same workload because everyone's wearing the same 15-pound weights on their ankles. One group is simply looking at the goal line, the other group is not told to look at the goal line. Simply by looking at the goal line does something to the psychology and end physiology of these people that allows them to move forward with less perceived effort and to do it more quickly. That's remarkable. In this case they're focused on the goal line, but in a few moments we'll talk about how one can use updating of goal line, so incremental goal line, starting with an intermediate goal and then extending the goal line further and further. Just sit back for a second and think about that. Just by changing where a person looks, they change their perceived effort and their ability to do something more effectively, more quickly, than a group that is not deliberately focusing their visual attention on one location. That's incredible. It's so incredible in fact you might say, how could that possibly be? Well, it turns out it has a very specific underlying physiological reason and that has to do with changes in our so-called autonomic nervous system, the aspects of our nervous system that prepare us for readiness and action or that prepare us for resting and relaxing. So what is special about focusing one's visual attention at a given location? Well, it turns out that we have two branches of our visual system, so visual information all comes in through our eyes, but then it can head down two different pathways. One pathway is engaged when our vision is brought to a common point, what we call a virgin-side movement. So if we're focusing very intensely on a given point, regardless of how far away from us that point is, our visual system engages a certain set of neurons, neural circuits that are involved in resolving fine detail and that can evaluate small changes over small periods of time. Just think of it as a very detailed camera of the visual world, it tends to be very restricted. The other pathway through the visual system is a so-called Magno-Cellar pathway and this is a pathway that's involved in taking in global information about lots of things that are happening around us, movement of things to our right, movement of things to our left, things that are happening down on the ground and all around us. And that pathway involves a sort of relaxation, if you will, of the neural circuits that are associated with alertness and attention. When you walk down the street and you're not thinking about much, provided you're not looking at your phone, you're not focusing on one location, you're more or less in a relaxed state compared to when you're looking for a particular sign, you're looking for a boss or a train that's coming or a particular person, and that should inherently make sense. When your level of attention and alertness goes up, there's sort of a small but perceptible increase in your level of arousal. It's not really stressed necessarily, but arousal of alertness. And it turns out that the visual system accomplishes this increase in alertness by communicating with your circulatory system and the system that delivers blood and nutrients and oxygen to the rest of the tissues in your body. So let's talk for a second about what focusing our vision on a particular location does, because in this study from the Balsettis lab, what they found was focusing on a goal line allows people to move more effectively toward that goal. This is something you can leverage in all aspects of all goal pursuits. What happens when we focus on a particular location? Believe it or not, there's an increase in a particular feature of our blood pressure. Now, your body has, of course, arteries, veins and capillaries and your heart pumps blood first to the arteries and then to the other components of your vascular system. And we have so-called blood pressure. Right? Blood pressure is just how much the fluid volume is pressing on those arteries, veins and capillaries. So you can imagine a pipe with very little fluid moving through it. That's low pressure. You have a pipe with a lot of fluid moving through it. That's even more pressure. You have a pipe with a lot of very viscous, meaning very kind of sticky thick stuff moving for it. That's even more pressure. Well, we have blood pressure and you've probably had your blood pressure measured. There's always two numbers. Right? You have a top number, which is this istolic blood pressure. And then there's the bottom number below the line, which is the diastolic pressure. So the important thing to understand is that your blood pressure will rise when your heart beats because there's more fluid moving through those pipes that are your arteries, your veins and your capillaries. And that top number is called the cystol or the systolic blood pressure because that's the pressure at the time when your heart contracts. So the top number, which normally if you have a healthy blood pressure, is somewhere in the range of 90 to 120 millimeters of mercury. Millimeters of mercury is just the way that pressure is measured. That top number, your systolic blood pressure is what's measured when the heart contracts. Okay? So that's the amount of pressure when there's a heartbeat and it's moving through your vasculature. Now between beats, right? The heart beats, but then it relaxes. Your blood pressure is going to drop to a lower value, right? Because fluid isn't being pumped through the system at those moments. And that's the bottom value, the diastolic pressure. And typically for healthy people, that's going to be 60 to 80 millimeters of mercury. So you might hear about a normal blood pressure being about, again, this is an approximate 120 over 80. What that means is at the point where blood was being pumped through your arteries and veins, boom, that it's 120 millimeters of mercury. But then when the heart relaxes for a second before the next beat, then it drops to 80. Okay? So there's high pressure, low pressure, high pressure, low pressure. The fluid is being pumped through the system. Now why am I telling you all this? Well, it turns out that there are neural circuits that link your visual system and focusing on a particular point with that top number, the systolic blood pressure. And when you focus your eyes on a particular location, that systolic blood pressure goes up and there are some other systems that are coordinated with it in your brain and body that start releasing adrenaline, low amounts of adrenaline in most cases. And adrenaline further reties your body for action. So bringing our visual focus to a particular location does a number of things to the brain and the whole system of the body to prepare it, to place it into a state of readiness that makes us more likely to lean into our goals into action. And if we step back and think about this, this makes perfect sense. The brain and body need to be coordinated. We can't just think about a goal. In fact, a deer or a lion can't just think about a goal. It has to think about a goal and then has to feel some sort of activation energy, some willingness or desire to move forward in pursuit of that goal. So imagining a goal has to be coupled to the physical pursuit of the goal. So our visual system in a beautiful way brings together a focus, literally a visual focus on a particular point outside us. And it recruits an increase in systolic blood pressure, which creates a systemic, a body wide and brain wide increase in fuel utilization, in oxygen availability, in our willingness to move forward as a body, as a whole coherent system. And then there are also neurotransmitter systems like epinephrine as as we will soon see dopamine that get recruited as well to place us into a continual mode of action. This to me is a remarkable feature of our physiology. And it gets right to the point of some of the psychological phenomenon that we were talking about earlier. Let's just recall what some of those are. I won't list them all. But, you know, a goal has to be significant, they say. Okay, all the psychologists, all the popular stuff online says it has to be significant has to be inspirational and has to be action oriented. Okay, so let's say you look out into the landscape of what's available to you, whether or not it's just in your mind or you look at a specific point, you say, I want to go to that particular restaurant to eat that particular food and you orient towards it and you move towards it. This is the way that your brain and body are coordinating their actions together. Conversely, when our visual system is in a mode of looking at everything when the aperture of our visual system is very broad. We know that there's also a reduction in our goal directed behavior and a reduction in the systolic blood pressure. It's as if our peri personal space is sufficient. We don't need to get beyond our current state. We're not oriented toward any one thing in particular. Okay, so I've now described some of the psychology and some of the underlying physiology. Now I'd like to mesh this within the context of actual specific goal setting and goal pursuit because what many of you are probably thinking is, okay, well that's some physiology, there's some psychology, but how do you actually apply this towards setting and achieving goals? Well, you do that by understanding that your mental frame and your attention are always either positioned to your peri personal space focused on your immediate possessions and state or towards things outside you, but that you also have the ability to dynamically travel back and forth between those. And so next we're going to talk about what the literature says about things like visualization, immediate and intermediate goals, long term goals and how to best achieve those. And then we're going to move specifically into the protocols that you can use. It's a protocol that I've specifically developed for you, the listeners, in order to incorporate all the signs into a best practice that you can do any time, any place to really identify what it is specifically that you want to pursue and the best route to pursue and achieve that goal. Focusing our visual attention on one particular point is incredibly effective for all types of goal pursuit. And if you'd like to read some of the scientific studies or read a review of the scientific studies that have looked at how narrowing one's visual attention can really enhance the effectiveness of pursuing goals. I'll put a link to this study that title of the study is keeping the goal in sight, testing the influence of narrowed visual attention on physical activity. And this is a paper from Emily Balsettis' lab focuses mainly on physical activities, but it mentions some other things as well. This is an article published in personality and social psychology bulletin in 2020. So it's recent. It's exceptional paper in my opinion. It really gets to the heart of how all this works and some examples of where it's been implemented. So let's apply this visual tool in a very simple way to any type of goal that you want to pursue. If you already know what goal you want to pursue, maybe it's a workout, maybe it's a cognitive work of some particular sort. Again, the process is very simple. You're going to focus your visual attention on one point beyond your peri personal space. So it could be on your computer, it could be on the wall. It could be a horizon. It could be at a distance. And you're going to focus your visual attention there. And with some effort, you're going to hold your visual attention for 30 to 60 seconds. You might blink. That's okay, but you're going to try and hold your visual attention there. So no moving your head around, no diverting your attention to other locations. Some people will find it very easy to do. Other people will find it quite hard. Your mind may drift cognitively. That's okay. But try and bring your visual attention to that common point. Several episodes ago, I talked about how there are actually studies looking at developing this kind of training in students for ADHD and the data on that are actually quite encouraging. So for people who have ADHD and focus issues and attention issues, this can be effective for people who don't. This can also be effective. Again, it places your brain and body into a state of readiness. And then the idea is to move into the particular actions that bring you closer to your goal. Okay, we haven't yet talked about how to set goals and how to assess progress. This is simply how to pursue goals. Okay, but the visual component is important. In fact, I would argue that the visual system and harnessing your visual attention to a narrow point is going to be the most effective way to get your brain and body into a mode of action to pursue whatever goal it is you're trying to pursue. That practice is in start contrast of multitasking where by definition your attention is moving from place to place to place. Right. I mentioned that multitasking can be effective in getting your system into somewhat of an increased level of active activation so that you can pursue a more focused goal. But the visual attention to a particular point is going to be the most effective way to bring your system into a state of readiness and action for goal pursuit. There's another really interesting way that you can leverage your visual system toward long term goals. The Balsettis Lab has also done some really interesting experiments looking at people's ability to set and stick to long term goals and the long term goal that they looked at was one related to saving money for later in life. This is something that a lot of people struggle with. A lot of people have a hard time investing money or saving money for later in life simply because as human beings we vary in the extent to which we worry about what's going to happen later. There's also a phenomenon of so called delayed discounting. Delayed discounting is the fact that goals become less rewarding when they exist further out in the future. You may have experienced this walking pass a donut shot. I love donuts. I'm just going to admit it over and over again on this spot. I love the smell of them. I love the taste of them. I try to eat them because I'm told they're not that good for me and indeed I don't think they are occasionally cave and I eat one or many. In general I try not to cave to the immediately rewarding properties of the smell and the taste of the donut. What we know is that if you smell a donut or you smell a wonderful piece of food in the immediate term it brings your level of focus, your mental focus to the immediate phase and it feels very rewarding. If you had it now it would just be so good. If you actually extend that reward out to tomorrow or the next day you think today happens to be a Saturday that we're recording but on Tuesday morning I'm going to get a donut. It doesn't have the same value because the reward system doesn't work as well for long term goals. It's not as salient, it's not as tangible a goal especially for something like a donut. Whereas the kinds of goals that work when you place them out into the longer term and can create a heightened sense of motivation tend to be things that are much more rewarding to us. So delayed discounting simply says that the further out in time that a given goal is the less effective that reward will be in motivating ones behavior. And indeed you see this with saving money for retirement you see this with all sorts of long term investment. The Balsettis Lab therefore did an experiment where they looked at people's tendency to save money for later in life. But the groups that they created in this study were really interesting. They had one group imagine what it would be like to be 30 or 40 years older and then to invest a certain amount of money according to whatever it is they thought that they would need. And they measured the amount that they had set aside and saved for later in life. The other group actually viewed photos of themselves. So picture images of themselves that were artificially digitally aged so that they could see themselves 30 or 40 years into the future. And it turns out that people in that second group simply by perceiving their own image in the future invested far more money into later life. They set aside more money somehow a bridge the gap between their immediate experience of life and the longer arc toward what it was going to be like in 30 or 40 years. And it's a very powerful result in my opinion because what it says again is that our visual perception of the future or our visual perception of the present is what allows us to anchor our goal directed systems and our motivation to take on things that in the immediate term might not seem that useful. And you can imagine all sorts of variations on this you can imagine that every time I want a donut I'd see a vision of myself or an actual physical picture of myself as a consequence of that having eaten many donuts every day for the next 10 years. I don't know what that image would look like because I've never seen it. That's not an experiment that I necessarily need to do because I'm not that motivated to eat donuts. But I have to confess you know I'm somebody who I think I'm pretty good at managing resources but I think if I were to see an image of myself at 70 or 75 there's so many things that are associated with visual images like what our body must feel like what our needs are probably going to be like in that state or in that age what sorts of things we may or may not still be able to do at that age. And that anchors back to immediate goal directed behavior such as setting aside money for retirement such as investing in one's health practices and indeed there's a study that has looked at how people invest in exercise and healthy eating. If they just think about the future and what they might be like in the future versus seeing images of themselves in the future if they were to go down a healthy or unhealthy route. So again the point is that the visual system what we see is principally important in defining what we do in the immediate term even if what we see relates to something in the far off distance. I think these are phenomenal studies and they get right down to an important issue that's been kicked around over and over in the literature and in the discussion about goal seeking which is visualization. We here keep the big goal in mind focus on the big goal so now we're going to address what is the science say about visualizing big goals if you're somebody who is interested in business or let's say you're focused on relationship is thinking about the perfect relationship and what that would look like and the family that you would have and where you would live is that effective in generating the kinds of behaviors that will lead you to that is it effective to think about the big win at the end. Well it turns out it is but you have to be very very careful with when and how you implement that visualization because if you do it correctly it can really serve your goal seeking well and if you do it incorrectly it can undermine the entire process. So does visualization work well turns out that visualization of the big win the end goal so the Super Bowl win or eight gold medals in the Olympics or graduation from the University of your choice. Or making a certain amount of money or finding the partner of your choice etc that visualization is effective in getting the goal pursuit process started but it actually is a pretty lousy and maybe even counterproductive way of maintaining pursuit of that goal meaning continuing to engage the sort of actions that are going to get you to eventually achieve that goal. I think this is going to be surprising to people at first but if we think back to our discussion about the physiology of the blood pressure system it will make sense. Good scientific studies have been done where people are told to imagine or even script out their long term vision and goal for themselves what is the big goal and they're taught to or told to imagine it with a rich amount of detail to think about how it's going to feel in their body. And the big win and basically what happens is if you measure people's blood pressure or other metrics of physiology you see an increase in that systolic blood pressure there's in kind of a ramping up of the readiness and excitement for that goal. But that increase in blood pressure quickly wanes and over time that visual of the long term goal becomes a poor thing to rely on in order to generate the actions that are required to reach that goal. In fact, there's a much better way to maintain ongoing action toward a goal that also involves visualization but it turns out it's not about visualizing success. It's about visualizing failure. The Balsettis lab and other labs have looked at whether or not people make progress toward goals of different types whether or not they're thinking about the goal they're thinking about that goal line and what they want to achieve that long term goal and all the wonderful things associated with the goal. Or whether or not they're thinking about all the ways in which they could fail and root to that goal. This is not typically what we are encouraged to do. Typically we are told don't imagine failure push failure out of your mind only focus on success. Fake it till you make it or it's a phrase that I absolutely hate frankly because it's not even clear what that means and it's not even clear what the ethical form of that is. I think it means continue despite any anxiety or fear that things won't work out but if you look at the literature the scientific literature what the Balsettis lab and other labs have shown is that there's a near doubling near doubling in the probability of reaching one's goal if you focus routinely on foreshadowing failure. You think about the ways in which things could fail if you take action a or you take action b and instead therefore you take action c. You're supposed to think about how things could fail if you don't get up and run each morning if your goal is say a fitness goal. So let's use that as an example because even though I realize people are in pursuit of many things not just fitness. Fitness goals and physical goals are a very concrete thing that we can all get on the same page about because they're related to actions. Let's say somebody it sets a goal of running five miles four times a week minimum and as many as seven four times a minimum before 8 a.m. Okay and a previous podcast on habits I talked about the benefits of non-disci요l setting specific times that one will do things but setting time blocks that one will do things. You say before 8 a.m. you're going to run five miles and that's going to have an up to seven days a week. Okay one version of this would be okay sit back in a chair and think about how great you're going to feel and look if you're doing this every day how your health is going to improve how everything is going to your blood markers of lipids etc going to improve okay fine that's the visualization goal of visualizing the end point turns out that is far less effective and maybe even counterproductive compared to thinking about what's going to happen if you don't do this. The negative health outcomes that are going to occur the disappointment you're going to have in yourself the fact that you're going to wait until seven thirty that's not long enough for many people to run five miles you go to put on your shoes is can be pouring rain or even hailing or snowing outside and now you're not going outside unless you're somebody who's particularly motivated to do that. Okay so foreshadowing failure turns out to be the best way to motivate toward goal pursuit in fact as I mentioned before there's a near doubling in the likelihood that people will reach goals of any kind when they're constantly thinking about how bad it's going to be if they fail. If we think back to the neural circuit associated with assessing value in our goal pursuits this makes perfect sense the amygdala that center of the brain that's involved in anxiety and fear and worry well the amygdala is one of the four core components of our goal. Setting in goal pursuit circuitry and there's no bypassing that there is no one listening to this or watching this who's amygdala is not involved in their goal setting in goal pursuit behavior and so while I'd love to be able to tell you that all you should think about is rainbows and puppies and all the wonderful rewarding things that are going to happen when you achieve your goals. The truth is you should be thinking mainly about how bad it's really going to get if you don't do it how disappointing yourself you're going to feel how it will negatively impact you if not in the immediate term in the long term if indeed your goal is to reach your goal so I want to emphasize that I'm not interested in encouraging people to flageulate themselves I'm encouraging people to achieve their goals and it turns out the best way to do that is by foreshadowing failure and the more specific you can get. By writing down or thinking about or talking about how bad it will be if you don't achieve your goals the more likely you are to achieve those goals part of the reason for that almost certainly has to do with increases in systolic blood pressure and increases in readiness in your system when you imagine failure the brain and body are much better at moving away from fearful things then towards things we want. I wish I could tell you that wasn't the case but there is a true asymmetry in the way we are built in fact the brain and body can engage in what's called one trial learning when something bad happens we eat a food that makes a sick we have an interaction with a person replace that we really don't like it only takes one trial to read one event one time to reorient or rewire our neural circuitry so that we have a bias toward moving away from that thing in the future when things go well unfortunately that doesn't often occur if things go really really well it might orient our brain in the future. It might orient our brain in body toward wanting more of that thing and we'll have neural circuitry changes that will lead us to engage in that particular behavior interaction again but it is never as effective as these avoidant circuits so again for shadow failure if you're going to visualize in a positive way do that at the very beginning of some goal pursuit maybe be intermittently every once in a while you imagine the big win of you know scoring perfect on exam or winning the championship or the great relationship but most of the time if you want to be effective you should be focusing on avoiding failure and you should be really clear about what those failures would look like and feel like now let's talk about goal setting going back to that prominent literature the psychology and popular literature again we can hear some of these themes start to emerge the goal should be significant we are told it should be inspirational it should be a aggressive yet realistic well okay that's all finding good but let's get semi quantitative about this let's at least get biological about this how inspirational does it need to be is does it need to be the kind of thing that is so inspiring to me that I can't sleep at all well that wouldn't be good because I believe and I know many of you've heard me say many many times before regular deep sleep 80% or more of the nights that you go to sleep is going to be crucial to your cognitive and mental functioning and your ability to achieve your goals in the long term that's absolutely clear so it's got to be inspirational and exciting but what does that really look like and what does that correspond to and how do we actually make that happen well once again there is a mismatch between what the real data show and what we're most often told turns out that again work in Balsettis lab but also other laboratories has this addressed whether or not the probability of achieving a goal goes up or down depending on whether or not the depending on whether or not one visualizes or sets a goal that is easy moderate or impossible okay impossible goal would be for instance if I say you know I'm going to jump from my front driveway all the way up to the road the road's quite a distance away it's more than 20 meters away it's just not going to happen this lifetime is not going to happen any other lifetime unless it involves some elaborate technology that I'm not aware of a jetpack or something like that's just not going to happen right and easy goal would be something like can you jump or could I jump you know to feed in front of me obviously yes okay now I'm using a trivial example here but this could be translated to any kind of goal school goal physical goal etc turns out that when people set goals whether or not they are nutritional goals eat more of this or eat less of that whether or not their fitness goals you know run more lift more some other goal swim less swim more whatever it is their goal happens to be some learning goal some relationship goal some attempt to modify their behavior turns out that if the goal is too easy it's too within reach it doesn't recruit enough of the autonomic nervous system to make pursuit of that goal likely now that might be surprising at least it was surprising to me you think well something is really really easy you know as a very low bar to achieve it people are probably more likely to do it but turns out that's not the case when we hear that a goal needs to be inspirational what do we mean when we hear that something is too easy to recruit our action what do we mean well that is lab measures systolic blood pressure and found that when goals were too easy for people to attain they didn't get that increase in systolic blood pressure and recruitment of the other neural and vascular systems meaning the blood systems and the nervous system that would place them into ongoing effort and so they quickly gave up also if a goal was too lofty if it was too far from their current abilities it didn't recruit enough systolic blood pressure even if people could get very excited about something mentally it simply didn't place their body into a state of readiness because they wasn't tangible that they could actually perhaps really achieve it so it turns out that when goals were moderate when they were just outside of the end of the day and then it was a lot of effort but it's within range or maybe in range like maybe I can do it maybe I can't then there was a near doubling of the systolic blood pressure in the good sense it didn't go into the unhealthy range and a doubling or more of the likelihood that they would engage in the ongoing pursuit of that particular goal that are realistic but that aren't so realistic that they're easy the goals need to be realistic and truly challenging don't set goals that are so challenging and so lofty that they crash that blood pressure system in the other direction and make you or anyone feel unmotivated in hearing this it makes sense but I don't think I would have predicted it had they not done this very controlled study I would have thought the loftier the goal the bigger the goal the more that it recruits the autonomic system and the more that people are likely to lean into the energy and effort to pursue and attain that goal I also would have thought that if a goal is really easy to achieve that it would engage the systems of action in the brain body enough that people would sort of get into motion and pursue that goal but neither is the case again set goals that are difficult to achieve but that are not so lofty that they collapse your system and that you feel overwhelmed and the important thing here is that they can do it and that it's not easy to do it and the goal is not easy to achieve. collapse your system and that you feel overwhelmed. And the important thing here is that how we perceive a goal, whether or not we think it's within reach or not, of course we'll vary depending on whether or not we are rested, depending on whether or not other aspects of our life are going well. I mean, we can think that we are hot on the heels of a lifetime goal and everything's going well. And then there'll be some crisis, interpersonal crisis, or there'll be a health crisis and you'll be shut down. And then that goal seems very, very hard to attain. So we will talk about how to update goals under different contexts in a few minutes. But of course, this is going to be an averaging. This isn't something that you do just once. But the takeaway again is very simple. Set goals that are moderately hard to hard, but not so hard, nor so easy, that they don't engage your brain and body properly. Moderate goals are best if you want to achieve your goals. Now I'd like to talk about three particular areas of scientific study that point to goal pursuit, goal assessment, and goal achievement. Previously, I told you that it's great to foreshadow failure, that that's a great way to get your system into a state of activation. I also told you that you want to set goals that are challenging but possible. And again, here I'm paraphrasing from the work of Emily Balsettis. I want to be very clear. There are a few other things that one can do in order to bias the likelihood that you will succeed in trying to achieve your goals. First of all, limit your options. Trying to pursue too many goals at once can definitely be counterproductive. Now I realize that life is complicated. We all have multiple goals that we're trying to pursue. But if we have particular goals that are important to us, we have to be careful to not get distracted by other goals. And many people run into this problem. So setting one or two or maybe three major goals for a given year is going to be more than enough for most people and is actually going to be challenging for most people. Now of course we have daily goals and monthly goals and yearly goals. But if we have big lofty goals, we need to be careful not to contaminate our mental space and our visual space with too many goals. And why do I say visual goals? Well, what various department stores and supermarkets have discovered is that the greater the number of things in our visual attention, the more that we can draw our attention and our goals off a line of pursuit. What does that mean? Well, let's think about it in the practical context. This has actually been done. Big department stores have figured out that if they stock their shelves, chalk a block with many, many options of food or clothing items or objects or anything like that, people simply buy more stuff. People are very prone to orienting their attention to whatever is in front of them. You put a lot of stuff in front of them, their attention drifts. You put fewer things in front of them, their attention is more narrow. In a later episode, we'll talk about designing a workspace that's optimized on the basis of this. It doesn't mean being in a room with nothing except just your desk and a computer. It doesn't have to be that sparse. But visual sparseness actually can help us orient our focus and our behavior. When we have a lot of things in our visual environment or a lot of things in our cognitive environment, it's the same thing. And so if you're going to try and pursue a fitness goal, a relationship goal, an academic goal, and a long-term life financial goal all at once, that's four things. And you're going to have to come up with systems that allow you to isolate those goals in a very rigid way. And if you do have multiple interleaving goals and overlapping goals and simultaneous goals, in a few minutes, we're going to talk about a process that will allow you to use your visual system to align towards each of those goals sequentially in a way that makes it much more likely that you'll achieve them. So now let's talk about specificity of goals. We've all heard that the more specific a goal is and the more specific we are about when and how we are going to execute that goal, the higher probability that we will actually achieve that goal. And indeed that's the case, but there's an additional feature that's not often discussed that is vitally important. And in fact, maybe more important than having a specific time of day or a specific endpoint in mind. It was a really nice study that was done looking at recycling. This is something that a number of groups, businesses, households, and individuals are trying to do more of. They're trying to lower carbon footprint or contribute to the world in some general way by throwing away fewer things that could potentially be recycled. So this has been studied in the context of the work environment, where a business decides and lets everybody know that there is going to be a greater effort toward recycling cans or bottles or bottles and cans, et cetera. And then the way these studies were done is that the janitorial staff was swapped out temporarily for researchers that actually measured the number of recyclable items that showed up in the trash and not in the recycle as a function of the total amount of trash. Why does it say as a function of the total amount of trash? What's a way of controlling for differences in beverage consumption from one week to the next? Anyway, the point is they were able to very carefully measure how much people are recycling before and after this call to action to recycle more. And what they found was if they said, we are going to try and recycle more, try not to put cans and bottles in the trash. There, of course, was an improvement in recycling, but it was pretty modest. Whereas when there was a very concrete plan and everyone knew what that concrete plan was, for instance, to place all bottles and cans into the recycle, not the trash, or to limit the amount of trash by 50% or to eliminate all recyclable items from the trash. So when they made it very concrete, exactly what the action steps were, there was a remarkable, I mean, close to a 100-folder more improvement in recycling behavior that lasted many months after this call to action was made. The takeaway from this is quite straightforward. It means that having a concrete plan is essential. You can't just say, I'm going to become a better recycler, or I'm going to do things that are better for the environment, or I'm going to become more physically fit. It has to be a specific set of action steps that get right down to details about what success would look like. I've heard this before described as, what does right look like? What is the actual outcome that one would like to achieve in terms of action steps? So not necessarily feeling states. It wasn't that they all sat around and said, how great we're all going to feel about ourselves in the world when we accomplished this goal. It was very concrete statements, very concrete plans about action steps that would deliver one to one's goal. Somewhat straightforward and intuitive, but nonetheless worthwhile. What it suggests is that for all of us, if we have certain goals that we want to achieve, we need to be exquisitely detailed about what the action steps are that we're going to take and to constantly update those action steps so that we have a higher probability of meeting those action steps. Some of you may be asking, how often should one assess progress? Well, that of course will depend on the given goal that you're trying to pursue, but in the studies that I've been referring to here, the assessment of progress and the updating of concrete plans was done weekly. So it seems like weekly is a good starting place to address how well one performed in the previous week and then based on that performance to update the action plan for the upcoming week. So weekly seems like a good solid rule of thumb for setting particular action goals and assessing one's progress towards the immediate and longer term goals. Any discussion about goals and goal pursuit would be incomplete without a discussion about the molecule dopamine. Dopamine is often thought of as the molecule of pleasure and reward, but actually it is the molecule of motivation. This is best illustrated by a classic set of studies that have been carried out in both animals and in humans. The animal study can be described the following way. Two rats each in a separate cage. You can provide those rats with the opportunity to indulge in something that they like, like food or mating or heat if it's cold in the environment or a cool spot in the cage, if it's warm in the environment and so forth. And what you find is that rats will very readily approach the rewarding thing they will mate, they will eat, they will pursue something that is of pleasure. Now if you are to take one of those rats and deplete its dopamine neurons, you can eliminate its dopamine neurons or block dopamine in the brain. What you find is that those animals will still enjoy pleasure. They will consume the food, they will mate, et cetera. However, their motivation to achieve pleasure is vastly reduced. In fact, if you place the item of pleasure, the mate, the food, et cetera, even just one rats length away from that rat, the rat without dopamine will not even move one length of its own body in order to achieve that pleasure. And there are naturally occurring experiments in humans that mimic that result very accurately. There are certain conditions in humans where there is a depletion of dopamine and what you find is that the depletion of dopamine does not inhibit an ability to experience pleasure necessarily, it inhibits an ability to pursue or go through the series of action steps in order to achieve pleasure. So dopamine really sits at the heart of our motivational state to seek out goals and to seek pleasure. And this is true for immediate goals that take place within a timeframe of minutes or a timeframe of a day or the timeframe of a week or the timeframe of a lifetime. Dopamine is the common currency by which we pursue goals. Now dopamine does a number of things that are very interesting. I'm gonna describe a few of them as they relate to goal seeking behavior. First of all, there's a fundamental feature of how our brain releases and uses dopamine that's called reward prediction error. And the simplest way to think about dopamine reward prediction error is that dopamine is released in the greatest amount and places us into a greater state of motivation when something happens that's positive and novel. Now an important thing to understand about dopamine is that it's not always released on the same schedule. There are a couple different ways that dopamine is released and when it is released relative to your anticipation of a reward is key. If you don't expect something positive to happen, you're just going about your day and something positive happens, dopamine and a lot of dopamine is released. I had this happen recently. I had no idea that I was going to be receiving something in the mail, but I went to the mail, I looked in the mail and I got something very positive and I was really, really excited about this. This is a real event that happened just today. However, if we anticipate something positive is going to happen and then that thing happens, we experience dopamine as part of the anticipation. So even before we get the reward, there's an increase in dopamine. It's not as high as it would be if something really novel and unexpected and positive happened, but we do get an increase in dopamine. And then when we actually experience the reward, we experience the positive thing, there's a smaller increase in dopamine. So again, the biggest increases in dopamine are response to things that are positive and unexpected. Lessor dopamine is released when we anticipate something good will happen. And when that happens, yes, we get some dopamine and we also get some dopamine when the positive thing happens. Think about anticipating a great meal with friends. We have some dopamine churning, friends come over, then we have the meal and we also get some dopamine from that, but not nearly as much as we would if it at all happened as a part of a big surprise. Then there's also the case in which we predict that something good will happen. When that happens, there's an increase in dopamine just as it was before, but then if that thing doesn't happen, for instance, our friends don't show up for dinner, then there's a drop in dopamine below our initial baseline. That drop in dopamine is the chemical essence of what we call disappointment. Now, this dopamine reward prediction error, as it's called, can be leveraged toward trying to reach our goals because it tells us where we should set our milestones. We can't be in a mode of simply being focused on the finish line. Very few people can do that over long periods of time in a way that's effective. Now, earlier I talked about a study where people were focused on a finish line visually and they were moving through space with these ankle weights on, but that was a very short-term goal. If a goal is within minutes or maybe even within an hour or is in with our immediate visual environment, maybe we can do that. But most goals of the sort that most people are pursuing, fitness goals, academic goals, business goals, relationship goals, et cetera, involve some milestones. So understanding what we know about reward prediction error, we can make better choices about where to place the milestones, how far out in the future to place milestones. So then the question becomes how often or at what intervals should one assess progress. And it turns out this is very subjective but that there's a way to make it objective. Now, in a previous episode of the Human Lab podcast, I had a discussion with the great Robert Sapolsky and we were talking about how the brain can subjectively change whether or not a given behavior or experience is positive or negative. And the example that Robert gave is a really phenomenal one. It's a study that's been done in rats and also in humans where they took a rat, they had a rat run on a running wheel. Rat turns out like to run on running wheels. And the blood pressure of that animal, the health metrics for that animal, the lipid profiles, many, many things improved. Okay, the rat was exercising and it got healthier and presumably got happier. We don't know, we could have asked it, but we wouldn't know. Doesn't know how to tell us, but we can measure blood lipids, we can measure blood pressure and all sorts of things. And indeed, when that rat exercised or when people exercise, they generally get healthier. Except in that particular experiment, they had another animal where every time rat number one ran, rat number two was forced to run. It was on a running wheel and it was forced to run not because it wanted to but because it was forced to. And what was remarkable is that the physiological effects of being forced to do something were in the complete opposite direction as they were when those same behaviors were undertaken voluntarily. In other words, the rat that was choosing to run got healthier and the rat that was forced to run became unhealthy. Blood pressure went up in a direction that wasn't effective and useful. Blood lipids got worse, stress hormones went up, et cetera, et cetera. And you see the same thing in humans. Now what this says is that our subjective understanding of why we are doing something is fundamentally important for the effects that we will get from that behavior and indeed the effects that that behavior will have on us. So this has two major implications. First of all, in terms of reward schedules, we can decide to use any reward schedule that we want for a given behavior. We can decide that the milestones for a, let's say a plan of getting in really terrific cardiovascular shape over the next year, we can decide to assess every day and ask ourselves how good it was our progress. And if we made progress, then we're going to reward ourselves. We could do that every third day. We could do it every week. We could do it every five minutes if we actually have the time to do that. The reward schedule, the dopamine system is highly susceptible to the subjective effects, the so-called top down effects. And when we decide that something is going to be good for us, if we analyze it on a given timeframe, well then, it's going to be good for us. So what I suggest people do is pick a particular interval at which they are going to assess progress. And if you've been making regular progress towards a goal that you reward yourself, and the reward indeed is all cognitive. It's all mental. It's telling yourself, yes, I'm on the right track. Now, some people will say, wait, but I want to know exactly how often I should do that. You need to do that at an interval that you can maintain consistently. So you're not going to reward yourself every minute or every step of every jog that you take, unless you can do it every minute of every step of every jog that you take. For that reason, I think that, month that daily or ideally weekly assessments are going to be best. I think that checking in at the end of a week, looking back on the previous week, and assessing how well you performed in pursuit of a given goal, how many times a week you ran, or how many times you studied, or how many times you did something that you wanted to do, or avoided something that you didn't want to do. I think that's a reasonable and tractable schedule to assess once a week. So that's one point that pick a milestone that you can maintain consistently throughout the pursuit of a goal. The second thing is that the subjective effects that were described by that Sapolsky study, or that Sapolsky described, rather, are absolutely essential for all aspects of goal seeking behavior. We cannot underestimate the extent to which the dopamine system and our sense of whether or not we are on the right track is under our cognitive control. If we constantly place ourself into a mode of thinking that we are failing, well, then indeed, we are not going to turn out much dopamine. Now, earlier I said we need to predict and visualize failure, but that is not the same thing as thinking about ourselves as failing. We need to predict what the outcome would be if we failed, but then encountering that and in behaving in a certain way and thinking in a certain way and pursuing our goals in an effective way, maybe checking in on that each week, we definitely need to reward ourselves cognitively for the correct and successful pursuit. What this means is that anticipate and think about failure as a mechanism of generating motivation and indeed fear and anxiety so that you lean into the correct behaviors and you lean away from the incorrect behaviors to reach your goal. But then weekly or so, whatever you can maintain consistently, you absolutely want to reward yourself cognitively by telling yourself I'm on the right track. I got another week where I accomplished whatever it is that I'm trying to accomplish. A concrete example that I'm following now is this 150 to 200 minutes of zone two cardio per week because that's shown to be very effective in improving mental and physical health metrics. So once a week I'll check in with myself if I reach that 150 to 200 minute threshold, then I'll reward myself simply by checking off a box and saying, okay, I'm on track, I'm on track, I'm on track. This dopamine system is critical to re-up, to remind ourselves that we are on track if indeed we are on track because dopamine itself provides a state of motivation and readiness to continue in the regular pursuit of our goals. Dopamine, the molecule is actually used to manufacture epinephrine and nor epinephrine, which are other molecules in our brain and body, which put us into that readiness and action state. There are actually the molecules that help generate that increase in systolic blood pressure that puts us into a state of readiness. So you can think about dopamine as a self amplifying system provided that you are leveraging the dopamine system on a consistent schedule. Now by also following a consistent schedule of self-reward, you set yourself up for any positive unanticipated rewards that may happen. So for instance, if you're checking in with yourself weekly, telling yourself that you're doing well if indeed you are, and then out of nowhere, for instance, you're out on a run or you're doing something, I'm using fitness as an example, but you're doing something you find yourself performing particularly well, that's an unexpected dopamine reward that will further amplify the system. Now I know many people out there having heard me talk about dopamine before, worry, well, can I release too much dopamine and then the whole system will crash and then I'll run out of motivation. In general, that doesn't happen unless people are using pharmacology supplements or prescription drugs or illicit drugs to increase dopamine. This is why I'm a big fan of things like cold showers and cold water exposure, which has been shown to lead to long-lasting 2.5 x increases in dopamine. Or in some cases, supplementation with things like L-tyrosine, which are precursors to dopamine. Or in some cases, caffeine, which can increase the number of dopamine receptors that we have so that whatever dopamine we have floating around can be more effective in activating these motivational states. But things that really increase dopamine and then cause it to crash can be problematic. One way to conceive of dopamine is as a sort of dopamine wave pool. You've probably seen these wave pools where some pressure is pushed into the pool and then you get these waves going. If those waves are consistent enough, but they're of high enough amplitude, the waves can continue to go up and down and up and down. But if it's a giant wave, if you get a huge blast of dopamine, well, then a bunch of the water sloshes out of the wave pool. And then you basically have to take some time off, reset that dopamine level. That's what happens in addiction. And when people start pushing in a lot of drugs or other things into the system that increase dopamine too much. So today, we've almost exclusively been talking about behavioral tools. It is possible to incorporate supplements and things of that sort that can increase dopamine as a way to getting into ongoing motivational states. But I caution people about relying on those too much. Really what you want is you want a situation where your own positive feedback, your own understanding that you are reaching the milestones that you've set out for yourself, that you're achieving those. And that is what's causing these waves or these increases in dopamine that will further amplify your motivational states. Another very interesting aspect of dopamine that I've not talked about at all on this podcast before is actually how the dopamine system interacts with the visual system. We've talked a lot about how harnessing your visual attention to a particular point is great and can help serve your ability to both set and achieve goals. Really wonderful work that was done by Wolfram Schultz, who's one of the great pioneers in this area of dopamine and dopamine reward prediction error, showed that for people that have normal levels of dopamine, their visual search, meaning how they scanned visual environments, tends to be pretty constrained. They might move their eyes around a particular visual environment searching somewhat. For people that lack dopamine, they actually have very little movement of their eyes. They don't actually tend to look very far into the horizon. They don't have that very focused virgins point that we're talking about that kind of, I guess, for lack of a better phrase, that kind of eye of the tiger focus on a goal. Rather, their eye movements are depleted and they're not actually evaluating horizons off in their future. They're not focused so much on the extra personal space. And this actually can be restored in some of these that took place in Parkinson's patients and other people who have dopamine depleted that when dopamine is restored pharmacologically, their visual focus is re-enhanced again. Now, there are a lot of details to this study that don't map perfectly onto everything that I've talked about, but the point is this. When we are focused on a particular point in visual space or its particular goal or horizon, all those systems are blood pressure, epinephrine, and indeed dopamine get recruited to put us into a state of readiness and willingness to go pursue things in that extra personal space. When our visual attention is very diffuse, all of that relaxes and we tend to be more comfortable staying in the place that we are in our peri personal space. And the effect works in the other direction too. When dopamine is increased, our visual attention for particular things out in space increase. So the way it works is reciprocal. When we use our visual system in a particular way, bring it to a point of focus, it recruits chemical and neural systems in our brain and body that put us into a state of readiness and pursuit. And when we increase certain chemicals in our brain and body like epinephrine, like dopamine, then we also allow our visual system to be in a state of looking out at particular locations in our visual world. So the system works in both directions. And some people leverage this by using things like caffeine or taking things like alkyr scene to increase dopamine. And again, it works both ways. There's no right or wrong way to do it. I'm a particular fan of using behavioral tools, always prior to using supplementation or any kinds of other tools. Because behavioral tools have a very unique feature that supplementation and other chemical tools don't, which is that behavioral tools used over time engage neural plasticity. As we start to practice using our visual system to harness our attention to particular locations and in that way move toward particular goals, we get better and better at using those systems. In fact, the systems for focus and motivation themselves have plasticity. So we get better at being motivated and focused when we place our visual attention at a given location. Using chemical assistance of a safe kind, of course, check with your doctor, but things like alkyr scene or caffeine or those combined, yes, it will increase dopamine and will increase our ability to engage in visual focus somewhat. But those compounds alone don't modify the circuitries in the way that we want. So I always say behavioral tools first, then nutritional tools, then supplementation tools, and then if it's right for you and safe, maybe you advance into some of the other more sophisticated tools. I'd like to just briefly recap what I've covered up until now. And again, emphasize that much of what I've covered has been based on the beautiful work of Emily Balsettis and colleagues. I do hope to get her as a guest on the podcast, by the way. First of all, set goals that are challenging, but possible, those moderate goals, not super easy, not super difficult, but moderately challenging goals seem to be the most effective in moving people towards their goals over the short and long term. Second, plan concretely. You need a concrete set of actions that you're going to follow in order to reach your goals. Third, foreshadow failure. This is a somewhat surprising one to me. I would have anticipated that imagining success is the way to go. It turns out that imagining success and visualizing success can be useful at the outset of a goal and maybe every once in a while in pursuit of that goal, but that it's not terrific for putting you in constant pursuit of that goal. Rather foreshadowing failure, visualizing failure and all the terrible things that it's going to bring seems to be more effective in that maps very well to what's known about the neural circuitry and the involvement of the amygdala. Focus on particular visual points as a way to harness your attention and to remove distractors. Removing distractors and getting your body and brain into a mode of activation, getting that healthy increase in systolic blood pressure that puts you into forward motion towards your goals is absolutely key. So that's a brief summary of what I've covered up until now. There were other things too, of course, the dopamine system and the power of subjective top down control in regulating that dopamine system. But I want to be sure to include a tool that's been especially powerful for me that's grounded in the neuroscience research and in the psychology research. And as I describe this tool next, I think you'll see the ways in which it meshes nicely with the work that Emily Balsettis and colleagues have done. This is something that I've personally been doing for many years based on my understanding of the visual system and the understanding that indeed we can move our cognition and our perception from a place of interoception and focusing on our peri-personal space that's based within us and immediately around us and on the things that are immediately accessible to us. That we can shift from that mode to this mode of extra-oception of focusing on things outside the confines of our skin and that are beyond our reach that are literally goal-directed behaviors and goal-directed thoughts. And this is something that in the past, I've talked about a little bit, and I've talked about something called space-time bridging. And we haven't talked too much about the time domain of the visual system today. But space-time bridging is simply a way of using one's visual system to focus on the peri-personal space and interoception and then gradually, in a deliberate way, stepping one's focus into the extra-personal space and then back to the peri-personal space in a way that gives you a lot of flexibility and control over that ability in your daily life. So I'm going to first describe the tool and then I will explain more about the underlying science and the underlying mechanism. Here's how you would do this. You could do this indoors or outdoors, although ideally, you would do it in a location where you could view a horizon. It could be through a window or ideally outdoors without a window. It could be done any time of day at night. It might be a little more challenging, but it goes the following way. What you first do is you would close your eyes. This could be done seat-er standing, but you would close your eyes. And you would focus as much of your attention, including your visual attention on your inner landscape, on your interoception. So that would be your breathing, your heart rate, maybe even the surface of your skin, but really focusing internally. Now, how can you focus your visual attention internally if your eyes are closed? Well, you do that by imagining your inner landscape. So you don't have to imagine your heart beating and so forth, but what you're trying to do is eliminate perception of the outside world. You're eliminating extra-oception, and you're focusing all of your cognitive attention and your perceptual attention on what you're experiencing within the confines of your skin or at the level of the surface of your skin and inside your body. And you would do that for a duration of approximately three slow breaths, okay? So close your eyes. You would do breath one, breath two, and breath three, concentrating all your attention on your internal landscape. Then you would open your eyes, and you would focus your visual attention on some area on the surface of your body. So for me, the way that I typically do this will be to focus on, say, the palm of my hand. So I'll focus my visual attention on the palm of my hand. And I then do three breaths again, focusing on my internal state, but now I'm splitting out a little bit of my attention from interoception to extra-oception. I'm focusing on something outside me. The ratio or the split of attention is about 90, 10. About 90% of my attention is focused internally, but I'm also focusing some of my attention externally. Most people can do this pretty easily. Then there's a third what I call station. I now move my visual attention to outside my body, to some location in the room, or if I'm outside in the external environment, something in the range of five to 15 feet away. And I'm trying to move 90% of my attention to that external object. So now I'm really biasing my perception and my attention towards extra-oception. As I breathe, I'm paying attention to those three breaths. So that's why there's still 10% that's focused on my internal landscape, because I want to pay attention to those three breaths, but I'm focusing as much of my attention outside of myself, maintaining just a little bit on my internal state, so I can measure the cadence of those three breaths. Then I move my visual attention to yet another station, which is further away, typically a horizon or something as far off in the distance as I can possibly see. Again, for the duration of three breaths. And at that point, I'm trying my very best to move 99, if not 100% of my attention to that external location. Okay? And then what I typically will do is I will try and expand both my vision and my cognition to a much broader sphere. This is that Magno-Cellar vision that we talked about before, where I'm not focusing on a particular location in the horizon, I'm trying to dilate the aperture of my field of view so I can see as much of the visual landscape as I'm in as possible. If you're in an internal, excuse me, if you're in indoors, then that might be the ceiling, the walls and the floor of the environment you're in. If you're outdoors, it would be to expand your visual focus as broadly as you possibly can, again, for the duration of three breaths. Then I would return immediately to my internal landscape. I would close my eyes and I would do three more breaths, focusing entirely on my interoception, on my internal landscape, or what we call before it, my peri-personal space. And I would then repeat that, peri-personal space, 100%. Focused on my hand, 90%, 10% on my peri-personal space or my internal landscape. Stepping out to another location where it's mostly exteroception, maybe a little bit of recognition of my internal state. Then to the horizon, then to this broader visual sphere then back into my body. And I would work through each of those stations, maybe two or three times. The entire thing takes about 90 seconds to three minutes, depending on how many breaths you do. I said three, but you could do one or 10. It doesn't really matter. Or it's also gonna depend on, for instance, how slowly you're breathing, because your breathing might be faster than mine or vice versa. What is all of this doing? Why do I call this space time bridging? And why is this useful for goal setting? The reason I call it space time bridging is that the visual system is not just about analyzing space. It's actually how we batch time. It's how we carve up time. And the simple way to state this is that when we focus our visual attention on a very narrow point that's close to our body and our immediate experience, we tend to slice up time very finely. We're focused on our breathing. We're focused on our heartbeat. In fact, our breathing and our internal landscape and our heartbeat become the sort of seconds hand, if you will, on our experience. We are carving up time, according to our immediate physiological experience. Whereas when we focus our visual attention outside our body, not only do we engage that extra-oceptive, extra-personal space system, and we start to engage the dopamine system, the goal-directed system, but we also start batching time differently. When we focus our visual system into a broader sphere of space or into a space beyond the confines of our skin, we start carving up time our frame rate changes. Now, this is useful in the context of goal setting, goal assessment, and goal pursuit, because with the exception of a very few isolated examples, almost all goals involve setting some goal that's often the future, and then carving up the time between now and the achievement of that goal into milestones that range in duration. And the rewards, even if we try and just make them every week, are going to come at some unexpected intervals, and that's actually can be helpful for reinforcing behavior. Intermittent reward that's intermittent and random is the most effective reward schedule we know. But the problem is always, how do we keep our cognition in line with the long-term goal while also being focused on these more immediate goals? And so this particular practice that I call space-time bridging, but we could give it a different name, sure there are better names, so maybe you can suggest some in the comment section on YouTube that are more accurate or more mapped to it better. But this behavior or this practice rather, is teaching us to use our visual system and thereby our cognitive system and thereby our reward systems to orient to different locations in space and therefore at different locations in time. And that is the essence of goal directed behavior. That is the essence of setting a goal. It's about thinking about what you want. Then it's about setting milestones that are intermediate to that goal. Then it's about assessing whether or not you're reaching those milestones. And then it's of course about updating your goals if you need to update your goals. All of that is an enormously confusing batch of challenges if you think about it all at once. But if you break it down into these elements that the visual system can help you find and move towards those milestones, I think there's ample evidence to support that. And that your control over your visual system is indeed yours that you can deliberately set it to different locations. And then you make a practice of stepping through these different stations on a regular basis. Again, I do this each morning. I do this once a day. Rarely have I done it twice a day. Rarely have I missed a day. But by doing that, you can be very effective in teaching the systems of your brain that are related to goal setting a reward to map to different time frames. So I found this to be a very effective protocol. The Balsettis work has mainly focused on visual tools that are of a single horizon. Here I'm talking about multiple what I called stations or horizons. But what's very clear is that an ability to move from different visual stations and to do that in a deliberate way, in a focused and conscious way clearly maps to an ability to conceive of different goals over different periods of time. And I do believe can be greatly beneficial in allowing one to set particular goals and then move through the milestones to those goals and to constantly update ones, pursuit, and reward in reaching those milestones and eventually the overall goal. Per usual, I covered a lot of material today. We talked about some of the neuroscience and psychology and popular understanding of goal seeking behavior, out of assessed goals, et cetera. Talked about the beautiful work of Emily Balsettis at New York University and her work on the use of the visual system to better achieve goals and indeed things like visualization and why forecasting failure can be more effective than forecasting success as counterintuitive as that might seem. That's what the data point to. And we talked about the importance of setting concrete plans and really what that means and what intervals at which to assess progress and what intervals at which to assess reward and how the dopamine system is involved. And in addition, I described this practice that one can incorporate as a daily or semi-daily practice of so-called space time bridging, of using the visual system and your ability to deliberately step your visual system from stations that are within your body, so-called peripersonal or interreceptive space, out into the world further and further and then back again in sequence, as a way to harness and cultivate and build up these systems that link vision, space, time, reward systems, and so forth. Ultimately, as you set out to accomplish your goals, there are going to be a number of basic steps that everyone will have to follow. You have to clearly identify what the long arching ultimate goal is. You have to identify what the milestones will be. You might not know all of them at the outset, but you ought to have some idea about the intervals at which you are going to set those milestones and set your reward schedule for assessing progress in route to those milestones in your ultimate goal. My hope is that you'll be able to incorporate these tools, if not all of them, perhaps just one of them or two of them in pursuit of whatever particular goals you happen to be focused on at this point and in the future. If you're enjoying and or learning from this podcast, please subscribe to the podcast on YouTube, Apple, and Spotify. That's a terrific zero-cost way to support us. In addition, on YouTube, you can leave us comments and feedback. You can also leave us suggestions about guests that you'd like us to include or topics that you'd like us to cover in the comments section on YouTube. And on Apple, you can leave us up to a five-star review. There's also an opportunity to leave us a written review. Please also check out the sponsors mentioned at the beginning of the podcast. That's perhaps the best way to support this podcast. And in addition, we have a Patreon. It's patreon.com slash Andrew Huberman. And there you can support the Huberman Lab podcast at any level that you like. In today's episode and in previous episodes of the Huberman Lab podcast, we talked about supplements. While supplements aren't necessary for everybody, many people derive tremendous benefit from them for things like sleep and focus and so forth. It's really important that if you're going to take supplements that they be of the absolute highest quality. For that reason, we partner with Thorne THRME because Thorne supplements have the highest levels of stringency with respect to the ingredients they include and the precision of the amounts of the ingredients they include in their products. If you wanna see the supplements that I take, you can go to ThorneTHRME.com slash the letter U slash Huberman. And you can see the supplements that I take and get 20% off any of those supplements. And if you navigate further into the Thorne site through Thorne.com slash U slash Huberman, you can also get 20% off any of the other supplements that Thorne makes. If you're not already following Huberman Lab on Instagram and or Twitter, please do so. There I teach neuroscience and neuroscience related tools that sometimes overlap with the content of the podcast, but oftentimes is unique from the content of the podcast. Also, if you haven't already done so, please subscribe to the Huberman Lab Neural Network newsletter. The Neural Network newsletter is a monthly zero cost newsletter where I very succinctly spell out or list out protocols for things like sleep, learning, neuroplasticity, and other topics as well. You can go to HubermanLab.com, click on the menu, go to newsletter, it's a simple signup. We will not give out your email information to anybody, all our privacy policy is there. Again, at zero cost and the tools that are there, very cleanly spell out a number of the protocols that you can hear about on the podcast. And in closing, I want to thank you once again for joining me in this discussion about the biology science and in particular, the neuroscience of goal setting, goal assessment, and achieving goals. And last, but certainly not least, thank you for your interest in science. it is very essential to make it possible that you are fit for yourself. The foundation of a new infrastructure is the international foundation of a new service to Ghost and Heal Help from Advanced 많은NDC and American distributing