# Health and Human Science Matters Season 4, Episode 2: Brett Fling

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 So while it's true, the right side of our brain controls the muscles in our left hand and the left side of our brain controls the muscles in our right hand, they have to be able to know what the other one is doing to coordinate themselves in time and space. So for buttoning our shirt this morning or for buckling our belt, it's great to have individual control of each of those hands, but they have to know where the other one is in time and space to be able to coordinate the movements together.

Avery Martin: Welcome to Health and Human Science Matters, a podcast by Colorado State University's College of Health and Human Sciences. I'm your co-host and digital media strategist, Avery Martin.

Matt Hickey: And I'm Matt Hickey, associate dean for research and graduate studies. In our college, we make it our mission to optimize human health and wellbeing through discovery and innovation. Don't just take our word for it. Each episode we sit down with people who fulfill that mission, our college faculty and staff.

 Well, today we're lucky enough to have a friend and colleague from Health and Exercise Sciences, Dr. Brett Fling. Brett and I of course share the same home department, and in fact have shared some job responsibilities over there, right?

Brett Fling: That's right.

Matt Hickey: So we know each other well, perhaps better than Brett's willing to admit, to be honest with you though. He's seen me at my best and my worst. So we're glad to have you, my friend. Welcome.

Brett Fling: It's a pleasure to be here. I appreciate it. As we were just saying, I'm a big podcast fan, and so I think I've listened to every episode of this show. And I think I'm going to try it and get out of the way a little bit. We'd like to hear a little bit more of the dulcet baritone of Avery, I think on this episode.

Matt Hickey: The perfect voice-

Avery Martin: Well, thanks.

Matt Hickey: ... as we say repeatedly because we mean it every time we say it.

Avery Martin: Well, today's perfect voice is Brett, so we can hop right into it.

Matt Hickey: That's right. That's right. So of course, you know the drill. We're interested in getting to know your scholarship story. And again, our aspiration is potentially prospective students, or even early career faculty or postdocs who are looking for a job somewhere, right? Might listen to something like this, and go, oh, wow. The other half of this, of course, is we all understand none of us is defined by what we do here on campus. There's much more to life than being an academic. And I say that even as somebody who loves my job. I really almost every day pinch myself thinking I can't believe I get to do this. But there's that story about what do we do when we're not on campus? And so we will talk about your journey, talk about where you grew up, and mentors, educational influences, et cetera. But we want to start with big ideas and big problems that you and your lab pursue.

Brett Fling: Hey, you bet. I'll echo your thoughts, and say that I really stumbled into this as a job and I love it. There is nothing I can envision I would rather do at this point in life. And it is a full life. We keep busy 24/7, that's for sure. The big picture questions that we're interested in, our group study is how your nervous system and your brain in particular controls your muscles to make you move. We're really interested in how you're able to coordinate your hands and your fingers together to button your shirt and tie your shoes in the morning, all the way up to how do you maintain your balance and walk around, and enjoy the quality of life and interact with the environment around you.

 So our work is really at that intersection of the biomechanics of how you move and the neural control of how you move. How do you actually put these pieces together to successfully navigate your environment and do the things that you want to do in life? We use a wide variety of approaches to assess your neural structure and your neural function, and then relate that back to behavioral elements. And for us, behavioral means walking, balancing, using your hands to accomplish a task. How do you voluntarily control the movements that you want to make?

Matt Hickey: That's cool. And it's predicated on a background of a clinical population you're particularly interested in, right?

Brett Fling: Very much so. We often say that we use human participants almost like those who do more bench work use a knockout mouse. So we use folks with clinical populations who have very known neuroanatomics, so structural issues or impairments within the nervous system, or neurophysiologic, so some functional communication issues within the nervous system, particularly within the brain. We've done a lot of work in a variety of populations, Parkinson's disease, individuals in the chronic stages of stroke following a neural insult. But the large, large majority of our work is in folks with multiple sclerosis.

Matt Hickey: And in Colorado, MS is a particular challenge, if I remember my national demographics, right?

Brett Fling: Yeah, MS is a really unique disease. It sits at the intersection of not quite being a neuro disease. It has a lot of neurodegenerative components to it, but it's also an autoimmune disorder at its heart. And so as a result, it ends up being a bit of a strange one to study. And it is all humans and all disease states are very heterogeneous. They're different across the group, but MS tends to be really heterogeneous. There is an incredible amount of variation in how severely it impacts an individual.

 And along those lines of it being really unique, it's also very geographically specific. So the further away from the Equator you get, the further north you get, the more and more common it becomes. The exact reasons for this remain a little bit unclear, but there are certainly some genetic and environmental components that seem to come together. And again, I'm not entirely sure why, but Colorado, for lack of a better word, is sort of a hotbed for folks with MS. It is incredibly common and prevalent here in Colorado, and as a result, it helps us be able to find the participants we need to really be able to study it.

Matt Hickey: That's fascinating, isn't it? So talk to us about some of the cool tools in your lab. So this would range from wearable sensors, so that somebody's performing a task to, of course, wall mounted motion capture cameras and treadmills with not one but two belts, because any old fool can have one belt on their treadmill. We got to have two. And even maybe a little bit about TMS, if you're willing to share.

Brett Fling: Why. You bet. We kind of use everything under the sun. Maybe I'll start with the behavioral pieces that we use to assess how you move, the quality of your movement both inside and outside of the lab. And then maybe I can transition over a little bit to how we get at that neuro component, the structure and the function of your brain, and how it contributes to those movement pieces.

 So we have what you would call sort of a traditional or the old gold standard biomechanics lab. So we have those infrared cameras that are mounted up on the ceiling and allow us to get a great 3D, three dimensional assessments of how you move. So we put those shiny passive reflective markers on known anatomic spots on the body, your elbow, your shoulder, your knee, your ankle, and from there we can reconstruct and make a model of how you're moving, how you walk, and how you move in space. This is the same sort of greenscreen technology they use to make all the video games now and movies like Lord of the Rings. This is a very old reference. I always use Lord of the Rings, and I realize now it's 25 years old almost.

Avery Martin: It's a classic.

Brett Fling: The Matrix, everything from when I was in college. And so we use those to now reconstruct what we would call the kinematics or the range of motion of how you move, how much do you flex and extend your knee, your ankle, your hip as you walk through our laboratory. We pair that together with things, as Matt just alluded to, we have something called a split belt treadmill within our lab. So as opposed to maybe that sad treadmill you have in your garage or hiding out down in the basement, or the one you go use at the gym where you set it to five miles an hour and you go for a jog, ours has two belts instead of one.

 So we have one belt that we can control for each leg so we can set them to the exact same speed. We can set both belts to five miles an hour, and you'd walk just like you would on a regular treadmill, or we can set them to different speeds and force you to adapt or change the way that you're walking to essentially force you to change the coordination between your two legs as you walk.

 You can use this in a variety of fashions. It's been sort of pioneered in the use of motor learning work. So how does our nervous system adapt to, in this case, a real heavy physical stimuli that's forcing you to move differently? For our work, we use it from an intervention or a neuro rehabilitation standpoint. So we're really interested in, again, in folks specifically with multiple sclerosis.

 One of the cool things about the work that we do is, despite its real heavy prevalence, MS is about as common as Parkinson's disease at this point in time, it tends to be much less researched. Historically, there's just been a lot less work on folks with MS than there has been on Parkinson's disease, individuals with a stroke, now, traumatic brain injuries and sports related concussion. I think because MS is so unique in its pathology, it makes it difficult to study. And so as a result, there's not a lot of work in it. So we get to steal from all of these other clinical populations, work that's been done prior in stroke and Parkinson's disease, and move it into the MS world.

 And so that's really one of the approaches that we use is the split belt treadmill. If you have multiple sclerosis, you tend to have a more affected side and a less affected side. Often someone with MS will say, "Oh, my right leg is my bad leg." And if you have a more affected side and a less affected side from a walking standpoint, you tend to take a nice big step with your "good leg," and sort of drag your bad leg along for the ride. You develop a limp. And as you do this week after week, month after month, year after year, decade after decade, it becomes more and more and more pronounced, and that bad leg gets worse.

 So what we can do with that split belt treadmill is we can get rid of your limp by forcing you to walk differently. So we actually speed up your bad leg and make it walk twice as fast as your good leg. Now as a result, you can't take that nice big step with your good leg and drag the bad leg along for the ride. You're forced to take bigger, longer, faster steps with that more affected leg. And we can do this within, I mean, honestly, you adapt within about 30 seconds. It's really radical to watch. But within just a 10 minute session, we can completely change the way an individual walks and coordinates their two legs. That's great from a very short term acute standpoint. It's great to be able to make this change in the lab for a 10 minute set. But then you leave the lab, and 10 minutes later, you're kind of gone back to the old way of doing things.

 So one of the things we're really interested in is how do we get this to persist? How can we get these acute changes that happen in the laboratory to become chronic changes that will stick with you over the rest of your life. Together with the split belt treadmill, what we do is we pair it with different kinds of wearable devices that an individual can take home with them and get out of the laboratory and put them on day to day. So you might think of a Fitbit or the Apple Watch that you're wearing right now. Those are commercially available devices, and there are a wide variety of commercially available devices to stimulate muscles or sensory feedback systems.

 So we specifically stimulate somatosensory receptors, or what are called proprioceptive receptors that give your nervous system information about where you are in space. They're telling you where your foot is, how much your ankle is bent. We're all using it right now as we sit in our chair telling us are we leaning a little to the left or to the right? We're getting constant feedback from the periphery of our bodies to tell us where we are. And we can augment or enhance that feedback with these wearable devices while someone's on the treadmill.

 And then we hope this is a process that's called neural entrainment. They then take that with them, and by wearing this sensor at home, while they're in the grocery store, while they're walking through the parking lot, or the hallway walking around in their house, they're getting this constant enhanced sensory feedback to really change the way their nervous system controls their movement.

 So we use wearable devices, we use these fancy treadmills and 3D motion capture, and we pair all of that together with a variety of non-invasive brain imaging approaches to look at the structure and the function of the brain to try and help us, A, predict how people are going to respond to these interventions that we try like the split belt treadmill and/or to identify who responded well to it and who didn't. So this is a classic issue in neurorehabilitation for any population out there. When you do some sort of intervention, some folks respond really well, they look a lot better after the intervention. Some folks respond a little bit, they improved on some things, but they didn't do great. Some folks don't improve at all, and might even look worse following the intervention. It might be the wrong intervention for them.

 And this is one of the big picture questions from a neuro rehabilitation standpoint is can we identify why? Can we figure out why did some of these folks respond real well? Why didn't some of these folks respond well? And so this is where our brain imaging components come in, is to try and be able to look at what are either things that predict people's responses, or what are some of the things that change following that intervention and the way their nervous system communicates that really tells us, Ooh, this is the group who responded really well.

 So we use a variety of magnetic resonance imaging approaches, MRI. You can do all kinds of things with an MRI besides just take a nice picture of your torn ACL. So we can get high resolutions structural images of your brain to look at things like the volume of specific areas within your brain that might be of interest to us. We can do what are called functional MRIs. So we can give you a task in the MRI scanner. We can have you tap a finger and see what areas of your brain light up, what areas of your brain are turning on to control that muscle activity. We can do this for a variety of behaviors. We could show you scary faces in the MRI, and see where the fear areas are within your brain. We could give you hard math problems to do, and see where attention and focus and memory. And there are a variety of behaviors.

Matt Hickey: You just like scary faces, right?

Brett Fling: Now, if anyone's ever had an MRI, what's the number one thing they tell you when you go in the MRI? Don't move. So it's really difficult to take some of these pieces of how does your brain turn on to control movement if the number one goal in the MRI is don't move, stay perfectly still because we can't have your brain moving around. We've got to localize where everything is.

 So as a result, we try and get away from the MRI and get into a little bit more of what we would call functional brain imaging approaches. And this is where we work with folks like Dr. Jaclyn Stevens from the OT department using mobile brain imaging approaches, whether that might be electroencephalography, EEG, or her current milieu is functional near infrared spectroscopy, fNIRS. And these are caps you can put on somebody. And we can now have them walk on our split belt treadmill and record their brain activity in real time to see how is it different when they're walking on the treadmill and the two legs are moving at the same speed versus when we have that split belt going and now one leg is walking twice as fast as the other.

 Where in the brain does that show up as different activity? How does the nervous system encode this to adapt and change the movement patterns? And what does it look like maybe if you are a neurotypical individual versus a person who has MS, how does that brain activity look different? How does it look different when we augment that sensory feedback system? How is the brain changing its activation patterns in response to these different rehabilitation approaches?

 And the hope is from using those types of pieces, we can really start to identify why some people respond really well to a given intervention. And we can start to stratify individuals into, ooh, you'd be a great candidate for intervention A. You seem like a much better candidate for intervention B based on these different activation patterns that we see in your brain.

Matt Hickey: Let me prompt you with a couple of other questions. First, imagine a patient in Colorado that has MS, and by some miracle of fate, has not yet met Dr. Fling, right? They hear something about wearable sensors, and I think I can do that. So when you are sending a research participant home and trying to maybe entrain that gait pattern that was induced for a short period of time on the treadmill, what kind of feedback am I getting? I might be asking is it auditory? Is it a vibration sort of thing? Is it some massive shock that I can't possibly ignore? What are we talking about?

Brett Fling: So we try not to use the terms massive electric shock when we're talking to our participants.

Matt Hickey: Strike that from-

Brett Fling: But it is sort of in that ballpark. So right now, I mean your question is right on the money, Matt. There are all kinds of different sensory feedbacks that we could augment, we could augment with a visual stimuli. And we've tried some of that in the past, with an auditory stimuli, with a vibratory stimuli. There's all sorts of different sensory receptors that we could target. At the moment, our approach is using a readily available over the counter, relatively low cost approach that is called transcutaneous electric nerve stimulation. So this is a TENS unit that has been used in rehab for decades.

 And there's a lot of really interesting work starting to come out that suggests this may sort of prime that sensory feedback system and send more information from the periphery into the central nervous system up into your brain, giving you more information about where you are in space, that then allows you to make a much better decision or an output to the muscle so that your motor control can improve because you're getting better information.

 This is one of the things that we know is impaired in a variety of populations. Again, stroke, Parkinson's disease, but certainly in folks with multiple sclerosis, this proprioceptive feedback of where they are in space, they're not getting enough of it, and it travels very slowly in their nervous system. So oftentimes the information they're getting that tells them where they are in space, if it's even a hundred milliseconds late, they're now making an incorrect movement with their muscles because they're out of time, they're out tempo with where they actually are because of this delay within their nervous system.

 So our approach is using this TENS unit to try and increase the quantity and the quality of that sensory feedback so that they can make more informed decisions of how to move. So we use these TENS units. We place just kind of big stickers essentially on muscles of the lower limbs, ones on the front, your shin muscle, if you will, that pulls your toes up in the air, and your hamstring muscle on the back of the leg that really helps you bend your knee.

 And they wear them all day long. And they just give a very low level stimuli just a touch below what we would call their threshold. So these individuals can't quite feel it, even though it is on. And it's just going all day long. And this tends to have a real systemic effect actually. So we work an awful lot and collaborate with a lot of ideas with Dr. Roger Enoka from down at CU Boulder, and he's been a pioneer in neuromotor control and neuromechanics for decades.

 And his work has shown that, even by putting these stimulating pads, electrodes on the lower limbs, it improves function of the hands. They tend to do better with coordination, dexterity. And so there's some sort of systemic effect where this improves a wide host of motor control, not specific to one thing, which is really the holy grail from a neuro rehab perspective is can we improve everything, not just that one very specific thing that we train. Can we generalize it to your everyday life?

Matt Hickey: This is really cool, right?

Avery Martin: Incredible.

Matt Hickey: So I'm going to put my nerd cap on here. So these are external signals that the individual cannot feel, but the brain is certainly aware of it. I mean, again, this dichotomy of I don't notice versus it's not being detected is a really interesting kind of phenomenon. Tell us a little bit more about that.

Brett Fling: Yeah, so the way that proprioception works is incredibly complicated, but you have what are called muscle spindles that are intramuscularly. So they're wrapped around individual muscle fibers within your muscles. And every time your muscle changes length, I mean we're talking about a nanometer, any change in your muscles' length, shorter or longer, these muscle spindles fire off and send information into the brain to tell it. My elbow's lengthening in a little bit, my elbow's shortening a little bit. It's getting information about how your joints are changing. This is how you move in your environment you turn your muscles on to make your joints change their position. This TENS unit is preferentially or selectively activating these muscle spindles essentially constantly so that they are turning them on and increasing the amount of feedback that's happening in your nervous system and sending more signals into your brain.

Matt Hickey: What do you think?

Avery Martin: I've learned so much. I feel like I just had the great opportunity to just be in one of your classes. So this was absolutely incredible.

Matt Hickey: This is where we're just going to go with my head's going to explode. We're all science 101 here, right?

Brett Fling: HES 303. This is what we're covering right now in class.

Matt Hickey: So let me ask you another question that just came to mind. Has anybody attempted sort of a multiple feedback that taps multiple systems at the same time? Does that make any difference? It's not just tactile. Maybe I do the visual and auditory.

Brett Fling: So I'm sure the answer has to be yes. I'm sure folks have done this. I don't have any good examples off the top of my head for what that might look like. But one of the things that we used to do when we used to really target individuals with Parkinson's disease, we would focus on individuals who there's a subset of folks with Parkinson's disease who over time developed something called freezing of gait. And it's called that because this is what it manifests and behaviorally looks like, folks look like they're frozen in place. They're trying to pick their feet up and take steps. And if you have this, people describe it as it feels like your feet are glued to the floor. I can't take a step even though I'm trying to. And you can just sort of see them stuck in place.

 And again, we don't know why some individuals develop this with Parkinson's disease and some don't. Also, if we describe it clinically, they look incredibly similar to someone who doesn't have it and someone who does have it. What we've seen is that from a rehabilitation standpoint, doing a more standard motor specific neurorehabilitation program, some of the sort of broad components of their gait, like gait speed and maybe their step length and stride length improves by a standard motor rehab component, but that freezing component wasn't getting any better. They still continue to freeze, even though once they get going, their walking looks a little bit better.

 And so one of the things that we found was by pairing what we called our ABCs, the agility boot camp, so we did a circuit training approach with them where they would do yoga and an obstacle course and boxing, and a wide variety. It's like going to the gym, and doing some CrossFit essentially, but for individuals with Parkinson's disease. If we paired that together with cognitive training at the same time, so now they're dual tasking with the boxing, with the obstacle course, with the yoga, by adding on this additional piece of not just the physical motor component of thinking about moving and how they move, but forcing them to do math, answer questions, do a wide variety of cognitive tasks at the same time, then we saw not only nice increases in those broad measures of gait speed and step length, but we saw really big changes in their freezing of gait as well. It tend to really lessen it and reduce it.

 So again, sort of looking at this interaction of, I think for years and years, we always thought our motor system, there's very specific areas in your brain that send signals out to the muscle. And we thought, well, this is the spot to look at if there's something wrong in that area. This is then how we can describe it out in the periphery with the behavioral issue. What we really know now is that your brain is so densely interconnected that the prefrontal cortex that houses all these cognitive and attention centers is very heavily communicating with the motor areas of your brain to help drive and control how you move. And a breakdown in any of these loops and circuits really manifest in a wide variety of behavioral impairments.

Matt Hickey: If you're not looking in the right place, you might miss it all if you're focused on a particular nucleus or region.

Brett Fling: That's exactly right.

Matt Hickey: That's interesting, isn't it? So a couple other things. While we're on a roll here, tell us about transcranial magnetic stimulation as a tool again to study the brain.

Brett Fling: So transcranial magnetic stimulation, again, getting away from the idea of a "massive electrical shock," TMS is a magnetic stimulator. So it's not an electrical stimulator, it's a magnetic stimulation. It works relatively similarly to the principles of a magnetic resonance imaging scanner, an MRI. So we have in our lab, it's called a figure eight coil. So it's a big piece of iron essentially that's shaped into a figure eight and it's got a plastic housing around it. And when we turn that machine on, it generates a magnetic field.

 And when we hit the discharge button, when we hit the orange button, it discharges a magnetic pulse. We can hold this over your brain. And all of our brains, give or take, are organized in a very similar fashion. So we know where the areas are on the right side of our brain that control the muscles in our left hand, or in our left leg or in our left foot. And by putting that magnetic stimulator over that spot on the right side of the brain, and discharging that magnetic pulse, our brain converts it into an electrical signal. And if it's of sufficient intensity, if it's a strong enough magnetic pulse, we can turn those neurons on in your brain which then make your muscle twitch. We can use it to assess indirectly neurotransmitter function within your brain. So we can use it to, if I want to give that stimulation, make your muscle twitch, we can see how excitable those neurons are, which is an indirect measure of glutamate within your brain. That's our most common excitatory neurotransmitter in the nervous system.

 We can use it in a different context to assess how well your neurons can inhibit activity as well. So a GABAergic function is another way we can assess how well maybe neurons can turn things off, or stop a signal that's going on in the brain. And so by having individuals do something and then stimulating that same spot in the brain, we can see how well we can turn that activity off for a period of time. There's different ways to assess acetylcholine within the brain, cholinergic function as well. So through a variety of ways we can use this to assess neurotransmitter density and uptake within these motor areas of the brain.

 And that's how we use it specifically as almost a diagnostic tool from a motor standpoint is how well can you turn neurons on and/or turn them off. Again in this enormously complicated neural network of the brain, these are really important components for how you're able to now coordinate and get the appropriate signals at the appropriate time to the muscles that you want to control your movements. TMS is also used in a repetitive faction. So you can use it to give a train of stimuli, a number of stimuli for 10 minutes, for 20 minutes, for 30 minutes to try and induce some neuroplasticity within the brain as well.

 So we might have neurons that aren't excitable enough and we want to increase their likelihood that they're going to turn on and discharge. So we can use a very high frequency repetitive stimuli to over 20 or 30 minutes to try and induce what we would call long-term potentiation. Can we get them more likely to turn on? And if they're more likely to turn on, the millions and hundreds of millions of neurons they connect with are now more likely to turn on. If we have some neurons that are maybe too excitable, we can also use it at a very low frequency to try and decrease the likelihood that those neurons will turn on. So we can try and institute some long-term depression within those neurons so that now they're less likely to turn on.

 This is actually the only current FDA approved use for repetitive TMS is to treat individuals with depression. So when we use TMS, we try and target these motor areas of the brain to activate muscles or inhibit muscle activity. For individuals that are treating depression, they might move up to more on the prefrontal cortex areas of the brain, and they're trying to increase that neuronal activity and increase serotonergic function. Can we release more serotonin up here than the brain to try it and mediate some of those symptoms? So they use TMS maybe in conjunction with a pharmacology plan to say, hey, what if you just swing by the doc's office once a month and get a stimuli, and you've got your medication you're taking on the daily basis, and do those two pieces together. As you were asking earlier, Matt, sort of had that cumulative effect of enhancing brain activity, brain function, and getting it a little bit more regulated.

Matt Hickey: Cool. So we've been doing this now, this is our fourth season, and I think I've been waiting from the first one to be able to ask this question because I've always wanted to say corpus callosum. So it's finally arrived. It's

Brett Fling: My favorite spot in the brain. You've come to the right place.

Matt Hickey: So I think even a lay audience understands the two sides of our brain. And so talk about the studies you do to try to understand how they're communicating with one another.

Brett Fling: So this is really where our work and what I've done for the past decade or so has really been heavily based on. So when we talk about our brain's function, we say the right side of our brain controls the left side of our body, and vice versa, the left side of the brain controls muscles on the right side of the body. I often describe our brain sort of like a heart. There are these two sides, the right hemisphere and the left hemisphere, and they sort of fold in and sit together like this. But really they're only connected via the corpus callosum. So it is the largest white matter tract in our nervous system that sits right in the middle, and it connects with white matter axons, the right and the left side together.

 So while it's true, the right side of our brain controls the muscles in our left hand, and the left side of our brain controls the muscles in our right hand, they have to be able to know what the other one is doing to coordinate themselves in time and space. So for buttoning our shirt this morning or buckling our belt, it's great to have individual control of each of those hands, but they have to know where the other one is in time and space to be able to coordinate the movements together.

 And so this is where the corpus callosum comes in. It's connecting the right and the left side of the brain together, and it has what we would call primarily homotopic connection. So they're communicating with each other to let one hand know what the other's doing so that you can move them together. And although it's a little bit different, we think this is really important for your legs as well. So when we're walking across CSU's beautiful campus on a snowy, icy day, we're not thinking about it all that much, but we are very, very definitely coordinating the right leg and the left leg knowing exactly where they are in time and space as we step and swing one leg through and do it with the other one.

 And this is one of the things that we think we really impact by doing that type of training on the split belt treadmill is really changing the way the two sides of the brain are talking to each other, and maybe bringing a little bit more attention to where am I in space and how do I coordinate these movements together?

Matt Hickey: We're going to pause for just a moment on brain stuff. We're going to come back to it, but we talk about you and your academic journey. Because again, I think particularly for a recruiting perspective, grad students, a lot of them are going to go, ooh, that's cool. I can relate to that.

Brett Fling: I think it's cool.

Matt Hickey: We're dying to hear it. So talk to us about where did you grow up, family, an educational trajectory. We're always interested in mentors, people who still really you bear their influence.

Brett Fling: Yeah, I think this is one of the fun parts of listening to this podcast and just getting to talk to all kinds of folks in academia at this point in time is what a weird journey it is. And mine is no different. I certainly never had designs or plans to do this as a career. I was not particularly invested as an undergraduate student, to be quite honest. So my mom remains amazed that I work at a university to this day. She can't believe I still do stuff with school.

 I'm a Colorado native. So I grew up west of Colorado Springs, what you call up the Pass, so up in Chipita Park. And just grew up loving the outdoors and loving athletics. I grew up with just an amazing family. I have one older brother who beats me at every sport still to this day. Much to my chagrin, I can't get the best of him. My dad was actually a race car driver. He was a gearhead growing up. He loved cars. And so he actually raced the Pikes Peak Hill climb for probably about 15 years. He was the rookie of the year back in, I don't know, 1965 or something like that.

 And his hobby was building and restoring old cars. So if you couldn't find him, he was in the garage with a wrench in his hand. And he probably went through about 20 to 25 cars over the course of us growing up. So whether we like it or not, my brother and I are also very mechanically inclined. We had no choice in the matter.

 We also loved sports. So he went to Greeley to UNC on a baseball scholarship. And I followed him there, and was not particularly focused on academics as a freshman or a sophomore in college. School always came very easy to me. And as a result, I didn't put in an awful lot of time and effort, I think it's fair to say. And my sophomore year, I took advantage of UNC, just like CSU is, as part of the WUE program, the Western United States Exchange Program. And so my freshman year at UNC, my roommate was from Maui, and about half of my floor in my dorm were all from Hawaii. They all wanted to get off the island. And they didn't realize Greeley was Greeley, but they wanted to come out to Colorado and go skiing.

 And so our entire floor was full of kids from Hawaii. And as we spent the year talking to them and saying, "How did you come here? How does this work? Why are you here?" And we realized, oh, we can go to Hawaii for the same amount of tuition to go live in Greeley. And so my sophomore year, a couple of friends and I went to Hawaii, and went to the University of Hawaii at Manoa on Oahu's campus. And one of my friends who I went there with was a kinesiology major. And he was a senior, so he was actually at the very end of his undergrad career.

 And he would bring home his biomechanics homework. And he didn't particularly enjoy math. And for one reason or another, I've just have always gotten math. Math is easy to me for some reason. And so he would bring home his homework and go, "Here," and I would sit there and I would do it. And it was about athletics and human movement and motion. And I thought, oh, this is awesome. I didn't know you could do math, and actually it had some relation to something I was interested in.

 And so I came back from Hawaii, and then came back to UNC. And I switched my major from who knows what I was doing, and switched to kinesiology. And the first class I took was biomechanics with Dr. Gary Heise, who he's been serving as the department chair there for about the last five to 10 years I think, and is a fabulous mentor to this day. I email with him regularly. And he is an amazing guy in a variety of levels. And I loved being in the classroom with him as an instructor. I found his class incredibly challenging and interesting as that first sort of introduction into kinesiology. My senior year he let me take a graduate course with a bunch of graduate students that he was teaching, so sort of an upper level biomechanics class that, again, just hit me right and I loved it. He helped me find an internship as I was finishing up. So similar to our program here in HES, you had to do an internship to graduate from the kines program there.

 And so I got to go work at the Children's Hospital down in Denver at the Center for Gait and Movement Analysis. So it is a 3D motion capture clinical gait laboratory. And a lot of folks were going off to do their internships at 24 Hour Fitness and things like that. And I thought, I didn't go to college to go work at a gym. I want to do something with this. And so Dr. Heise said, "Well, here's an idea. I can put in a phone call for you." And I got down there and it blew my mind. That job really changed my life for what I wound up doing. I worked there during the summer as an intern.

 And since it was in a children's hospital, primarily we saw children with cerebral palsy. So these are individuals who had a neural injury, preterm or during birth, or immediately after birth. And depending upon the location and the severity of that injury to the brain, really then dictated the severity and what their behavioral impairments and issues looked like. So we would see about eight kids a week, and they would come in and do our clinical gait analysis. So we would start off with a physical therapist, and I was the intern. So I was walking around holding a clipboard just writing down numbers and doing what I was told.

 And so we would do a physical assessment, range of motions, strengths, spasticity, all these things with the physical therapist. Then we'd take them out, and I'd get them all gussied up with a variety of sensors. So as we spoke about earlier, those reflective markers on bony landmarks in the body, so we could reconstruct that model of how they walk. We put electrodes on the muscles of the lower limbs so we can see their muscle activity, when are they turning on, when are they turning off? How much are they turning on? What's that activity of the muscles look like? And we would then do a gait analysis to see how they walk. What do their movements look like? How much range of motion do they have at the hip, the knee, the ankle? What does the strength of those muscles look like? Are they turning on at the right time?

 And would put all of these pieces together, and we would work with a number of physical therapists, the lab had a full-time biomechanist, and then the sort of co-directors of the lab where the chief orthopedic surgeon, and the head of rehab medicine for the children's hospital. And so we would get together once a week and have case review. And so we would go through the eight individuals we saw the prior week, and we'd have the report up and we'd just go around the room talking about, "Well, I saw this," and we noticed that she was weak here, and she was a little bit spasticity on this muscle.

 And after we'd talk about them for a while, we would then make these recommendations. That to me as an intern blew my mind whether this was a course of drug therapy, pharmacology, would we inject Botox to try and decrease spasticity within a muscle? Would we suggest maybe an ankle foot orthosis, an AFO, or a knee, ankle, foot orthosis, some sort of physical therapy approach. Or I think what was maybe not the most common, but very often was some sort of surgical intervention for these kids to try and assist in their movement patterns. And these surgeries, again, to me as a young person who was just getting into the medical field, were astonishing.

 So there were things like muscle lengthening. They would go in and cut the fascia on the muscle and cast it in a real extended position to try and get these tight muscles to stretch out. There would be muscle transfers. They would cut one of the quadriceps muscles and wrap it around and suture it to the hamstring because that muscle was turning on at the wrong time. And as a result, it was making the knee go straight. If we move its position and attach it to the hamstring, now when you turn that muscle on, it bends the knee. And I would go and "assist" with the surgery. So the head of orthopedic surgery, who would come sit in on these grand rounds, would then say, "Well, you can come up and see this one if you want to."

Matt Hickey: So in the OR?

Brett Fling: So I would go scrub, and I would hold a leg while they were in their doing this radical carpentry, and cutting bones in half, and turning the femur and rotating it, moving the muscles, doing all these pieces. And I was blown away. I had no idea that this is what was happening.

Matt Hickey: So then of course, graduate school is suddenly appealing to you.

Brett Fling: So from there seemed, I loved this as an idea, as a career, as a job, and I really want to figure out how can I be knowledgeable enough to feel comfortable in making some of these suggestions or these decisions. And so started looking around for graduate school. And I think, unbeknownst to me, I picked an incredible school to go to and a fabulous program. So I was, again, at the very nascent stages of my career, I knew very little about kinesiology programs and rankings and who did what. And really, I was very naive to the field of research in general. I was working in a very clinical setting in a hospital. We did the exact same type of analysis every single day. I didn't know what research was, I think it's fair to say.

 But I thought, well, I'll go get a master's degree, and then maybe I could be the lab biomechanics person. I could be that person who sort of oversees the biomechanics piece of one of these clinical gait labs. So I went to the University of Massachusetts. This is a common story I always like to tell grad students. I applied to work in a great biomechanics s lab there. And I went and sort of interviewed and met with the director of the biomechanics lab, went to UMass Amherst to visit.

 And when I got done with the interview, I got an email about a week later that said, "Hey, I really enjoyed your visit, but I don't think I'm going to take any students next year." He said, "But you have a good resume. I could pass it around to other faculty if anyone else is looking for a master's student." And I said, "Sounds great. I really want to go there and move to Massachusetts and join that program. So feel free to pass it around."

 So he passed it around, and I got an email from a different faculty member who studied neuromotor control. And he said, "I see you have some electromyography background, some EMG with working with the clinical populations and assessing muscle activity. That's what our lab does. Would you want to join us?" And with no thought whatsoever said, "Sure, that sounds great. I'll go do that." So I went and joined his lab and spent two years there working on my master's degree. And we studied what we would call intramuscular EMGs. So we would insert needles into the muscle itself and study individual motor units. So when you turn on a muscle or activate a muscle, you turn on one neuron at a time, which activates a set number of muscle fibers. And the more force you need, the more and more neurons you turn on until you get the amount of force you're looking for.

 And so we would study those individual motor neurons, and how they're recruited within a muscle in college aged kids, in grandma and grandpa, how are they different? What if you're really, really heavily strength trained, a great anaerobic function, does that change the order and the process in which you recruit these motor neurons to activate your muscle? And I spent a couple of years doing that. And so really looking at spinal level control of muscle activity.

 And when I got done with those two years of the master's, I did exactly what I thought. I applied to a bunch of different clinical gait labs. The Shriners Hospital has a huge network throughout the United States, and they were sort of the originator of these clinical gait labs. And so they have them all over the country. And I got offered several jobs to go be the lab biomechanist at these different Shriners Hospitals.

 And so after talking about it, and talking with other graduate students, and my advisor for a long time, I said, "I don't want to go do this. I kind of like the research actually." And so I again had a great advisor during my master's. And he said, "Well, I have some money. You can just stay here for a year and work as a research assistant, do a couple of other studies in the lab, and think about what do you want to do next. What would make the most sense?" So I said, "That sounds great."

 So I stayed and I worked as a teaching assistant and a research assistant in the department and stayed an extra year. This is coincidentally where I met the great Dr. Braun originally. So he was a faculty member at UMass at this point in time, which is a heavy contributor to how I wound up here years later. And so I stayed for about a year. And as I was doing it, I got late into the fall and into the winter, and I thought, I don't want to be the person who just does the same thing day after day in some clinical lab. I want to direct the lab. And to do that, I need to get a PhD. So now I guess I'm going to go to more school. Which again, much to my parents' amazement, thought are you kidding me? How can you still be in school at this point?

 And so I started looking around for different programs to go do a PhD. And not dissimilar from my master's experience, I applied to work with an amazing individual at the University of Michigan who did really cool biomechanics work. And I really wanted to go work in his lab and learn about walking assessments. And he was starting to do some of this mobile brain imaging component. And I thought, this is the perfect fit. So I applied to his lab, and I went to Michigan in January in Ann Arbor, and it was cold as all get out. And spent a couple of days interviewing with him and got back. And about two weeks later I got the fateful email of, "I don't think I'm going to take any students next year, but I'd be happy to pass your resume around other folks in the department." And I said, "Okay, that sounds good."

 And he passed it around. And again, someone who did much more sort of neuromotor control contacted me, and said, "Hey, you have a pretty good background. I'm looking for a PhD student. Do you want to join my lab?" And I had always wanted to go to Michigan for some reason. I loved Michigan growing up. I loved the Fab Five. Just Michigan was always high on my list of this is an awesome place to go to school. So I said, "Sure, I'll join your lab." And I went there.

 And again, it worked out as just the perfect experience. She was the most incredible mentor. She is still a very good friend to this day. I worked with Dr. Rachael Seidler there. And I communicate with her very, very often still to this day. And so I started doing work in her lab. And there we really went heavy into the MRI work. So I learned how to use an MRI machine, how to collect the anatomic pieces, the physiologic pieces. And actually over time, I wound up getting trained on how to run the MRI machine. And so by the third year that I was there, I started doing a part-time job where I would go run the scanner about one day a week for everybody else's studies that was going on.

 So I became very, very ensconced in the world of loud buzzing noises, if you ever had an MRI, with that terrible... And I would sit there and listen to it all day long. But really received fantastic training in the nitty gritty of what the MRI does, how it works, and how to use it. And received incredible mentorship from Dr. Seidler on what her job was, what it meant to be a professor and a faculty member at an academic institution. And that was something I had never given, I wouldn't say a second thought to, I'd never given it a first thought too. It had never crossed my mind as this is a job that I would do.

 And over the course of being there for several years, she had a couple of small children at that point, and I was just enamored with what she spent her days doing. I found it fascinating. I really loved going to our lab meeting every week. You just spent your time learning so much cool stuff on a weekly basis. So I thought, I can't believe this is what you do all day. This seems so cool.

 And so over the course of my time being there, I started talking to her about it. And she's started filling me in on what her day was like, and how she got into it, what her background was, what she loved about her job, what she didn't love about her job. And over time I thought, I'm not going to go work in a hospital. I want to do this. This is great. So when I finished my time there, I was very sold on the idea of I want to be a professor. I want to work at an academic institution and do this for a career.

Matt Hickey: And so the natural next step for many of us, not everybody admittedly, is a postdoc, right?

Brett Fling: Natural next step was a postdoc. And those things I tell my students now, timing is everything, right? I mean, there's tons and tons of labs, places, individuals you'd love to go work with, but it may not be the right time to be able to go do it with them. So I was looking all over the country, all over the world for, this is one of the cool things about a postdoc, it's a great time to get out of the US and go explore a different culture, a different part of the world.

 But for me, unfortunately, my dad was very sick at this point in time. And he had been diagnosed with cancer, and was going through treatments. And timing was everything in a great way. And in this case where I actually found a postdoc. My dad was living out in Southern California at this point. He and my brother were out there together, and my mom was sort of going back and forth between Colorado and California as he was doing his treatments out there. And I found a postdoc position at the University of California Irvine, which was about 50 miles down the road from where the rest of the family was living. So we moved out there, and it was a perfect opportunity to get to spend a bunch of extra time with him that I never would've gotten to otherwise, which to this day, I am incredibly grateful we made that decision.

 So I joined the neurobiology department at the University of California in Irvine, and spent a year there working with folks who had had a stroke. And so we worked at the medical center, and we would have folks that were admitted with a stroke. And the first thing they get is an MRI to see the location and the severity, where's the stroke? We then got to work with that MRI and see how are they doing a year later, five years later? We would track them chronically down the road to see, can we really predict, based on what that stroke looks like the second you're checked into the ER right when you've had the injury, is that pretty much the predictor that's going to tell us how you look a year later, five years later? Do we need all of these additional assessments that we do millions and millions of times, or can we tell right off the bat how it's going to look?

 And it was a really interesting set of studies and approaches, but I got a grant to move somewhere else. And so we took off and went to postdoc number two. So I was only in Irvine for about a year. My family, my dad and my mom, moved back to Colorado at that point in time. And so the pull to be in Southern California was less strong. I'm a Colorado mountainy type of a guy. I'm not a Southern California pavement type of a guy. And so I didn't love the environment and the culture in Southern California where we were at.

 But we got an offer to move to Portland, Oregon, and join the Oregon Health and Science University's Department of Neurology. And there it was a much better fit for the type of work that I was doing and was interested in and kind of where I saw my career going. So we went and joined the neurology department there, again, still as a post-doctoral fellow, but started doing work in Parkinson's disease and multiple sclerosis. So I had a grant to go there to work on some multiple sclerosis work and really kind of get that line of work going that I always wanted to do.

 And there was an enormous group of folks doing just really cutting edge Parkinson's disease research. And they've been there for 30 plus years, and have really been at the forefront of a lot of the things that we know now. Living in Portland was a big draw, but then again, going back to the question of a mentor, the individual I got to go work with at Portland is a giant in the field. She has been for a long time. She's sort of the original physical therapist who started doing research. So her name is Dr. Fay Horak. And I didn't realize what a big deal she was, to be honest. They offered me a position, I said, "Sure, that sounds great. We want to move to Portland. So this sounds great." And I spent the next five years having people go, "Oh, you work with Fay?"

 And she is a force to be reckoned with. She is an amazing person. She juggles a huge research team and agenda and is known throughout the world for her work. And it was the most impactful, informative, training experience I've ever had. It really set me on the path that I've been on for the past 10 plus years. And she was really the guiding hand in all of it. And she's been doing it for such a long time that she has this enormous scientific tree that there's nothing more enjoyable than going to a conference, and you're going to run into five different folks who were a PhD student with her or a postdoc with her, and have stories to tell. And you get to sit around and hit a happy hour and spend a couple of hours just listening to their experiences with her. She was incredible. And it was easily the best decision I've ever made from an academic standpoint and a career standpoint to get to go learn and work with her.

Matt Hickey: That's so cool. Now, of course, you've throughout the talk made clear to our listeners how much of a home Colorado is to you. And so talk about the casting your eyes homework while you were in Portland.

Brett Fling: Well, the great Dr. Hickey won't remember this, but the department of HES had multiple faculty searches during the early 2010s. And yours truly applied to all of those repeatedly because I really wanted to move back to Colorado. And you happened to be the search chair on several of those. And you weren't interested in my application for a few years.

Matt Hickey: It's my biggest regret in life too, to be honest with you.

Brett Fling: No, it was clearly the right decision at the time. I needed to garner a lot more training, and it worked out great that I was able to go do these postdoc experiences to really improve my capacity. So yeah, Colorado was certainly, like we say, timing is everything. It was always a pipe dream in the back of my head that I would love to move back to Colorado and be able to work here and raise my family here.

 And when I came, I actually came out to CSU to give the HES Graduate Student Seminar. So we run a student seminar series every Friday. And I was invited out to give a talk in 2014 as part of that seminar series. And I came out on a perfect Colorado April Friday afternoon. And I came and gave the talk, and we got done. And I was walking around campus. And I mean the intermural fields were full of kids playing volleyball and there's soccer balls flying everywhere. And I just thought, oh, I miss this so much. So I was at Oregon Health and Science University at that point. And it is a very large clinical research complex, very akin to a Mayo Clinic, a Cleveland Clinic. That's the vibe there. It is a multitude of hospitals all garnered together in this huge research clinical complex. And it is an incredible place to work and do research, especially if you're interested in some of those clinical populations.

 And I came out to CSU, and the sun was shining and the birds were chirping, and the Frisbee was flying at your head every two seconds. And we went home, and I woke up Monday to go into work in Portland. And it was raining and it was gray and gloomy. And I walked into the hospital and I thought, I don't like this environment anymore. It's an incredible opportunity and a great place to work. But man, I miss Colorado.

 And while I was out here giving that seminar at CSU, the department of HES was in the midst of a search for a new department head. And so actually as I was walking around the halls and talking to folks and doing my seminar, I saw posters and flyers everywhere for Dr. Barry Braun who was coming to give a talk the next week and interview for the department head. And I thought, I know that guy. I love that guy. And I don't know what it was, three or four months later, he was officially announced as the new department head at HES.

 And so I sent him an email eight seconds later, and said, "I know this is a ridiculous thing to send, and I know you haven't even started there yet, but I really want to come work there. And if you think there's going to be any job opportunities in the next several years, I just want my name on the list. I would love to be able to come and interview there and meet folks." And he responded and said, "Well, I'm not going to offer you a job, but I think we are certainly going to have some positions available in the coming years that you'd be a pretty appealing candidate for." And so I think about three months later, there was a position available that was right up my alley. It happened to just work out. Again, timing is everything. It worked out perfectly. And so I had the chance to come interview and get offered a position to come back here. And I mean, it was the easiest decision I've ever made in my life. I was dying to move back to Fort Collins.

Matt Hickey: And so you started with us what year?

Brett Fling: So I came out in the summer of 2016.

Matt Hickey: Okay. Not that long ago, as it turns out.

Brett Fling: Not that long ago. But also, well, almost seven years. It feels like a lifetime somehow.

Matt Hickey: Yeah. It's both quick and it's filled with a variety of experiences.

Brett Fling: That is the truth.

Matt Hickey: So tell us about, I'm going to call it the Fling Lab. You can adjust that in just a moment. But the people you train and things you do. And we've stuck with this sort of cliche of the day in the life knowing, and 100% of people have pushed back and said, "There is no typical day." And that's fine, but you get the idea. We're interested in life for you and your team as you're pursuing these questions that we started with.

Brett Fling: I mean, this is a pretty typical day for me. I do a podcast every morning at 9:00 AM. So our lab is called the Sensorimotor Neuroimaging Lab. It is very intentionally not called the Fling Lab. This is conversations I had with a lot of students as I was coming up through my graduate training. And we found we always liked labs that weren't named after the head honcho. Ours is the SNL. I love Saturday Night Live. It is one of my guilty pleasures. I think I've probably seen every episode ever. It's been around for almost 50 years. So that's a lot of TV I've watched. And I very intentionally, we are the SNL.

 We are a pretty big lab. So on average, I would say for most years we have somewhere in the ballpark of about five graduate students, a mix of master's and PhD students. We tend to have that exact same number of undergraduate honor students working on a thesis, and they're paired together with a graduate students. So we're getting that sort of symbiotic mentoring experience for the grad students as well to work hand in hand, one-on-one with an undergrad. And then we typically have a postdoc in the lab as well. So I would say that's about the right size for our group is somewhere in the 10 to 12 range of students working together in the lab.

 It is unquestionably my favorite part of my job. I love, this is one of the things that I really was not getting when I was at OHSU in Portland. It was a professional research lab, so we hired all professional research assistants and postdocs. You told them what project to do, and they went and did it. Here it is. What I love about my job, it's a teaching, a mentoring. I mean, the number of meetings I have in a given week is hard to fathom, I feel like. And oftentimes, more often than not, they're impromptu as well. We're not setting something on the calendar, just my door is open and someone comes walking in and 45 minutes later we're deep into something.

 Our group is heavy on human participant data collection. So we have probably somewhere in the ballpark of 45 folks a week coming into the lab to get on the treadmill, get their brains stimulated, whatever it might be. And those are all projects run by different graduate students. We have a weekly lab meeting that I said I always loved when I was doing my PhD at the University of Michigan. I love sitting in on those lab meetings and hearing about the wild variety of topics going on in human neuroscience. That remains my favorite part of the week. We have a wide variety of things we do in there that are talking about science. They're professional development based, they're team building. They're all over the map.

 And I am very fortunate to get to work with just an exquisite group of passionate, curious, intelligent, I guess, young men and women. I'm getting old now. I have to call them young men and women now. I used to say I was just one of them, but now it's very clear that I don't fit it any anymore from an age standpoint. And they're just an incredible group to get to interact with and learn from, and try to impart a little knowledge to them as well, dependent upon what the question of the day is.

Matt Hickey: Brett, one of the many things that I've admired about you is the degrees of freedom you give to your trainees. That affords some really neat opportunities.

Brett Fling: I think it's unquestionably my favorite part of this as a career is the opportunity to get to learn. I mean, we're recruiting and attracting and trying to get all of these incredible minds to come here and work with you. And then my job is not to dictate and say, "Well, this is what we do. You go do this project." So this is my sort of mentoring style is to really try and individualize it and give the freedom and the flexibility to folks to find what they're excited about, to find their passion.

 My job is not to tell you what your passion should be, it's to try and give you all the tools and resources that set you up and allows you to find what you really love, and then foster that and help you go explore it. And put a few bounds, and put up a mild fence, maybe just some chicken wire to reign folks in a little bit and direct them. But to really let them explore and design and create and ask the research questions they're interested in. And then to provide the resources necessary to really help foster it and let it flourish. And I don't know if it always works out, but thus far it's worked out really well here. It's been a great approach for myself that I've really enjoyed.

Matt Hickey: So talk to us about aspirations over the next five years or so. And we just throw around these numbers, but as you think about, I'm now a tenured associate professor, of course, I've been here for some time. I've got a nice team. And even as people of course move on and they're doing their own postdocs or whatever, we tend to keep this stable sized team. Your reputation is growing all across campus. And so aspirations over the next five years for your team.

Brett Fling: So I think in a lot of ways what I envision is really expanding what my "team" is. So you're talking about across campus, and this is I think one of our big picture designs and ideas at the moment is to really start to foster much more serious interdisciplinary collaborations across groups. So we're working very heavily right now with a number of folks from the occupational therapy department to really take our sort of lab-based neuroscience movement control ideas, and really translate it and generalize it into activities of daily living. How do we get this stuff out of the lab and actually impact people's lives on a daily basis to make them more functional, more independent, and improve quality of life?

 So in the coming years, what I would love to see is really solidifying and fostering these collaborations between, certainly within our college, but between us and occupational therapy, food science and human nutrition, human development and family studies. There's just a number of folks across the board. We really have some great ideas. You're well aware of this. We've been working on, with the Center for Healthy Aging, a variety of ideas as well. And so I think in the big scheme of life, it's nice to have "my" lab, but I would really like to see our impact across campus really start to broaden and be able to then get that out into the community. That's really what I envision the next five years looking like.

Matt Hickey: Can't wait to see it.

Avery Martin: That's awesome.

Matt Hickey: It's going to be good.

Avery Martin: And if you don't mind, cast your vision for your students as well. What do you see the folks that are working in your lab now, what are they going to be doing?

Brett Fling: It's really cool to see the wide variety of things they go on to do. So a number of my students will stay in academia. So we have several who have gone on, finished a master's degree here, and are now in great doctoral programs at universities around the country. Ones who finished their doctoral degree here are now in those post-doctoral positions around the country we were talking about earlier. Several of them have been offered faculty positions at this point. So they're kind of on that academic career path studying, certainly not multiple sclerosis per se, but studying those sort of brain behavior associations and how it relates to mobility control.

 We also have a number of studies who go on slightly more clinical directions. So I have a number of students who have gone on to DPT, doctorate of physical therapy programs, and are, we are getting old, they're at the point of finishing those programs now, and are going out into the world as maybe more clinical physical therapists, or research physical therapists, and kind of combining the two together. We have a former student who is currently in the graduate program in occupational therapy here at CSU as well. And then certainly from our undergrads, an awful lot of them go onto those more clinical strains of a DPT program or a med school as well. We also have one who's gone on and is now working in the war fighter division of the Office of Naval Research out in San Diego in studying human performance and trying to impart some of these neuromechanic and neuromotor control and biomechanic pieces into how can we use this to improve human performance in a military fashion.

 And so there's a wide range of stuff folks can go on to do. There's no question about it. And this really becomes the most fun part of this job is seeing where people go, what they're doing. We were writing a grant last year, and it's a training grant. So as a faculty member, you're going to get money to help train students. And so within there, you had to make up a table of who have you trained in the past and what are they doing now? And so I got to fill in this two page sheet. And I thought, wow, these people are all incredible. They're all doing such cool stuff now. This is great. It was really fun.

Avery Martin: That's really cool.

Matt Hickey: Opportunities that's like that are so great to reflect. So last two questions, talk about the professional context in which we find ourselves. And so the first one, we're interested in your reflections on things you like the best about being a faculty member in the College of Health and Human Sciences.

Brett Fling: Yeah. So I think we probably just touched on that a bit is I really love the interdisciplinary nature and the way to approach the same problem from a wide variety of angles. I've always had a good tie to this college. So two of my best friends from elementary school were actually construction management undergrads here 20 something years ago. And so I really love it to get to still interact with folks from construction management now. But certainly from a research standpoint, we really heavily interact with food science and human nutrition, occupational therapy, human development and family studies. And we use some of the same tools and we're interested in some of the same questions, but we do it in a wide variety of different ways. And I really love the chance to get together with those folks. So it's a unique and really fantastic college to be a part of.

Matt Hickey: It gives you some sense of the breadth, right?

Avery Martin: Yes, absolutely.

Matt Hickey: So of course we are nested within this institution, Colorado State University, and it's a land grant institution. And again, one of the things I've really enjoyed about working here is that mission, that land grant mission is centered. It's taken very seriously. It's not just window dressing. So talk to us about what the land grant mission means to Dr. Brett Fling.

Brett Fling: Yeah, I think it's probably very fair to say coming here, I didn't even know what the land grant mission was. I was familiar with the idea and the concept of land grant universities, and our good buddy Dr. Lincoln. But I did not really know what that entailed and what it meant. I love being back in Colorado. I love being in Fort Collins. All those things are really nice. One of my favorite things has been really understanding what the mission of CSU is, and what that looks like in a broader context within Northern Colorado, within the state of Colorado, within the region of Wyoming and Colorado, Nebraska. And it's something that, unintentionally or maybe subconsciously, I have really wound up dedicating my approach here on campus to that land grant mission.

 And so we have a great research team and we do good research, I think. I love teaching in the classroom. This is one of the reasons I wanted to go back to an academic institution as well, and not that clinical institution. I thoroughly enjoy teaching both the undergraduate and the graduate level. But then the community service and outreach piece is something that has really struck a chord with me. And so we do a wide variety of things as a lab group, as a department, and as a university that I have tried to spearhead a number of ways, but just really enjoy being a part of.

 So we do an awful lot of work with the National Multiple Sclerosis Society in terms of fundraising and activism. We've participated in a different activity every year, whether it's the MS Hike, hiking up Keystone, the MS Walk, the MuckFest a few years ago, where it's basically a Tough Mudder running around a five kilometer obstacle course and just getting as messy as you can while you're having a good time. And that's something that has really struck a chord with me.

 In addition, I'm a co-founder and a founding board member of the Brain Health Center of the Rockies, which is a nonprofit here in town, but that really has a national reach at this point. And we do a wide variety of activities, events, classes that are designed to promote brain health and wellness in different clinical populations, whether that's folks with Alzheimer's disease or the early stages of dementia, individuals with Parkinson's disease. We have a very large multiple sclerosis based program. And we offer just a whole bunch of different classes, activities, events that are free of charge to anyone who's in the area that can come to them in person. And we make them all virtual as well for folks who want to join from Iowa or Florida, or wherever else they might be. And that has become a huge part of my time and my scholarship is interacting with the group and being able to get information out in the community and engage on a variety of levels.

Matt Hickey: For anybody who listens to this, the notion of what does Dr. Fling do in his spare time would probably make them laugh, right?

Avery Martin: Where is it?

Brett Fling: Spare time's where I spend most of my time. We haven't even gotten to the family yet.

Matt Hickey: A lot going on. Exactly. But you're a family man as well, so talk to us again about other things that keep you occupied.

Brett Fling: Yeah, I have an incredible family. So we have a blended family with five kids, so we have a full blown Brady Bunch going on at my house. And so it is hectic. We are ensconced in a lot of youth sports. So every night there's a practice. Every weekend there's a game. We've got some high school dances going. The Sadie Hawkins dance was Saturday night, so there's a lot of action going on there. So yeah, my wife and I keep incredibly busy. She works for Larimer County downtown. And so one of us is driving somewhere to do something about every second of the day. We coach a lot of flag football and soccer and basketball teams. And when we get the chance, she and I love to get out of town and go hit the mountains and snowshoe a little. She's a fantastic camper. She knows how to camp. So we love getting out of town when we can. And yeah, it's a busy life to say the least.

Matt Hickey: Good for you. Well, thanks for coming. We really appreciate the time, the energy, again, I think we should figure out how to plug you in my furnace. Right into the grid would be really cool. So thanks for your time.

Brett Fling: I enjoyed the heck out of it. Thank you both very much. I talked too much. We didn't get to hear from Avery. I blew it.

Avery Martin: Oh no, not a problem. This is the important part. We heard from you. We heard about your journey. So I loved it.

Matt Hickey: That's great.

Avery Martin: Yeah. Thank you.

Brett Fling: Thanks, guys.

Matt Hickey: Good to see you. Another great interview is in the books. Thank you for listening to this episode of Health and Human Science Matters.

Avery Martin: Stay tuned for the next episode. It's on the way. In the meantime, go listen to our episodes from seasons one, two, and three. And if you want to learn more about our CSU College of Health and Human Sciences, go to www.chhs.colostate.edu.