

Brain connectivity and letting the data speak with Emily Finn

The Dartmouth College researcher talks about her quest to understand behavior and doing neuroscience “in the woods.”

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This transcript has been lightly edited for clarity; it may contain errors due to the transcription process.

[opening theme music]

Brady Huggett

Hello, welcome to our podcast. If you're new, it's called "[Synaptic](#)," and it looks at the people, the research and the challenges of the neuroscience field. If you're a frequent listener you already know that, but welcome aboard anyway. I am the host of this show; my name is Brady Huggett.

[transition music]

Brady Huggett

All right, here we are. Today let's go back to 1997. That's the year David Griswold founded Sustainable Harvest Coffee Importers. His idea was to make the supply chain of coffee production more transparent, to help coffee bean farmers know what consumers wanted, and to help buyers have consistent access to the beans that they needed. Griswold called this concept “relationship coffee,” and by 2022 Sustainable Harvest had grown to operate in 20 countries, sourcing coffee from 79,000 farmers across South and Central America, Africa and Indonesia.

Now, it had satellite offices in six of those countries. One of those offices was in Lima, Peru. And sometime around 2009, a recent college graduate named Emily Finn was looking for something to do. That's today's guest: Emily Finn. After college, she had applied for Ph.D. programs, but in truth she had kind of exhausted herself at the end of her college career. She'd put in long hours working on a brain scan project, and it seemed “the honeymoon period” between her and science had ended, she said. She was not sure if she was ready to jump into the commitment of a Ph.D. program.

So she applied to work in the Lima office of Sustainable Harvest. She got the position, and she relocated. She stayed there more than a year, helping with translations and communications, basically doing something “completely different” than anything else she'd ever done, she said. When she got acceptance letters to Ph.D. programs, she turned them down and stayed in Lima for about a year.

But eventually she began to miss science, and she came back to the U.S. with a long view toward eventually getting her Ph.D. Because when she had first come across real science as an undergrad, it had hooked her as nothing else had. We talked about that on this podcast, how she “drank the Kool-Aid” with science, as she said. We also talked about how she set up her lab at Dartmouth during the COVID shutdowns of 2020. And of course we talked about brain imaging and brain connectivity.

All that, plus more, coming up in the next hour.

I interviewed Emily on April 16, 2024, on the Dartmouth campus. It was cold that morning, with a low-lying fog, and temperatures were in the 30s—still a little New England chill in the air from winter. In her office, I put mics across a desk, and we sat across from each other. Let's pick this up here, where I'm asking Emily about the Dartmouth nickname, “The Woods,” and also “Admitted Students Day,” an event on campus that I happened to overlap with.

That should do it. Here is your episode of “Synaptic” with Emily Finn, starting right now.

[transition music]

Emily Finn

Oh, well, I feel like I use that. I just tell people if you want to come study the brain in the woods, it's mostly because we're just in the middle of nowhere, and there's a lot of trees and not a lot of else.

Brady Huggett

I think that's part of, like-

Emily Finn

Do we all say it? I feel like it's maybe something that we all say, unless the undergrads have some other meaning for it, in which case I have no idea.

Brady Huggett

I think so. The other part and these two things are related with yesterday was Admitted Students Day or something.

Emily Finn

Oh.

Brady Huggett

I think.

Emily Finn

Yes, maybe you're right.

Brady Huggett

Because at the hotel there were people saying, "Are your kids coming here, were you're thinking about it? Somebody was either, I saw a promotional piece and they're like, "Welcome to The Woods." I thought, "Oh, that must be like a Dartmouth thing where-"

Emily Finn

That's funny. I think it's one of those things that we all say without necessarily realizing that everyone else is saying it, because it is just the only real way to describe where we live.

Brady Huggett

Yes. You are in the woods.

Emily Finn

I had no idea. That makes sense. I think decisions came out a couple of weeks ago, but it's funny that you're over overlapping with all of these second-look admitted students.

Brady Huggett

Yes. I actually really liked it. It's like, well, college students in general, just being around them, I find it very hopeful because they have their whole lives ahead of them and they're full of hope, and their careers are going to start and they're learning all these interesting things, and college is a great time to expand your brain. I feel like that's maybe part of a joy being a professor on campus, but the admitted students, it's even a step before because they haven't even, they're like still trying to figure out if they're going to go here and it's, I don't know. It made me happy for sure.

Emily Finn

Yes, there's a lot of good energy.

Brady Huggett

You ready?

Emily Finn

Yes.

Brady Huggett

All right. Oh, we're ready. I don't know that this is the case, but I have a feeling that you might actually be a New England person.

Emily Finn

I am, yes.

Brady Huggett

Where'd you grow up?

Emily Finn

I grew up in southwestern New England, about as close to New York as you can get. I grew up in Stamford, Connecticut. I should have known what I was in for moving up here, but this is by far the most north I've ever lived.

Brady Huggett

Yes. Stamford's not quite the New England that Vermont might be or up in New Hampshire.

Emily Finn

Yes.

Brady Huggett

Then why was your family there?

Emily Finn

My dad is a lawyer; my mom's a nurse. They just settled there. My dad is originally from New York. My mom grew up outside of Providence, Rhode Island. I guess they split the difference.

Brady Huggett

She's New England?

Emily Finn

Yes.

Brady Huggett

Did they meet in New York or something like that?

Emily Finn

No, they met in Providence, actually. My dad was working there right out of law school, and then he got a job at a firm in Stamford, so they moved down there, I think right before I was born.

Brady Huggett

So they never lived in New York together?

Emily Finn

No.

Brady Huggett

Your mother grew up outside of Providence?

Emily Finn

Yes. In Pawtucket, Rhode Island.

Brady Huggett

Oh, nice, so she's a New Englander by family lineage.

Emily Finn

Yes. Actually, her parents came down from Quebec, from French Canada. I guess that's even further north, but she was born and raised in Rhode Island.

Brady Huggett

They came down for work?

Emily Finn

Yes.

Brady Huggett

To work in the mills, I guess.

Emily Finn

Yes. embarrassingly, I'm not even sure; unfortunately, both of those grandparents passed away when I was very young, so I never got to know them, but yes, some factory job in Providence, I think my grandfather was working.

Brady Huggett

French Canadian on your mother's side.

Emily Finn

Yes.

Brady Huggett

What about your father?

Emily Finn

He is Eastern European Jew.

Brady Huggett

New York.

Emily Finn

Broadly defined. Yes. They came over; my dad's dad was in the diamond business, actually. He came over and set up a small shop in the diamond district in Manhattan. He worked there for basically his whole life.

Brady Huggett

Have you ever been there, to that diamond district in Manhattan?

Emily Finn

I have. My uncle actually still, my uncle is recently retired, but until recently he was still running that business, and that's where my now-husband got my engagement ring. Actually, my husband's probably spent more time there than I have.

Brady Huggett

Did he know, was there a family person that he was going to see, or he just went down there?

Emily Finn

Yes, it was just my uncle in business on his own for the later half of his career, so yes, and Zack knew it was a whole thing.

Brady Huggett

It's great. I've been there.

Emily Finn

Just slipped him his number. I was like, here you go.

Brady Huggett

Oh really? You slipped him the number?

Emily Finn

Well, we talked about it.

Brady Huggett

Yes. I have been there not to buy a diamond, but I was getting a watch fixed, and there was a watchmaker back behind some diamond places, tiny little thing. This guy with a, oval was sitting there, and I was kind of—because I didn't know it existed, really. It's really just a block of, like, diamond distributors. It's amazing.

Emily Finn

Yes. It's feels like a throwback. It's cool.

Brady Huggett

Your dad came to [crosstalk].

Emily Finn

No, it was his grandparents, I think, that came over. They've been in the U.S. for a long time.

Brady Huggett

In the typical way.

Emily Finn

Yes, typical way.

Brady Huggett

Fleeing the pogroms or-

Emily Finn

Yes, actually my, so my last name, our last name used to be Finkelstein and my, I think great-grandfather changed it. It was not changed for him. I think he actually requested to change it and shorten it to just Finn. Yes, they came over, gosh, probably early 1900s. I'm not even sure exactly when, but, yes. My grandfather was born here.

Brady Huggett

Yes, grandparents on all sides or both sides are born in this country.

Emily Finn

Yes.

Brady Huggett

You're growing up in Stamford. You don't have any science really in your family, like mentoring.

Emily Finn

No.

Brady Huggett

What were you thinking about as a child?

Emily Finn

As a child, I was really into reading and writing. I was always more sort of like a language arts person. I worked hard, did well in school, didn't hate science and math, but certainly wasn't my natural attraction. Just really liked spending time outside, really liked reading, art. I love to draw, fine-art stuff. Yes, science was not really on my radar as one of my top subjects or top interests for a long time.

Brady Huggett

You're thinking, I don't know, you're thinking that you might want to be an artist. You're thinking that you might want to be in literature or work, I mean-

Emily Finn

Yes, gosh, I didn't even really know. I feel like I cycled through so many different possible careers. I loved animals. I was thinking vet at one point, which I guess is maybe that got the medical thing in it. As a kid, I didn't know, I was just going wherever my interest took me. Then even when I got to college, I still didn't really know. It took a long time to stumble on this and figure out that this path, a, even existed and b, was the right one for me.

Brady Huggett

Exactly. Right. All right. You knew you wanted to go to college. That was definitely a plan, right?

Emily Finn

College was always the plan.

Brady Huggett

Yes. I'm sure your parents were like, college is a smart thing to do. Let's do that.

Emily Finn

Yes.

Brady Huggett

You weren't looking for a specific school that had a really good program in x because you weren't sure what x would be for you.

Emily Finn

Yes. I was very much the classic American liberal arts model, really just embraced that when I was looking at schools and deciding where to apply.

Brady Huggett

Did you look all over?

Emily Finn

I did. I did. I went through a phase where I really wanted to go to the West Coast and I was that college senior thing, I want to get out of New England. I remember my mom actually had to bribe me to even go look at Yale because I was in New Haven, and I grew up in Stamford, and we just had this conception of New Haven. I don't even know that it was New Haven's reputation. I think it was more my desire to just get far away and experience something different, and New Haven just felt really close. My mom bribed me by letting me take the afternoon off school, and she threw me in the car and drove me up 95 and made me look at the campus. I was like, this is beautiful. I guess I'll just apply and see what happens.

Brady Huggett

It's Yale, right? It's a great school.

Emily Finn

It's a fantastic school. Yes.

Brady Huggett

You didn't need to be convinced that hard to stick around. You weren't really like, I got to get out of here. I need to go. I want more sun. I want, I don't know, Pacific Northwest, nothing like that.

Emily Finn

I think I thought I wanted that at one point, but I didn't really know what that meant. I didn't actually go visit schools on the West Coast. I applied to some, but I think when push came to shove and when the acceptances came out and I was in the very

privileged position of making this decision, I saw the resources and the opportunities at Yale, and it made the decision pretty easy.

Brady Huggett

Then you're just going up 95 to school. You're going to Yale. Still, you're not sure what you're going to do. I'm just going to, it's a great school, great liberal arts. I'm going to take it all. See what interests me.

Emily Finn

Yes. I was coming into college, I was really interested or I thought I was really interested in linguistics. I didn't know what linguistics meant, but I thought that it was something that would let me take a bunch of different languages because that was my passion by the end of high school. I was really into learning languages. I got deep into my high school's French curriculum. I think I finished it by sophomore year. Then I started taking German, which they had just started offering. I was teaching myself Spanish on the side. I was just really into learning world languages, and I didn't necessarily want to pick one to major in.

I wanted to be able to take a smattering of languages and piece stuff together, and do some literature and some cultural stuff. I had heard this term linguistics. I think I actually saw it for the first time on the common app. I don't even know if that's still used, but I had to indicate what I might be interested in majoring. I remember seeing linguistics and I was like, oh, that sounds like maybe something that would just let me take a bunch of different languages. I actually did put that on my application, but I didn't really know what it meant. Then I showed up and I did take a linguistics class. I think it was my second semester, spring of my freshman year, and really liked it.

Brady Huggett

The class itself is not like learning other languages, telling you how language is developed.

Emily Finn

Right. Yes. Broadly defined, it's the study of language itself and you can break it down into syntax and semantics and phonology and morphology. These days there's a huge element, at the time that I was starting the whole natural language processing field and AI and large language models, that was still at least a decade away. Most of my classes were not about that. I think these days there's a much more computational element probably even at the undergrad level, but I was taking classes and yes, just the science of language and its form and how it works.

Although the classes that I liked the best were the ones that intersected with the mind and the brain. How the mind and the brain support language learning, language use, stuff like that.

Brady Huggett

Back to that. Did you use French because of the French Canadian connection?

Emily Finn

Yes, I think that was probably an early influence. My mom spoke a little bit of French. I think it was the thing where her parents used French when they didn't want her to understand. She was not fluent, but she certainly knew some words and identified with that as part of her culture. I think even early on, I was asking my mom to teach me some French words. When I was in a position to be able to choose which language I was going to learn, many people in my school chose Spanish, which is obviously quite useful. I do actually speak Spanish now way better than I speak French, but at the time, I identified with French and I went that route.

Brady Huggett

The German was probably short-lived.

Emily Finn

German was short. German was interesting because they had just added, I think I took the first year of German classes that they were offered at my high school. They were debating. They wanted to offer another language. They were offering French, Spanish, and Latin at the time, and they wanted to offer another living language. I think there was a big debate between German and Chinese. I think I actually was hoping for Chinese, but really anything. I was just excited to learn a non-romance language.

Brady Huggett

I can see how Chinese would make perfect sense, especially, given this was how long ago?

Emily Finn

This was in 2003, I want to say. Yes, about 20 years ago.

Brady Huggett

That would make perfect sense. That's a big ask for a high school student, because it's a whole new alphabet and everything else. Then, to keep the German alive, you have to really search it out, and that's harder. Whereas you have ample opportunity to speak Spanish.

Emily Finn

Spanish has stayed alive largely not because of any classes that I took, but I lived in Peru for a short time. Actually, not that short of time. It was about a year and a half between college and grad school.

Brady Huggett

Anyway, you're in college. You take this linguistics class. You like it. Are you thinking what would my career be if I continue to get my undergrad and then maybe, I don't know, advanced degrees in linguistics? What would your career have been?

Emily Finn

Yes, it's a great question. I think at the time, I honestly wasn't thinking all that hard, perhaps to my parents' chagrin, about how my choice of major would actually influence what I ended up doing as a career. I guess I saw people coming out of Yale and similar schools. For better or worse, it didn't really seem to matter a whole lot what their degree was, actually. I did see people going on to law school or med school or going on to get jobs in investment banking or consulting or the big firms that come and heavily recruit you right out of undergrad.

At the time, especially early on freshman, sophomore year, I was just more concerned with finding something that was going to hold my interest long enough to support a whole major in it. Yes, I wasn't really thinking super hard about where I was going to go next.

Brady Huggett

It sounded like you did think you were going to go someplace else. Yale was not going to be the end for you. There was going to be something beyond your undergraduate degree.

Emily Finn

Yes, I think I had a sense that I would probably seek out additional school, but I didn't really know what that would be. I definitely wasn't someone coming in thinking, I definitely want to go to med school, so I'm going to set everything up to be a pre-med, or I definitely see law school in my future, so I'm going to sort of do things that position me well for that. I think I would have been hard pressed at that time to say, to the extent that I was planning to seek a graduate degree, what exactly that would be in.

Brady Huggett

Were your parents concerned about that at all?

Emily Finn

If they were, they hid it pretty well. I think they've always been very supportive. They've always pushed me to work hard, not necessarily in the service of any specific goal that they have or even that I have, but more just to keep the doors open. If you work hard and do well at whatever level you're at, that just means that more doors will be open and stay open for you the further you get.

Brady Huggett

All right, so you take this class, you start to realize, I think, tell me where I'm wrong, that you also are fascinated by the way language works in the brain.

Emily Finn

Yes.

Brady Huggett

That seems to have opened some sort of thought process for you.

Emily Finn

Yes.

Brady Huggett

You finish undergrad with a degree in linguistics, and then what do you—I know you get a Ph.D., but I don't know what happens in between there.

Emily Finn

Yes, a lot happened in between. Yes, so by the end of undergrad—I came in jokingly having put on my application that I might major in linguistics, and then to my own surprise, I actually did. Although along the way, I had taken these classes, especially that were intersecting with neuroscience and cognitive psychology. That really became my favorite part of linguistics, which was ironic because I was counting all of these language classes towards the major, but by the end of college, it was more about I was getting more into the scientific side of specifically the neuroscience and the psychology of language.

I briefly considered double majoring in biology, specifically the neuroscience track, but I never thought that I wanted to go to med school. At least at the time, that major was set up as a pretty like pre-med. I was like, I'm going to just take some of these classes, not fulfill all of those requirements. I had a decent grounding in neuroscience by the end of undergrad. I had done a big undergraduate thesis project, which was actually my first introduction to functional MRI, which was really fun. That really captured my attention and my passion during my senior year, at a time where I was also trying to figure out what I was going to do next, and watching my friends apply to med school, apply to law school, figure it all out. I was still floundering a little bit and not totally sure where I wanted to go.

Brady Huggett

What was the thesis?

Emily Finn

The thesis was a pretty, what seems to me now, at least, a pretty esoteric investigation into how the brain supports syntactic structure, and specifically these long-range dependencies. It's like these sentences that are horrible, like you've never actually want to speak them or listen to them or write them. Nevertheless, humans can understand that, there's all these relative clauses and dependencies that you have to hold in mind, what is that pronoun referring to so that when you get back to the end of that clause, you can correctly fill in that gap. We were testing different models for how the brain might do this.

We were looking for evidence that reference, so to speak, gets reactivated at this moment where the clause resolves. We were very carefully comparing these different sentences that were all technically grammatical, but all absolutely horrible to actually read and understand. It was great. I was just so enthralled with the whole research process and coming up with a question and coming up with the stimuli. I remember my advisor at the time was like, well, we need about 240 of these sentences to be able to get the power that we need to test these hypotheses. I just gladly went home and all weekend worked on writing these sentences.

Brady Huggett

I was going to ask, you had to come up with the sentences yourself.

Emily Finn

Yes. They had to fit this certain structure, but we were just trying to vary the content and make them different and interesting as much as they could be.

Brady Huggett

Tell me how this experiment was set up. Who was the adviser?

Emily Finn

It was a professor in Yale's linguistics department who's name is Maria Piñango, and she's still there.

Brady Huggett

How was it set up? You came up with 240 of these on your own.

Emily Finn

Yes.

Brady Huggett

Then you had volunteers from the campus.

Emily Finn

Mostly my friends who I roped into doing the study. We paid them, but it was pretty miserable.

Brady Huggett

Then the idea was -- what did you use for that, fMRI?

Emily Finn

Yes. This was an fMRI study. It was great because it was actually Maria's first fMRI study at Yale. She had sort of recently arrived at Yale at that time, and she had done some fMRI in the past, but she had never done it at Yale. We got a lot of support from Todd Constable, who's the director of the MRI Center, who eventually ended up becoming my Ph.D. adviser, but we got to know him quite well. We got a lot of support from him and his team.

Brady Huggett

Then your friends come in, they get in the machine. You say, please read these 240 sentences. Their brain is mapped and then, across how many volunteers total?

Emily Finn

Oh, I think we had maybe 15 or 20. Not that many. It felt like a lot at the time.

Brady Huggett

For undergrad, this is pretty serious work.

Emily Finn

Yes. I was easily spending 20 hours a week on it at one point in my senior year.

Brady Huggett

What did you find? Did you find anything? I guess-

Emily Finn

Yes, we did. We did find some interesting hints of stuff. When we compared these sentences that had this syntactic gap in a particular spot to sentences that were matched on just about everything except for that gap, we did find some evidence that the left inferior frontal gyrus was more active at the moment that you had to resolve that syntactic dependency, and correctly remember what had been referred to before when you finally got to the end of that clause and understood the role that it was playing in the sentence.

Brady Huggett

Were some of these sentences almost intentionally grammatically incorrect? Meaning, if you'd left a clause out, you would see in the person's scan that their brain struggled to hold onto the meaning of the entire sentence.

Emily Finn

Yes. The 240 sentences were actually grouped into pairs of four. I hope I can actually remember at this point what we did, but we had our condition that we were most interested in, where you had this long-range gap that people had to fill. Then we had another condition that was grammatical. I wish I could remember examples of these, but that didn't have a gap in exactly the

same place, but that was matched for total number of words and general semantic content. Then we did have a condition that was ungrammatical in the sense that we had wrongly filled the gap.

To make a very simple example, “The cat that the dog chased the mouse.” If you just say “the cat that the dog chased,” people understand, I need to reactivate the cat after chase, or at least that was the theory at the time, that we reactivate this in the canonical position that would be in, which in English is right after the verb. If you fill that position with another noun, then that’s a violation and people are like, well, what’s the cat doing? I don’t, that’s not grammatical. We did have a condition like that. That was actually the condition that induced the most widespread activation because people’s brains were like, wait, that’s wrong.

Then we had a fourth condition that was just an equally long sentence, but without the horrible multiple recursive dependent clauses.

Brady Huggett

That’s fascinating. Honestly, that’s fascinating. I assume that you were fascinated by this as well.

Emily Finn

Yes, I was.

Brady Huggett

You finished, and you thought, I want to do more of this.

Emily Finn

I had drunk the Kool-Aid. Yes. I was super into it.

Brady Huggett

You’re graduating, and did you have anything lined up?

Emily Finn

The irony is that this was all going on my senior year, and here I am, like, skipping class, I don’t know, not even, like, my friends were like going out and I was like, I have to finish this before I scan tomorrow. I was deep in. I really loved the research. For some reason I just had these blinders; it was just this total parallel universe where then on the side, I’m also throwing applications at, like, anything and everything that I can think of. I don’t know. Fellowships to go abroad.

Brady Huggett

Neuroscience fellowships.

Emily Finn

No, not even, like, I can’t even remember. I was just applying to, like, literally everything.

Brady Huggett

Like, something next.

Emily Finn

I was just, what is next? I knew I didn’t want to jump right into more school right then and there. I was looking for one- to two-year opportunities, whether that be through some fellowship or just some volunteer, like minimally paid position. I don’t know. I just wanted to get out and do something. The whole time I’m doing this research, and it’s like I was totally blind to the fact that that’s what I was actually most passionate about, and I’m applying for these things that are not really much to do with neuroscience or psychology research.

Finally, my undergrad adviser, Maria, I was complaining to her one day about how like, “Oh, I’m working so hard on these applications, I’m not really getting any bites.” She’s like, “Clearly what you’re most passionate about is research. Why don’t you just go to grad school for this?” It was just one of those moments where I was like, “Oh,” and it’s crazy. I had just spent four years at an excellent school and interacted with many professors, and for whatever reason, that career path was just not on

my radar, I think. Yes, once she said that, I was like, oh, and then I started to think like, maybe I should go and do a Ph.D., and what would that look like?

Brady Huggett

Do you think that's because, how to say this, like, you were thinking—most of us think, when we go to college, we think that we're going to get some job. A job means a company, versus a well, actually, professor is a job, academic is a job. You hadn't really thought about that.

Emily Finn

I had not thought about that at all. I had a pretty privileged childhood. My parents are both professionals; pretty much all of the friends that I had growing up, their parents were professionals of some kind. Yet, neither my parents, nor any of their close friends, nor any of my close friends' parents were academics. I didn't really know anyone that had a Ph.D. I didn't know anyone that had pursued this particular path. It just wasn't on my menu of options when I was cycling through either in high school or even later in college, what might it be that I might want to be when I grow up, so to speak.

Yes, and then I spent four years at college and interacted with many professors. I think I still I think as an undergrad, you often don't, unless you start getting into research, which I did, but only later on in my undergrad career, you don't really have a full picture of what it is that your professors do all day.

Brady Huggett

Yes. That's right. You see them twice a week for 45, whatever it is.

Emily Finn

Yes, right.

Brady Huggett

Then, so, all right, now you've said OK, then maybe research is what I want to do. What did you do? How did you- I don't understand, Peru? How did Peru-

Emily Finn

Yes. This I think I probably had this realization that maybe I should consider grad school around February or March of my senior spring. It was too late for me to apply to start right away, basically for that following fall, and also my undergrad thesis project was going pretty well and we were excited about it. There were some follow-up studies that my adviser wanted to run. She made me an offer to stay one more semester. I would have graduated, but I would stay on as a full-time research assistant the following fall to help finish out and run some more of these studies.

I was really excited about that. It's like, oh, yes, now I can actually just do research full time and be paid for it. That was great. That was a no-brainer. I decided to stay one more semester, six months or so. I was thinking I'll use that time to also apply so that I can start next fall somewhere. I also really I had this itch that I wanted to live abroad. We went through the whole grew up in Connecticut, went to school in Connecticut. I didn't actually study abroad in undergrad, which was always a little bit of an irony, given my love of language learning and stuff.

It just never quite worked out with my time. I did go abroad in the summers, but I hadn't spent a true semester, like good chunk of time, abroad. Peru was supposed to basically just be an interlude between applying to grad school, which happens in December, and then starting grad school, which happens the following fall. It was supposed to be a six-month thing. I found this basically volunteer, I was very minimally paid, but I found this basically volunteer position with a coffee company. This one is hard to explain, but it was a company, they're actually headquartered in the U.S., a coffee importer.

They were one of these social enterprise companies. They did a lot of work in coffee-growing countries to help farmers improve the quality of their coffee so that they could sell it at higher rates and stuff. I was based in the Lima office. Yes, again, it was supposed to be a six-month thing.

Brady Huggett

What was the job? Were you like-

Emily Finn

I don't know that I actually added very much value to this company. I'm still not totally sure why they hired me. They asked me if I spoke Spanish during the interview phase and I was like—I had not taken a single hour of Spanish class at this time.

Brady Huggett

Oh, you hadn't?

Emily Finn

No, I never studied Spanish in school. I had taught myself on the side. I knew French quite well. At that point, I still had pretty good French, and they're similar enough. I don't know. I listened to a lot of Latino music and convinced myself that I could speak Spanish. They always said they were going to interview me in Spanish, and then they never did. Joke was on them. I moved to Lima, and my job function was, the Lima office was very small. I think there were only four of us at the time. I was a jack of all trades. I was doing some translating. I was doing some communications. I was doing some event planning. I was doing some grant writing, funnily enough, which is probably the most transferable skill to what I do now.

Brady Huggett

How were you doing the translating? You were-

Emily Finn

Only from Spanish to English. That part is, if you have a dictionary on hand and you know the general structure of the language, it's not terribly hard.

Brady Huggett

Meanwhile, your Spanish must have been growing daily just because you're immersed in it.

Emily Finn

Yes, it improved quite rapidly in that first month because I was trying not to embarrass myself.

Brady Huggett

You do this for- while you're doing this, you're also looking at Ph.D. programs.

Emily Finn

Right. I had submitted my applications all before I left, but then I did the interviews as well. I went right after the interviews wrapped up. I was in Peru as I was getting these decisions, acceptances and rejections. Yes, it was funny. I think by that point, by the time that I had left my full-time research position with my old adviser, I think the honeymoon period had ended on the science. I think it was, in retrospect, it was one of those things where I think we just got really lucky with my undergrad thesis and things were great.

It's easy to think that you love science when everything's working out and you're seeing the results you were hoping for. By the end of that extra semester, I don't know, things were just not as clean. I was getting a little frustrated. I was seeing the more tedious and difficult side of science.

Brady Huggett

Like the grind part.

Emily Finn

Yes. The part where you're putting in a lot of work and you are not seeing much results for it. By the time I got to Peru, to be honest, I was already a little bit like, I don't know if I'm ready to jump right into a five-year, five-, six-year commitment for this. I think being down there and just, I don't know, doing something completely different. I did, I was fortunate to get into a couple of places that cycle, but I was a little worried about, I don't know, just having a really good time. I felt like this, I felt like I was finally living in this brand-new place and experiencing all of this novelty that I had been craving throughout my whole life.

I tried to defer my acceptances, and no one would let me defer. I basically wanted to take an extra year and then just stay in Peru and just continue to explore and do something totally different. No one at that time would let me defer my acceptance. I

was in this hard position of, like, well, do I come back and start this thing before I feel like I'm truly ready? Or do I decline and just take the chance and apply again, maybe if they'll take me back. It was hard, but I think, yes, at that time it was just very clear to me that I was not ready to start a Ph.D. program, and that if I had done so, it just would have been a disservice to not only myself, but my advisers and the people that were going to invest in my training. I just didn't feel ready for that.

I declined my offers, and that raised some eyebrows back here in the U.S. with my family, I think. Although they continued to be outwardly very supportive. I stayed in Lima for a little over a year.

Brady Huggett

Was one of those Yale?

Emily Finn

Yes.

Brady Huggett

You told Yale no, stayed another year?

Emily Finn

I ended up, well, so I stayed in Lima for about another year, and I continued to work for this coffee company, which was just really fun and interesting and was exposing me to all these other worlds. International development, and that field was something that I had considered in undergrad as something I could possibly be interested in. It was like this opportunity to try out this counterfactual almost of, here's this other thing that I thought I would like, do I actually like it? The answer was, like, I liked it, but I didn't love it.

It didn't spark that same passion as the research had in me. Yes, after about a year and change, I was like, this has been really fun, but I think I'm probably ready to move back home and try to get a big-kid job. I did start to miss science at that point. I was like, yes, I miss thinking about research and learning about research.

Brady Huggett

That would be my question. How did you know at what point you're like, now I'm ready? If I wasn't ready before, now I'm actually ready to go back and try to do this.

Emily Finn

Yes, so it still wasn't in Lima. I think one of the takeaways from my time with the coffee company was I did end up doing a lot of writing for them, whether that was putting together these communications or writing blog posts about the coffee farmers and what they needed and what we were doing with them. I did do some grant writing because the office in Lima was a nonprofit, so they were eligible to get grants from certain institutions. I really enjoyed writing. It was something I had already known about myself from growing up, but that was my first opportunity to do it in this professional context.

I feel like that I could see that was the most value that I was adding to that organization. I had no training in coffee agriculture or business or anything like that, but I saw that I was adding value by being able to write fairly well. At the same time, I was also missing science and missing scientific research, but not in a way that I was fully ready to start the Ph.D. In my head, I was like, well, maybe I could write about science. There's science writing. That's a whole field. I started applying for science writing, science communication jobs, and I got a job at MIT working in their news office, which was great.

Brady Huggett

I think I totally missed this.

Emily Finn

Really?

Brady Huggett

I missed this totally in my research. Go ahead.

Emily Finn

Yes. I wasn't there for very long, to spoil the story, but I was super excited to land that job. I moved back to the U.S. for that job, and I started working in the MIT news office, which, as you probably know, it's a great job in that you get to go interview scientists, and MIT is one of these places. We maintained the homepage of MIT, and people do actually go to MIT.edu to get their science news, which is pretty cool. We were writing press releases, but we were also writing articles directly for the lay public. I had a great time. It was an awesome role.

I got to interview people doing all kinds of scientific work, although my favorite interviews were when I got to go talk to people in the brain and cognitive sciences department, and those were always the ones that I was like, they were probably trying to kick me out of their office, but I just kept asking questions. I refer to that time as my gateway drug back into science, because it's like, this is showing me that I do still really like this stuff. At some point, I started to realize that I wanted to be the one doing the science again, and not just writing about the science.

Brady Huggett

Yes. Then, this is, I'm sure this isn't quite how, but then you go back to Yale and say, "Hey, I already said no to you."

Emily Finn

Yes, I basically came crawling back. I had maintained, when I did decline the two years prior, so that all took me, I took three full academic years off. I'm never totally sure how to count it because I was there as an RA after, and then I actually started as an RA before I started my Ph.D. again. It was three full years. I guess it was two years in between application cycles, but I did have strong personal relationships with many of the people in the program, and I had written these long emails about why I was declining. I think everyone understood.

Honestly, looking back now as a PI, I wouldn't want to take someone before they're ready. Someone's telling you they're not ready. I'm like, yes, go do your thing. If you love something, let it go. If it comes back, it's yours. No one wants to invest in someone that's not totally sure this is for them. Anyway, so I wrote back to everyone, including Todd Constable, and said, I'm back I'm at MIT, but I think I'm really ready now. He was like, great, well, why don't you come on back? That cycle, I only submitted one application, and it was back to Yale.

Brady Huggett

Oh, you did?

Emily Finn

Yes, I was pretty confident. One thing I had sort of learned both in my time in research and undergrad, but then also in the real world, was it's really important to like the people that you work with. I knew, especially for a Ph.D., it's really important to have an adviser that you trust and that's going to support you and that you get along with. I had enough life experience at that point to realize, like, I know that this is going to be a good situation for me, or I'm very confident that this is going to be a good situation for me. I don't need to necessarily explore a bunch of other places, and I'm ready to just dive right back in.

Brady Huggett

Todd was your adviser for your Ph.D.?

Emily Finn

Yes.

Brady Huggett

While you're there, you do this really interesting paper. This comes out in 2015. This is [the fingerprint connectome paper](#). It got a lot of attention. It's been pretty well cited. It's fascinating work. Can you just tell me how that experiment came up and then how you pulled it off?

Emily Finn

Yes. That whole paper, the dirty little secret behind that paper is it was basically just a happy accident. At the time that I started grad school, which was 2012, Todd's lab and many others in the field were really interested in functional connectivity. It was the new-ish, latest, greatest thing. It was also early days of the Human Connectome Project. They had released their early quarter of data. I was working with a fabulous research scientist in the lab at the time, Xilin Shen, who's the co-first

author on that paper. She and I had gotten our hands on this Human Connectome Project data, which is great because they have a number of individuals doing scans during rest, but also during several different cognitive tasks. What we were going after at the time was differences in functional connectivity based on tasks. Based on what the person is actually doing in the scanner.

Brady Huggett

Based on two different tasks, or rest versus task?

Emily Finn

Basically based on rest versus any number of tasks. Yes, we weren't, I'm saying task as a monolith, but in that project we were separating out between the different task conditions, which in the Human Connectome Project were things like an N-Back task for working memory, there was an emotional faces task, there was a gambling task. Then there was also a lot of resting-state data, and each person had done all of these different task conditions as well as rest. Xilin and I were trying to see how tasks changed functional connectivity, whether that be between task and rest or between different tasks.

We had calculated a bunch of functional connectivity matrices from all of these people as they did all these tasks. Our hypothesis or what we hoped we would see if we threw these into a big clustering algorithm was we thought we would see clusters of the different tasks. All the connectivity matrices from people doing the N-Back task were clustered together and all the matrices from rest were clustered together and, etc. We kept throwing the data into the clustering algorithm, and we just kept on getting out subject. It was that all the matrices from a given subject would cluster together, and those would be separate from someone else. Rest, all the different tasks, all nicely clustered together within a person, but totally distinct from a separate person doing all of those same things.

Brady Huggett

That is, so first off on the outside, that's a failed experiment.

Emily Finn

Yes. We thought there was something wrong. We thought that we had mislabeled the tasks at one point. We thought that, I don't know, it was just so surprising to us.

Brady Huggett

Yes. What you end up finding is a really more interesting thing.

Emily Finn

Yes. It was very much one of these cases of let the data tell you what it wants to tell you. Yes, as I said, we were just at the time we were the first few times we saw the result, we were just like, did we mess something up? What does this really mean? Then over the course of several discussions, internally with the lab and then also showing it to other folks, we were just like, well, maybe this is the story here. Maybe we want to lean into this and then poke this and prod this in a few different ways and see if we can convince ourselves that this is real and meaningful.

Brady Huggett

At what level and maybe by subject number were you starting to see, you're like, we don't actually, I don't know if this is right. Did we do something wrong? I think you used 126 people total, right?

Emily Finn

That's right. That was all the data available at the time. Now it's up to 1,200 for that sample. Yes.

Brady Huggett

At what point did you think maybe let's, as you said, lean into this, you weren't through everybody yet?

Emily Finn

We had calculated, I think we had the matrices from everybody doing all of these tasks. You can plot things in different ways. You can color them by task or color them by subject. It wasn't quite so perfectly clean. Obviously, there's always some slop and some messiness to that, but we would, originally we would color things by task because that was our hypothesis going in. If we make all the N-Back little dots blue, we should see them over here in this part of the graph, and all the emotional faces

red, they should be over here. Instead we were just seeing these little clusters of multicolored dots that were turned out to be coming from the same person.

Brady Huggett

I just love that. I think like, if you think about it and I think, in the paper itself, where you liken each individual connectome to a fingerprint made perfect sense for the lay audience, right? Everyone knows that you have a fingerprint. We know this from crime shows. If that's your fingerprint, that is you and no one else, but you. Now you're saying, look, but also your brain is extremely unique and only your brain is your brain. I think if we thought about that, we would that, but this is the first time it's been shown, that your connectome is unique to you and only you.

Emily Finn

Yes. It's funny you say that because we were obviously pretty excited about this result, but our initial excitement was like, this is a methods result. We know that everyone is unique. We know that people, we can identify- we also don't need to put someone in the scanner to know who they are. We can know that by looking at them or looking at their actual fingerprint or taking their DNA. We were surprised, maybe naively so, at the lay interest in this paper. Our initial excitement as researchers was like, OK, we know that everyone is different, but what we didn't know was that these differences were stable enough and unique enough to be observed with fMRI.

The traditional dogma was like fMRI, it's this noisy thing, and we have to average data from all these people and all these trials, and all these sessions, to get something meaningful. We were excited about the result more from a method standpoint of what it meant about the technique itself of fMRI and less about the real-world implications to this because we have much better ways of identifying individuals.

Brady Huggett

Yes, there's something—I don't know what's the word—almost like magical that whatever I'm doing, my brain has always identified as me. Whatever. Whether it's jogging, doing a math problem, cleaning the house. It's always operating in a way that you can identify as only me. I think that's the fascinating part about it.

Emily Finn

It is cool. I think it also went against, not against, but I think it opened a new lens on the other traditional dogma in fMRI, which was all of the task-based stuff that fMRI was built on. By the way, I still think has immense value, but I think the way many researchers were used to thinking about fMRI from the start was we give people this task. We as the experimenters give them. We are manipulating brain activity by having people do some task. That is the main thing that's driving what the brain is looking like. It's what we're having people do in the scanner.

That's still true. I want to be careful here because I think the fingerprinting paper, it does show, and follow-ups by us and many, many other people since then, we know that there is a lot of uniqueness and a lot of stability to the individual functional connectome.

We also know that it's not that the brain doesn't change depending on what you're doing. It's just that, in most cases, it doesn't change enough to make you look like someone else. It's this balance. I still struggle with how best to think about this myself and how to communicate it.

There are definitely changes that depend on what you're doing in the moment or these longer-scale processes like development, or aging, or disease. There's this huge backbone that is just very unique to the individual. That seems to be present in most cases, regardless of what you're doing or when the scan is taking place.

That tension between flexibility, but also this unique foundation is something that is, I think, important to try to quantify. I think the main innovation of the paper at the time was like, this stuff is stable enough that we can see it on an individual level and it's stable enough that it doesn't completely reconfigure. Yes, it reconfigured some, but not so completely as to make an individual look like something else. That was a hopeful result, I think, for people that were hoping to use this data as a biomarker for-

Brady Huggett

Whatever.

Emily Finn

For whatever.

Brady Huggett

Yes. You also, I think, you found some interesting guesstimates on intelligence based on everybody's connectome. You could see that if the brain was well connected, that they had a sort of, I think you termed it fluid intelligence. Yes? Can you tell me about that?

Emily Finn

Yes. Actually, that result is the one that I personally think was more important and interesting from that paper. The second half of the paper was more about this behavior prediction. I think the reason that that's important is I actually think the fingerprint metaphor, yes, it was a catchy way to communicate both to other scientists and to the public what we had found.

It's also, in some sense, not a great metaphor because fingerprints themselves, like the actual pattern of bumps and ridges on your finger, at least to my knowledge, there's no link between that and anything meaningful about the person, right?

It's more analogous to a barcode where each item has a unique barcode, but there's nothing in the pattern of thick or thin stripes that lets me look at that barcode and say, that's a book versus an apple. It's just this arbitrary thing that's identifying, but it doesn't actually carry any meaningful information.

As part of that first paper, we also really wanted to prove to both ourselves and others that it isn't so much analogous to a barcode, there's actually some media information in there that relates to the real-world output of the brain, which is of course behavior.

As part of that first effort, because the Human Connectome Project had collected all of these measures outside the scanner, we were able to show that we could train a very simple model to take in someone's resting state-connectivity pattern and predict with some degree of accuracy, certainly not perfectly, but some statistical accuracy, their performance on this test, which was administered outside the scanner. It's totally independent of the scan, but it shows us that something about that intrinsic pattern of connections and where you have strong versus weak edges or connections carry some information about your brain's ability to solve these fluid intelligence problems.

Brady Huggett

I also thought that was really interesting. Almost like what you just said, I wondered why—not that it was—it was maybe a little overshadowed by the fingerprint metaphor. I wondered why that was. I had this feeling that it might be-

I'm talking about maybe just like lay media here, is that the idea of predicting intelligence is something that maybe people don't want to look at very well. If we could figure that out, we could predict someone's intelligence, and we don't really want to do that. Does that sound-

Emily Finn

Yes. In retrospect, I think we were probably pretty naive when we published that paper. Again, we did not expect it to garner the lay interest that it did. I remember I was a third-year grad student at the time, and I had reporters from pretty major news outlet calling me and wanting to know what the ethical implications of this were and how do we think about this. Is this Big Brother, government, going to get a handle on this?

Brady Huggett

As if you can answer that.

Emily Finn

Yes. I just was totally unprepared for that line of questioning. I think, still to this day, struggle with how to think about that and how to answer those questions when I get them.

Brady Huggett

I know. This is a whole different question, but is that your job? Your job is to do the work and then report the work that you found. You weren't necessarily even looking for that, but here's what we found by the way, and here's our paper.

Emily Finn

Yes. I think there's multiple ways to look at it. I would say I personally am still undecided. I think, as scientists, we do have an obligation to think, at least somewhat, to ourselves and with our colleagues about what the ethical implications of what we're doing are.

I think, at the time, and to be honest, still, I just feel like we're so far away from something that's ready to be rolled out in any real-world context. That to me, it wasn't a super pressing thing to have to think about that right then and there. Then I could sort of see how it's a slippery slope.

If each incremental advance, it doesn't feel like it's ready, but then all of a sudden it is, or someone's trying to commercialize it and no one's considered it. I do think there's a danger in putting our blinders on for too long. I also think that as far as these technologies go, fMRI requires so much compliance from the subject.

You look at our predictions. Yes, they're statistically above chance, but they're not going to hold up in a court of law. No sane person would make real-world decisions based on that, at least not right now. It does become this weird gray area of like, OK, well, this isn't nearly good enough now. I guess we're putting this out there. If other people build on it and someday it does become good enough to do this prediction, then yes, we will have to grapple with the ethical implications of that.

Brady Huggett

Yes. It's almost like, this isn't ready now, but we should start thinking about it now because it might get ready.

Emily Finn

Yes. The analog that's top of mind right now is AI, right? Here we are having to grapple with this stuff. There's this incredible, very steep advance in the last few years, and no one thought that it would be this fast, and here we are. I don't know.

Brady Huggett

OK. You finished your Ph.D., and then you did a postdoc at the NIH under Peter Bandettini, I think.

Emily Finn

Yes, Peter Bandettini.

Brady Huggett

After that, you came right to Dartmouth.

Emily Finn

That's right.

Brady Huggett

My thought was like, were you looking to open a lab then? Start your lab?

Emily Finn

Yes, I was. Well, I would say I went through phases, honestly, both during grad school and postdoc where I wasn't totally sure that I wanted to stay in academia. I had been in-- Yes, the postdoc position was also fabulous, very supportive lab. I was able to do some really good stuff there.

Brady Huggett

We should say this is imaging again.

Emily Finn

Yes. Peter and Todd actually have similar backgrounds in that they were both MRI physicists by training but got in on the ground floor functional MRI and built a lot of tools that people like me can come and play with.

As a postdoc, I waffled, honestly, back and forth about how hard I wanted to chase a PI job. I think I was someone that thought that I would enjoy it, but also was not willing to necessarily just move wherever or roll the dice in that sense.

I thought a little bit about pivoting to industry roles, but I guess similar in a weird analogy to my undergrad senior year, I was haphazardly tossing out some applications, and nothing really landed. Then things turned around and science started working well again. I was like, OK, I guess I'll try for this faculty thing.

Yes, the first year and only year that I applied, I did what I and many others do this, too, would consider a soft apply. Basically, just choosing a small handful of schools that were reaches, but that I would be really excited to be at. NIH is great because the funding is very stable.

If I had not gotten a job that year, I would have been able to stay. I didn't need a job, but I was like, OK, I'm going to send out some feelers and see how this goes. I was super lucky that the folks here decided to make me an offer.

Brady Huggett

You were a COVID hire.

Emily Finn

Well, yes. I got the offer in 2019, and then I deferred it a year, which is also not uncommon, so I could recruit people to wrap up my postdoc stuff, recruit some trainees to start with me. That was all happening in the lead-up to COVID before I or anyone knew that we were going to be virtual for the whole first year, year and a half.

Brady Huggett

When did you start?

Emily Finn

I started July 2020.

Brady Huggett

Oh my God. When did Dartmouth allow you, well, anyone back on campus?

Emily Finn

That's a good question. My husband and I had physically moved here, which was great by the way, because we had been living in a tiny one-bedroom in D.C. in March 2020, and so getting up here was a huge breath of fresh air.

Although we were living about an hour away, we were squatting my in-laws' vacation home. I think some people were intermittently coming to campus during that 2020 to 2021 academic year, but most people were not. I was coming in maybe once a week to sit here in my office and convince myself that I was actually a professor now. [laughs] It was very hard, honestly.

I had hired three people to start with me. I had hired people at the postdoc, grad student, and RA level, and they had all moved. In retrospect, if I had known we wouldn't be able to come in, I probably would've said stay put. It's just a hard time to be going through these life transitions and moving to a place like this, which is pretty rural, and you may feel isolated under the best of circumstances, and then doing that-

Brady Huggett

You really [crosstalk].

Emily Finn

-during a global pandemic. I'm trying to initialize these mentoring relationships de novo. I think it was hard for many, many people for many different reasons. Some people had to totally pause data collection and really interrupted studies.

We were in the happy position of we hadn't started any data collection yet, but at the same time, we didn't have in-person relationships. I was trying to figure out how to be a PI, but also how to be a PI in a global pandemic, and mentor these people that had moved up here taking a risk on me and starting this lab. Now we're all just sitting in our weird apartments in the middle of the woods just Zooming with each other.

Brady Huggett

For anyone that's stressful, but you'd never done this before. You'd never set up your own lab. You'd never been a PI. Now, you've recruited people and you have to handle- how did you manage to hold the team together? How big was the team then?

Emily Finn

In the very beginning, it was just four of us. There was myself, the postdoc, the grad student and the RA. Then I actually hired a second postdoc only a couple months into that first year, so then there was five of us. It was very hard.

I'm lucky that all of them handled it super well. I think everyone was just doing the best they could. I think looking back, I probably put a lot more pressure on myself internally than what they- I think they knew there was no blueprint for this, but here I am feeling totally responsible for not only these people's careers but also their mental health and their well-being at this time that was just really uncertain for everybody.

We did our Zoom, we did a couple of masked outdoor hikes. We had a couple of awkward virtual game nights to try to get to know each other. [laughs]. I'm just really lucky, I think, in the mix of people that I had chosen, because they also just did the best they could.

It was one of those weird, again, counterfactuals of- As you said, I had never started a lab, but that meant I had never started a lab not during COVID. You always expect that it's going to be hard, and so it was hard. I'm sure it was hard in some ways that were unique to the COVID situation, but in other ways, it's always going to be hard. At the time, this is just the hand you're dealt and you just have to muddle through.

Brady Huggett

The masked hike, that sounds like that might work.

Emily Finn

Yes. [laughs]

Brady Huggett

You're outside; you're moving; you're with people physically. Maybe at the top, you take your mask off, and you're 6 feet apart. I'm like, "That's not a bad way to build a team."

Emily Finn

Being here was not a bad thing. Especially that first year, the rates up here in northern New England were very low. We did feel like we could gather outside fairly safely, and so we did do some of that, and that was nice.

Brady Huggett

Man, that must have been hard. I wanted to ask, I saw that you're going to OHBM this year and that you're speaking at it.

Emily Finn

Yes.

Brady Huggett

Do you know what you're going to speak about?

Emily Finn

It's a great question. I was super honored to be asked. I consider OHBM my home meeting. I've been going since, I think 2012 was my first meeting. I wasn't even technically a grad student then. I was an RA in Todd's lab in a couple months before I was officially starting.

Was super honored to get the invitation. I'm still thinking about exactly what I want to talk about. I think my lab has some new work that I'm really proud of and excited about. I'll obviously try to feature some of that, but I think I also want to make it a broader message about just these themes I've been thinking about recently with scan paradigm and what we actually have people do while we're in this scanner.

Brady Huggett

Oh, right. You just wrote something. I should say this, you just wrote something for us. We [published it yesterday](#) about this very topic. Maybe just talk about what you wrote for us and your thoughts on scanning, the size of scans that we need, the sample size versus maybe focus scanning.

Emily Finn

I think there's been a lot of well-placed scrutiny lately on our sample sizes and our statistical practices and the need for replicability and generalizability and reproducibility. A lot of the work that I've been doing- Honestly, we're doing less of this these days, but a lot of mine and my colleagues' earlier stuff with using functional connectivity to predict behavior.

We have realized as a field that we just probably need much bigger samples to be able to say something truly conclusive about those relationships and to be able to work towards these real-world tools. Something that will eventually be good enough to be used in a real-world clinical or educational setting.

We are just going to need, frankly, a lot more data. These relationships are very subtle. The data themselves are noisy. I think all of that is very true, but at the same time, I think the OHBM community and the community of people calling for that type of move towards these larger sample sizes is a community that thinks very deeply about things like how we're acquiring the data from a physics standpoint and the actual acquisition parameters on the scanner.

They think very deeply about analysis and the best way to pre-process the data and the best way to calculate connectivity. One thing that I see as missing is there's less attention on the actual scan paradigm, meaning what we have people do while they're in that scanner. I think rest was such a powerful idea to break us out of that traditional task mindset.

It's led to a lot of really amazing new insights about the brain. I worry a bit, and I've written other opinion pieces about this, that rest has taken over in a way that's maybe doing us a disservice at this point. I think there's a lot of evidence now, some from my work, honestly, mostly from other folks' work, that rest is some of the least sensitive to these behavioral relationships.

There's a danger of this circularity. We're all mining these large-scale datasets that have mostly rest. Some other task paradigms, but also task paradigms that weren't necessarily chosen because they're the best at revealing these individual differences. They were just chosen because we know that they evoke robust activation.

There's, I think, just a tension between- we're mining these datasets. We're using them to figure out how many subjects we actually need to be able to say something meaningful. There's a distinct possibility that if we had data acquired under different scan paradigms that we're more sensitive to these relationships, we could bring down that number of subjects that we really need to say something incisive about these relationships.

Brady Huggett

Not to say that large samples aren't needed, but if you don't have it, you could also get better results this way.

Emily Finn

Right. I think one of the tensions, these large-scale datasets are all science by committee, and that's by design. That's just how these things work. You wouldn't want to have a single PI or single lab in charge of these things.

What that means is that when people have to make decisions about what to include in these large-scale datasets, they're often going to default to these well-worn- They're going to do rest, and then they're going to do these well-worn cognitive tasks. Those cognitive tasks did not necessarily get well-worn because they're really good at revealing individual differences.

They got well-worn because they're really good at activating the same regions in everybody. They show robustness and reliability that way, but that's actually not necessarily what we want if we're going after these individual differences, and we're trying to train these brain-behavior predictive models to look at what's different across people.

The point that I was making in the *Transmitter* piece this week was that we may stifle innovation. I'm thinking ahead to the next wave, like, what is the next human connection project, ABCD, UK Biobank? When it comes time to make decisions about

what paradigms we want to include in those studies, if we haven't allowed some evidence to build up from smaller-scale studies, we'll still be stuck in the same rut.

Brady Huggett

I read it in draft form to prepare for this interview, actually. I was like, I hadn't considered it, and I thought it was really, really smart. Not to flatter you, I actually felt that way. Also, I know it's only been a day, but have you gotten feedback? I've seen that people are talking about it a little bit.

Emily Finn

Yes. There's been an interesting response on the website formerly known as Twitter. I've published, honestly, a couple of pieces that in the last few years. Just my take on whatever, mostly to mask the slow empirical output from starting lab during COVID. [laughs]

Usually, the people that react first are the people that agree, and they're like, "Yes, yes, yes." Sometimes it's the thing where it's like, "Yes, yes, we know this." It's funny because now I'm in a psychology department, and many people in psychology, not just here, but everywhere, never really jumped on the resting-state bandwagon to begin with.

Sometimes I feel like, when I get on this soapbox in front of different audiences, some people are like, "Well we never thought resting state was a good idea. Then you have a whole other community of people that think resting state is the best thing ever because now they don't have to think about tasks, and they can just throw the person in the scanner and press go.

There's just very different, I think, perspectives. Sometimes you get people being like, "Yes, this is great. I'm glad someone finally said this." Sometimes you get people saying, "Yes, this is silly. We've known this. Everything's coming full circle thing." Usually, in my experience, the people that disagree take a little longer to respond. I haven't had any pushback yet. We'll see.

Brady Huggett

It's early. I had this thought. This is the last thing I want to ask you. I could be 100 percent wrong on this, and just tell me if I'm wrong. I was looking at your career. I think people use imaging as a way to figure out the brain, obviously. To understand the brain. Their interest is the brain. I think your interest is the brain. Also, I feel like you honestly have an interest in imaging, how to do it, how to do it better. That maybe is the driving thing for you. Is that right?

Emily Finn

To be honest, I think the driving thing for me is behavior. I am interested in the brain because I'm interested in human behavior. I think that's true for most neuroscientists, right? Otherwise, you might as well just study the heart. It's a lot easier, or so I'm told.

I think I do have an interest in imaging. I have an interest in imaging in the sense that if we believe the brain has something to tell us about behavior, which I think it does, although to be honest, I think we can also get a lot of insights from just looking directly at behavior.

To the extent that we're using the brain in service of understanding behavior, imaging is the best worst tool we have for most human brains to look at it non-invasively and safely. I have an interest in, to the extent that we're doing imaging, because it's expensive in many ways, not just money, but time and effort. Let's do it the best that we can do it in order to further this goal of understanding behavior.

That's why I've become convinced that even though resting state is and was a powerful way to extract the general organizational template of the brain, what we really want to be doing is looking at the brain as it's behaving.

What we care about, what I care about, and what I think most people fundamentally care about at the end of the day is behavior. Why do humans do what they do? Why do humans become mentally ill? Why do humans have differing experiences from one another over time? That's all the common denominator of all that, we think, is something that's happening in the brain.

Brady Huggett

Yes. Perfect. Thank you.

[transition music]

Brady Huggett

You know, the thing about talking with someone who studied linguistics is that they pepper their responses with these gorgeous little turns of phrase. I'm thinking in particular where Emily said, "I'm saying task as a monolith," which might be a phrase never before uttered in the English language. She was a lot of fun to talk to, so thank you, Emily, for having me into your office, and for giving me your time.

By the time we'd finished this interview and I was again back outside, this bright sun had come out in Hanover. The temperature had gotten up to 60 degrees, and the college kids were spread out all over the Dartmouth Green. Nice campus.

OK, this episode will be archived on TheTransmitter.org, where we also have a transcript. In the transcript, we have inserted links to the main papers that we discussed, so check that out if you'd like more information. The show can be found wherever you get your podcasts: Apple, Spotify, YouTube, or in whatever podcast app you use. Some of the information on Sustainable Harvest for the intro was sourced from the podcast "Brand on Purpose," hosted by Aaron Kwittken. Emily Finn's essay—and the title is, "[To improve big data, we need small-scale human imaging studies](#)"—can be found on TheTransmitter.org or by checking the transcript for the link.

If you'd like to comment on this show or whatever we do at *The Transmitter*, you can find us on the social media platforms X, BlueSky, Mastodon and LinkedIn. Our theme song was written and performed by Chris Collingwood.

Thank you for listening to "Synaptic." Until next time.

[ending theme music]

Emily Finn

You can make it an out and back if you want to, just kind of like, walk down to the river as far as you want and then turn around. If you do this whole loop, it might be, like, an hour and change.

Brady Huggett

In which case I'll wish I had my sneakers on, probably.

Emily Finn

Oh.

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