

Hear Here Podcast – Season 1, Episode 5: Dr. Viji Easwar

Hello and welcome to the Hear Here podcast. I'm your host, Karen Gordon, I'm an audiologist and senior scientist at the hospital for Sick Children in Toronto, Canada, and a professor at the University of Toronto. Our goal with these discussions is to explore new ideas that may help people use devices like cochlear implants to hear. Transcripts of these discussions are available alongside the recordings.

[Music]

Karen Gordon

OK, welcome back to the Hear Here podcast. It's wonderful that I am joined again by Dr. Sharon Cushing and Dr Blake Papsin; your Hear Here podcast team! We are delighted to introduce this discussion that we had with Doctor Viji Easwar. She is an audiologist. She did her PhD at Western University. She became a team member with us at SickKids doing her postdoctoral work for a couple of years

Sharon Cushing

I know, I, I remember Viji well.

Karen Gordon

Yeah, she's, she is a wonderful, wonderful member of our team. And, uh, she just did such great work while she was here looking at cortical processing of bilateral cochlear implant stimulation

Blake Papsin

It was in a ginormous data set. She was really, really incredibly dedicated to get through that work and, and produce what she did.

[Music]

Karen Gordon

At the time of the recording Viji was an assistant professor at the University of Wisconsin in Madison and is now working at the National Acoustics Laboratory in Australia.

Doctor Easwar I'm just really excited to, um, say hello and welcome you!

Viji Easwar

Thank you, thanks for the invitation. It's a great pleasure to be here.

Karen Gordon

We know each other well, um, having worked together in Toronto, in my lab, and it, it was just such a wonderful time working with you. Tell me a bit about how you got to, um, a career in hearing research.

Viji Easwar

Now, my interests in hearing research actually started, um, in my undergrad degree. So, in India, the universities offer an undergraduate degree in audiology and speech language pathology. and then I specialized in hearing, or audiology, alone, in my master's degree.

[Music]

Karen Gordon

I always find it wonderful that clinical people want to do research.

Sharon Cushing

and so I think that that clinical experience, whether it's current or distant, just keeps you grounded in a way that you have patients in mind that inform the questions you're asking and the solutions that you're finding.

Blake Papsin

the early days of implantation we would sort of push a button and then see if they did better and push another button and see if they did better and, and then the buttons became bigger, and more complicated and the paradigms and the strategies we used equally complicated.

People always said, well, what's the outcome that you're talking about, and I said, well, I don't know if they're happy in their life, not just how to make them hear better, but what they do in school and who they marry and what they do and who they interact with, how they interact, um their balance. So really research is the key to the whole, um, clinical mission.

[Music]

Karen Gordon

It's not so common for people to want to get into academic research work. What do you think, um, inspired you to switch from clinical to research?

Viji Easwar

So, being a clinician, um, and having had worked with adults as well as children, um, in multiple places, um, sort of made clear the shortcomings of our current approaches. So, I, as I worked longer, um, I realized that there are several aspects of clinical work that could improve.

So, I did my PhD in the National Centre of Audiology at Western University in London, Ontario. In my PhD, I developed a method that could be used to measure hearing aid benefits, using EEG alone.

One of the things to remember is that these hearing aids are very sensitive to the type of input they get, um, so, we want to be using speech stimuli, speech stimuli as close to natural speech or natural running speech as possible. We also want to be evaluating all these, uh, hearing aid benefits and hearing in, in a frequency specific manner because hearing loss varies by frequency, hearing aid gain varies by frequency and therefore, hearing aid benefit also varies by frequency.

The main findings from my PhD work, is that it is possible to evaluate or rely on EEG to predict outcomes, um, in children with hearing loss in a frequency specific manner.

[Music]

Karen Gordon

So, we always look at, you know, these outcomes of how the, the system is actually developing and how, how things are, are, adapting and changing.

Sharon Cushing

kids are little black boxes, right? it's a powerful thing, um, because, you know, what you do and what you don't do is going to impact on their development.

Karen Gordon

What we concentrate on most in audiology is access to sound. Is it audible across the range of frequencies that we need for them, um, to hear for speech understanding. We do have some nice tools to do that in babies, um, and we use them to screen hearing loss at, you know, first day of life. So that's great, um, but then what do we do about it? And, and that's what Viji's looking at;

[Music]

Karen Gordon

What would you say to clinicians who are kind of afraid of, of, uh, doing this procedure, there's more equipment- all the electrodes, as opposed to just watching the baby?

Viji Easwar

Oh well, um, I think no pain, no gain. These tools, I think, are going to be most useful, um, when we can't have another way of assessing if the child can hear sounds or not.

So, if we have a child who's been fit with hearing aids, let's say by 3 months of age, we are likely waiting until they're about 8 months or so, before we can clinically assess how well they hear with hearing aids.

We know that, that period is quite critical for language development, so rather than wait, putting in the effort and using techniques like EEG, um, at three months of age or as soon as the child has been fit with hearing aids. If the child can hear through hearing aids, it's likely that the hearing test was accurate and the hearing aids are doing what they need to do.

And for the parent, it's actually encouraging to see the differences with and without a hearing aid and then helping the parent to see that the child brain is picking up signals um, and that hearing aids are of benefit, or are useful, or providing access to speech. It is a struggle to achieve hearing aid retention in the early years of life so showing a parent that the hearing aid is of benefit in an objective manner, could, um, help parents persevere through that phase.

Karen Gordon

I think you raise a really, really important point which is around, um, ensuring that development is actually happening. There might be particular populations or special circumstances where we would, might need to use these more often?

Viji Easwar

Yeah, absolutely. So, when I mentioned about the 8 month mark, it's for a child who's typically developing, otherwise. A child with additional comorbidities might never be able to perform clinical behavioral tests. So EEG as a way of measuring hearing aid benefit is not just in the baby phase, um, but it could also be for children who are not able to participate in testing because of an additional developmental disability.

[Music]

Blake Papsin

I want to know, tell me when I see some incredibly, uh, challenged child go silent, and listen, and move their head, and sway when music comes through the cochlear implant. Give me some of that joy- it's not language based.

Karen Gordon

I think what you're saying here, is that, that system includes the whole human and the response that the whole human has.

Blake Papsin

Yeah, and, and then of course the seat of that is going to be the cortex. And it's in Viji's work and Dan Wong's work and the work that's gone on in the lab for really 25 years or so.

So yeah, it's true that cortex, studying auditory areas can tell us the perceptible, where the auditory percept is reaching the source, but nowhere near telling us what meaning it's carrying.

Karen Gordon

Yes, that's true. Although we spend a lot of time thinking about some children and wondering whether the access that they have through hearing aids is enough and whether we should push beyond what they have to put them into surgery to get a cochlear implant.

Blake Papsin

Mm-hmm.

Karen Gordon

And that is the question I think that Viji is working on, is: What's enough through a hearing aid for hearing in early life.

Sharon Cushing

And I think that's a moving target, right? 'Cause you know what was enough 10 years ago, or 20 years ago, is very different than what we would consider enough now as we see, sort of implant candidacy change, as we can do implants safely, as we can do them quicker, then, we want more, and so the "enough" gets bigger, right?

Karen Gordon

And, well, it may be also not a target that we can hit with one tool.

Sharon Cushing

you know, we tend to focus outcomes on, you know speech recognition or, you know “what is the word” but how is the word being said with what intention, anger, flirtatiousness, you know, all of those things.

Karen Gordon

But I think even more basic to audiology, you know, it could be that the brainstem just carries sound differently in this person and that's what Viji is measuring. You put an electrode on the surface of the head and you send in some sounds and you watch what the brainstem can do with more complex input.

And, and that'll tell you maybe something more than what you knew before, may be able to predict any delay in speech and language acquisition, and that would include as you get more complex, prosody and speech understanding, communication that interaction, this understanding that somebody is making a joke.

Blake Papsin

So, we're looking for connection to humanity.

Karen Gordon

Yes, ultimately, what they're looking for is that the brain is responding like it should to the signal.

[Music]

Karen Gordon

These are cortical responses to the sound, is that right?

Viji Easwar

The main method that we have been trying to use is more brainstem dominated, um, it's, it has some cortical contributions but it is mainly brainstem dominated. If the child is asleep, that doesn't affect, um, the response amplitude, so, um, it, it, it is beneficial when the child is asleep which can happen a lot in young babies.

Karen Gordon

So, the setup would be something like what you might see in the, um, newborn screening?

Viji Easwar

Because it's a brainstem, um, dominated response, it is as simple as placing 3 electrodes, one on the head, one maybe behind the ear, or on the nape, and one on a collarbone, or the other ear, or low forehead. A child has an ear phone in their ear and the sounds are playing and we could be doing that with, with, with a hearing aid, or without a hearing aid and then compare.

So, with, without a hearing aid and with a hearing aid, what is the, what is the improvement that you see in the brain signal and how that correlates with how well they hear.

We are also trying to understand what developmental changes there would be in such responses, with and without hearing loss. We still have a lot more to understand about, for example, how just having hearing loss would influence that type of response, if those responses are reliable, or can be used reliably to predict speech understanding, for example, and not just tell us about access to sounds. Um, so these are things that we are continuing to study.

Karen Gordon

This is great collaborative work that you're continuing to do.

Viji Easwar

Yes, I am continuing to collaborate with David Purcell and, and Susan Scollie, um, and, I'm beginning to look into how we could tap into cortical responses for the same stimuli. If that is successful, we could be looking at brainstem, as well, as cortical level processing of sounds with and without hearing aids.

Karen Gordon

Some people think "oh much more important to measure what the cortex is doing, because that's where hearing really happens", but the, if it doesn't go through the brainstem properly, then you know maybe that's the bottleneck that we need to be focused on what, what do you think?

Viji Easwar

Both are important, um, and both offer sort of different benefits, um. In terms of practical benefit, um, brainstem responses are more robust and the amplitude doesn't get attenuated if the child falls asleep.

Cortical responses are definitely more complex in terms of the amount of processing that can happen, ; and it would likely correlate with perception a lot more, um, than brainstem responses will. There are situations where we know that brainstem processing may be scrambled and not doing as well, but cortical processing will make up for it. So, I think it's important to look at both.

[Music]

Blake Papsin

We just need that next kick to say what of these billions of ways as our, as our computing capacity gets better, and better, and better, and we start to understand different regions and their network abilities. Um, once we tackle that, we're going to start to go, "oh, that's what joy looks like! Program the implants to give joy".

Get the joy, the joy wave. That's what I want, the one where I'm at peace where I understand what's being said it, has to do with frequency, uh, characteristics, it has to do with clarity, it has to do with timing, give me the joy thing, that means I understood everything and I'm comfortable on Earth right now. That's the one I want, I want the joy wave.

Karen Gordon

I, I love it! We're, I, I will, um, have to express that to Viji that she wants to develop a protocol for establishing joy. Yes, yep.

Sharon Cushing

Anybody can do it, Viji can.

Karen Gordon

If anyone could do it, Viji can. So, uh, but I, I do think, you know, it, it is going to be something that she's going to look at for her whole career, in that case, and she's at the pretty early stages.

When I asked her to think back to her postdoc experience, now that she's a faculty member, she described it so well. She said, you know, it's the bridge between being a student and a completely independent faculty scientist, and she said it was like, like being a teenager.

Blake Papsin

Wow, that's amazing.

Sharon Cushing

That's a good way to say it.

[Music]

Viji Easwar

The postdoc phase is quite interesting, um, so you, you feel like you should be independent but you know, you're not quite independent, it's more like being a teenager. (*Chuckles*) The first postdoc experience with you taught me a lot of different things.

So, I think the first postdoc with you, for me, really helped steer my thinking towards more basic questions that I could ask about how childhood hearing loss could affect auditory development.

The second postdoc for me was sort of a continuation of my PhD. So at the end of the PhD we obviously found limitations in what we did and we wanted to improve that.

Karen Gordon

for you it doesn't just span across time, uh, it spans across so many different places, (*chuckles*) and I think we've mentioned at least four different countries that, that your training has been done in and so, tell me a little bit about, you know, always this moving in, in support of your career.

Viji Easwar

When I moved for the first time out of India to Southampton, um, in England, I did not think I would move as much. Um, but in the pursuit of hearing research, um, I've just moved, um, where appropriate opportunity has been.

Um, so, I, I moved from India to Southampton, England to do my masters in audiology. And then I moved to Brighton, um, which was my first job in, in the UK, um, I worked as an audiologist in, um, with adults, uh, in the National Health Service there, um, and then I soon became interested in pediatrics and moved to Glasgow for a couple of years to work as, as a pediatric audiology, audiologist, in, in a children's hospital.

And, and two years in, I paid off all my student loans and, and, and then I, I wanted to go back to school because I, I reached a point where I began to observe a lot of limitations in clinical work and it sort of intersected with my research interests. There was a PhD opportunity in, in Canada, so I wrote to them and then I moved, um, spent 4 years there.

Then I got to know about your work, um, and I wanted to increase my area of work or research experience, um, from just hearing aids and EEG, to cochlear implants and EEG and neuroplasticity in general. That's how I came to your lab in Toronto and then I went back to London because we won a grant and that could fund my second postdoc.

And then I moved to the US, the University of Wisconsin, Madison. Um, actually, I moved here because, um, my husband, who also does similar work, um, in research, got a tenure track job and I got hired as a teaching faculty. I tried to keep up my research productivity during that time and the last year I got a tenure track job in the same university.

Karen Gordon

That is such an accomplishment. It really, really is.

Viji Easwar

One of the advantages I've had, um, with moving, is not just pursuing, you know, my research interest, or area of the research interest, but also meeting all the best people, in, in the field and knowing how they run successful labs. I think that's, um, been one of the main things I've learned, um, how you, uh, motivate students, how, how you have a collegial, working, productive team, um, and how you keep people happy.

Karen Gordon

What do you think was the success of, you know, going into new situations and new places?

Viji Easwar

I mean, obviously change is difficult, um, because you're needing to adapt to these new situations. Um, and at the time of change, and at the time of adapting, it feels difficult. It's helpful to remember that it's all happening for a reason, it's all going to pay off.

[Music]

Karen Gordon

I think it is important to remember that she spent a long while getting there, uh, and she literally moved all over the globe to pursue this scientific career. A scientific career really is many years, and science does take some time.

Blake Papsin

I think Viji, and many of the other students who have come from, you know, different parts of the world to study with us, they understand things I will never ever know.

I learn a lot from them watching their, just capacity to overcome obstacle after obstacle that we, in the established scientific community, keep throwing in front of these bright young people, and they just crawl over them, though, like they were like nothing. So being a Canadian, I don't think I've ever really had to crawl over much, except big snow drifts.

Karen Gordon

I think doing research, um, is one of those things that you have to think beyond the world that you are living in, in the context that you are, and think about language, as such a fundamental part of all human experience. We are all looking for that that same development for children all over the world.

Sharon Cushing

when I think about Viji, you know, this is a girl who loves what she does, right? And, and, and you meet her and she is this smiling, humble human, you know that she got through her own hard work

[Music]

Karen Gordon

Although research is so independent uh, at the end of the day, there's still a group and a team that puts it all together, and so having a good team is, is really a big part of it.

Viji Easwar

In research, everybody is an independent thinker. So, you're trained to be an independent critical thinker, so you'll get really critical of not only your work, of everybody else's work, and then you have to work together and it's not that easy to, you know, accept everything and, and there's going to be compromises somewhere.

I think, um, remembering and knowing that it's for the progression of science, for the progression of, you know, clinical outcomes, for improving, like, lifestyle for individuals who need help, um, I think that keeping that big picture in mind, um, really improves or, or reminds us of what's common between all of us, um, because what we are trying to achieve is, is more than what is important at an individual level.

One of the things I've learned from other labs and other mentors is to have a multidisciplinary team. Um, because if we have people who are trained like us, we all tend to think the same way and we don't diversify our thinking at all.

Karen Gordon

So, it sounds like you're really transitioning into being a mentor, which is wonderful!

Viji Easwar

It is a different mindset, but having been a postdoc for a couple of years and then being in that teaching position, sort of prepped me towards this position.

[Music]

Karen Gordon

Research never stays the same. *(laughter)* We're always looking for, for new ways to do things, change is really an inherent part of what we do. One of the biggest changes is on a personal side for you, I don't know whether you want to share, um, what it's like to be a new mom and, and work, uh, in a, a pretty demanding job.

Viji Easwar

Yeah, it's been quite a change knowing how your day will go made it very easy, how your day, or week will go made it very easy to plan writing, meetings, teaching and so on and so forth. And in the past year with the addition of a new family member, um, I've had to divide that time. *(chuckles)*

It's not reduced my love for research any less, um, but, I think, I've learned to be more efficient because I know I have limited time.

Karen Gordon

I hear from people who are trying to find the balance, I just want to encourage people that the balance is different for everybody.

Viji Easwar

I think, um, I've learned, um, to have a better work life balance. In a way it was forced on me, I would say, *(laughter)* 'cause you, you can only play with your child and not be working at the same time. I, I feel like that's actually brought better work life balance for me

[Music]

Karen Gordon

She's a new mom. *(overlapping chatter)* So, yeah, I had an opportunity to, to discuss with her that balancing of being an early career scientist and a new mum and in a new place, new country. I think she said it just has made her be more efficient at everything because you really have to divide time and try to focus in on, when, with whatever you're doing at that moment.

Sharon Cushing

It's a beautiful thing and, and I'm so happy to hear 'cause the last time I saw Viji, um we were both at the AAS conference and, you know, the first time I ran into her at that conference, I was busy pushing my son in a stroller and, um, you know, she took such joy in getting to meet him.

Karen Gordon

I wonder if you want to share some, some of your thoughts on, on, you know, what, what works for you?

Sharon Cushing

I think back with, with tons of fondness now, um, about even the decision about having children. It wasn't an easy one for me, um, and I love what I do and, you know, this may seem selfish to some, but I was worried about how a child might impact that enjoyment and I'm putting it out there and being vulnerable 'cause there may be other people who feel this way, but it was honestly, I, I was worried about that, you

know, what if what I love changes? Um, and it didn't, um, I just recognized that, you know, I could welcome a love like I've never known before when I became a mom.

You know, for me it's more about work life integration, and I think it's different for everybody. Um, some people need to keep them separate, um, for me, I needed to integrate them and I think, you know, that came back to having you know, you welcomed me with a newborn infant that I was breastfeeding into the lab meetings and, and coming back, you know, in ways, you know, that I could, and I was welcomed.

You know, my son has been all over the world with me, and I've recognized that just for him, home is where I am, doesn't have to be his own bed. Him being there with me has been, it's important for me and I think it's important for him. It's been a little tougher with COVID, um, but you know, he said, he still says to me, "mom, when are we getting back on an airplane?"

Karen Gordon

So I, I, I really get that and I, I'm so happy that Viji is doing the same thing and shared her experiences as well. So, thank you both for being so open.

[Music]

Karen Gordon

I just think that your journey from, um, through your training into your, your faculty position is just so inspiring for people to, to hear. I've also really appreciated hearing all about really important work, uh, that you've done. I really look forward to using your research tools in the future. with that, I, I want to thank you so much for being a part of this podcast and spending the time chatting with me.

Viji Easwar

Thank, thank you for the invitation again.

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You can catch other episodes of the Hear Here podcast, there's a link on our website, search Archie's Cochlear Implant Lab Sickkids Research Institute, or wherever you get your podcasts.

The Hear Here podcast is put together by me, Doctor Karen Gordon, with my colleagues at the hospital for Sick Children in Toronto, Canada, Doctors Blake Papsin and Sharon Cushing with a tremendous production and advisory team: Sofia Olaizola, Rachel Bedder, and Maria Khan. Our wonderful Hear Here podcast music was composed and performed by Doctor Blake Papsin.