

Contents

Proem 00:53 1

Introducing Dr. Aparna Raghuram 03:09 1

Converging-Diverging. I can help. I promise nothing. 04:31 1

Meditation for the eyes 11:47..... 3

Vision as a barometer of stress 15:36..... 4

Eye health in Covid19 world 20:43 5

Reflection 28:36..... 7

Proem 00:53

When diagnosed with Multiple Sclerosis in 2008, the neurologist told me that I had had MS for 25 years. ‘How can you tell?’ ‘See these black dots and white spots on your brain scan? The white dots are inflammation from active demyelination, and the black holes are where the inflammation has been reabsorbed. There’s nothing there.’ Actually, it looked like swiss cheese. I was 56, so 25 years earlier would be 31 years old. My wife and I tried to piece that together. At that time, 25 years earlier, I had decided to stop wearing my glasses because of the double vision. The prisms in my lenses were getting stronger and stronger. I read about eye exercises and tried them. I even drove without my glasses. That lasted six months or so. Fast forward to 2008 – I spent a lot of time in meetings, reading and writing notes while looking up at a speaker or slides, taking my glasses on and off, on and off. I was exhausted, frustrated. I told my PCP that something was really wrong. I felt a fog rolling over me - my vision, weakness, dizziness, fatigue. When finally diagnosed and treatment started, my vision remained a problem. I didn’t know if I could keep working. Disturbing. Then I met Dr. Aparna Raghuram, an optometrist. She saved my life.

Introducing Dr. Aparna Raghuram 03:09

Aparna received her Ph.D. from the University of Missouri-St Louis and obtained her doctorate in Optometry from the New England College of Optometry. She is an optometrist working at Boston Children’s Hospital for the past 11 years. Her clinical area of expertise is to assess and manage double vision, visual function deficits in post-concussion and learning disability, and functional vision assessment. She is an Assistant Professor at Harvard Medical School. Her research focuses on understanding visual function through psychophysics and electrophysiology in areas of retinal diseases, concussion, and learning. Outside of work, Aparna likes to travel, running and playing board games with family.

Health Hats: Good morning.

Aparna Raghuram: Good morning.

Converging-Diverging. I can help. I promise nothing. 04:31

Health Hats: Dr. Raghuram, I just loved that you've joined me. I know it’s unusual to say to an optometrist, but I feel like you've saved my life. Who says that to an optometrist?

Aparna Raghuram: Yeah, I know.

Health Hats: When I first came to you, I was working at Boston Children's Hospital. I led the Patient Family Experience Initiative. I had been diagnosed with Multiple Sclerosis, and I was struggling with my vision. I would be at meetings, and I had this double vision at a distance and not double vision close. I couldn't manage. Meetings were a big part of my life, and I felt exhausted. I'm trying to remember who sent me your way. First, somebody said, 'the problem you have is really a pediatric vision problem - double vision at a distance. You're working at the right place.' Maybe I saw Dr. Danielle Ledoux.

Aparna Raghuram: Yes, you saw Dr. Ledoux.

Health Hats: She did her exam, and she said, 'I don't have that much to offer. You don't need surgery, see Dr. Raghuram. I remember our first conversation; you were explaining about vision. You said, 'picture that you're getting thousands of images coming into your brain through your eyes. Your brain's job is to put that together into one image, a moving image, but a series of one, not thousands of images. Your brain can't handle thousands. I have this idea. I guarantee nothing.' I don't think you said it that way, but those are my words telling the story. 'If you do these exercises twice a day for six months, all of a sudden, one day, your brain is going to be different. I can't promise it. It's worked for some people, and it'll happen all of a sudden.' I remember seven months because it was more than six. I'm thinking, 'okay, she's crazy.' But all of a sudden, literally just as you describe it, one day, one minute, my vision was 80% better. Not perfect, but 80% better. What's that about? What happened?

Aparna Raghuram: I saw that you had a condition where your eyes had a harder time diverging for far away. Your eyes used to cross in a little bit and up-close you did better. You had a prescription for glasses that also made it slightly harder to diverge, but it made you have good vision. But it made it harder to diverge. You had progressive lenses. We were trying to work with prisms to figure out how we can get your eyes to be as aligned as possible, so you don't see double. Let's go back a little bit, it's much easier to train convergence than to train divergence.

Health Hats: Convergence is in, divergence is out?

Aparna Raghuram: Convergence is something evolutionarily natural. You look far, you look up close, you converge. You have to relax to go back. Convergence is more intuitively trainable because your brain understands, you bring something towards you, and you need to converge. You're looking at a book, and you read, your eyes need to point together, so you converge. Intuitively, convergence is a little easier to train. Divergence is harder to train because it is a concept the eyes naturally when you look far away, they need to battle in a way that it sees things that infinity, there is no alignment issues. Your brain looks at the image and confuses it, and you look up close you need to converge. But in your case, your natural position of rest was slightly inwards. So, one eye was seeing the target; the other eye was a little bit crossed over. You saw double because it was within your range of field of motion, and you couldn't let your eye relax. The training for distance divergence is even harder. Even up close, it's harder because you have to learn how to let go and relax and zone out. But as human beings, we are continually processing things and attending to matters. We look at it more and more. We make our eyes do the opposite. That's why convergence is easier to train. So, we had to train divergence, and it's not easy. Also, you came to like the pediatric facility and within Children's where vision therapy or eye exercises itself is a little controversial to begin with, for good reason, because there's a difference of opinion.

There are no standardized clinical trials. There are lots of issues. Convergence has gotten much more a benefit of the doubt, and a lot more studies have come out in the last 10 -15 years, but there's not been much for divergence training. In your case, the amount by which your eyes were drifting out to a smaller degree, so it's not something that they want to do surgery. Also, the condition could be variable. You might have a good day, you might have a bad day, and the situation can vary, and the numbers can vary.

Health Hats: I noticed that when I'm more stressed, not feeling as well, or having a relapse, it all goes to shit.

Aparna Raghuram: Exactly. And that's the unfortunate norm. Exercises are not a complete cure to the problem, but it makes your brain understand how to relax. But whenever you're stressed, when you're not feeling very well, or the end of the day when you're tired, it just loves to go to that place and not have enough of a drive to make your eyes do it. The reason, in your case, I always went with caution is because we were not going to go the surgical route.

Health Hats: That's what Dr. Ledoux said. I got nothing to offer you surgically. See Dr. Raghuram.

Meditation for the eyes 11:47

Aparna Raghuram: They were more amenable, sending you to somebody like me because at least we can try. But I'm not somebody who did a lot of in-office vision therapy. I just showed you how to do some of it.

Health Hats: You gave me the beads. I still have them and use them once a day. It's very relaxing.

Aparna Raghuram: It is

Health Hats: Kind of amazing. Feels like

Aparna Raghuram: Meditation for the eyes.

The beads we're talking about are placed every 18 inches on a 8-foot cord. One end tied head high, and the other held to your nose, and you relax your eyes, focusing on each bead down the line and back again for a few minutes.

Aparna Raghuram: That's the concept. Something in you clicked. It is not easy because you have to take the exercises home and do it, not in-office with a therapist. The string is a relaxing exercise to do. You went home and tried the exercises without fail a couple of days, some good days. I remember you coming back in three months. You didn't know if it was working. You were healing through the process that your MS. So much was going on. I don't know what clicked. Maybe the attempt of the exercises or that relaxing, zoning out, and you clicked and that's how it happens. And even when you do in-office vision therapy, sometimes suddenly something clicks in you. You understand how to relax your eyes better. And once that concept comes in, the more you repetitively train it, you can keep going. Your body has the same muscles, your biceps, and the triceps, each one has its own strengths, and you have muscles that converge, and muscles that diverge, and they are the same muscles. They need the same blood supply, innervation, and oxygen to go through them. The more you train, the more the muscle stamina improves. You can do it yourself to relax and focus. That's the purpose of the exercises. Many people feel tired and low. Your body's already vulnerable, and the most vulnerable part of your body

gets the most debilitating symptoms. In your case, it was the eyes. It was so important. It was unique to what you were doing. Everything was focused around the eyes. When you got tired, you happen to notice it more. You were one of the first few patients that I had who worked with me in the kind of exercises I give you and take it home. You did it, and you would come and tell me. It helped because I'm dealing with children. Many children can't tell me back and forth what's happening. But you would give me feedback, and we would work with that and see what worked for you. We gave some exercises, like the beads, the prisms. We didn't do too many, but we did something.

Health Hats: The glasses with different colors. And something with my nose.

Aparna Raghuram: Yes. To relax and how to not over-converge to let it go more zone out and distance.

Vision as a barometer of stress 15:36

Health Hats: My primary care physician likes to say that the stuff with my eyes was a red herring. Because when she was trying to figure out what was going on, she first sent me to a neuro-ophthalmologist.

Aparna Raghuram: Yes.

Health Hats: He said, 'maybe you have some optic nerve involvement, but it's really not enough for this.' From there she kept thinking that this was a red herring, but I think it was a barometer. When I feel like my double vision is more problematic, then I think, 'okay, you're stressed. What's the stress? How do I relieve life stress, body stress first?' Then I got to go back to the beads and the string and do my exercises, but I have to deal with manageable stress first. If something freaky is happening in my life, or I'm upset with my wife, or I've lost my job.

Aparna Raghuram: Simple things, right? But it shows and if you take care of that stress, then you're able to manage better. And then the exercises make it a little bit easier to do as well. As you said, it's a barometer, an indicator of underlying stress. Once you start dealing with stress, your body responds. I think the same way with your diagnosis. There were fluctuations. You were going through some stuff and at the seven-month mark something clicked with everything else, also - not just the eye exercises. Maybe the exercises could have been a tool, but whatever you're doing, your body was also responding to all those things. Then it came to that zone where the exercises made sense and weren't hard to do. Once the exercises clicked and you knew what to do to make your eyes work better. We also looked at things over time. We change prescriptions, we didn't want to put too many prisms in the glasses - the least amount and we wanted to keep training your eyes. Once you rely only on prisms, sometimes you can keep taking in more and more prisms, and then that's not solving the problem - masking the problem. When you actively did the exercises, it made your eye muscles get that range of motion that was otherwise harder for it to make. It's also not sustainable sometimes. That's why you notice periodically, I will tell you to at least keep doing some maintenance exercises. Don't let it go down because then it may be harder to train it back again, so you want to keep it kind of maintaining some memory?

Health Hats: I have my morning routine of balance, stretching, strengthening, and my eyes.

Aparna Raghuram: And your eyes.

Health Hats: It's a good package.

Aparna Raghuram: Yes, and you followed it. That was the key. You had the right attitude. You would come in with a more positive thought process, too. Even with all these things, you were still open-minded to me in a way, and I think that helped as well. I've had patients that I sometimes don't click with, but then another provider clicks beautifully. But it's important to have that relationship with the doctor as well.

Health Hats: You have to have trust. I trusted you, and it seemed like, okay, at five months, at six months, I thought, 'Oh my God. She said, stick with it.'

Aparna Raghuram: Sometimes, it's like I'm counseling, just being there for the patients. You go through the process and just stick with it and honest to God; sometimes it works, and it clicks and it just, all things coming together in the world. Sometimes it's not, and you just have to deal with it.

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Eye health in Covid19 world 20:43

Health Hats: Let's talk about eye health in general. Here we are in this time - talk about stress. I don't feel all that stressed out unless I'm just like furious with how insane this all is. But I liken it more to grief. I'm grieving what we had, and that life is changing. People are listening to this podcast. I have a feeling that maybe you and I are the only people listening who think about our eyes. But the eyes are as important as our brain and as our walking and our mental health. What do you think people who don't have MS or double vision - how can people attend to their eye health in times of stress and grief?

Aparna Raghuram: We are home now doing a lot of screen time. Zoom meetings are becoming so popular now. Half of the days as a clinician, as a person, doing a lot of screen time. From that aspect, this is not new. It is something that's been there all the time. We tell it for kids, but it applies to all of us. The same thing applies to television. They're all evolutionarily looking at things at a distance, looking up close. We are not particularly trained, at least this generation, these decades we work a lot on the computer. We work on this short distance. We don't blink enough. Our eyes can get dry. We used to have a lot of dry eye consequences coming from screen time, up-close computer work, phone, you keep it so close, and your vision gets blurrier, faster. Young workers in the hospital too, who work on the computer taking calls all day, making appointments, have so much eye strain that comes with time. Now with all of us being home, seeing so much more TV, so much more up-close work. We are continually focusing at a certain distance, which is probably not good. It's good to be in a room like I am, with windows to look outside, look at something green that helps you to relax your eyes. After about 30 minutes of doing continuous work, let's look out, relax, take a break. Your eyes are focusing and tired.

You also get dry eyes because you're constantly looking at a screen and a monitor, and you don't blink as much. Children have more dry eyes now than we've known before, and we think it might have to do with screen time. Schools are adopting Chromebooks, and everybody's doing things on the computer. So that might be one.

Health Hats: So, do you think blinking and distance relaxing that I need to remember to do? I have an app on my phone that every hour says, get up. But it seems like probably that should be 30 minutes.

Aparna Raghuram: I believe that we are so engrossed in what we do that we forget to do these things.

Health Hats: When you're recommending people look outside or look at something green, something to relax, are you talking about for 30 seconds or you're looking saying five minutes.

Aparna Raghuram: No, just a few seconds, five, ten seconds, even 15 seconds look outside, get your eyes to relax, and let it be. Then come back to what you're doing and periodically, your eyes get a break, relax, and come back. The longer, better. If you can do it for 30 seconds, a minute, that's great. That's why you get up from your chair and walk around and do something and then come back to what you're doing. Just don't be into it all.

Health Hats: But otherwise, you're just saying, look away from the TV, the screen, and just look in the distance.

Aparna Raghuram: Correct. Five seconds would be the general rule. People are more concerned about lots of other things, but they are loading their visual system a lot more now because everything is on the screen or the TV. We are doing everything in doctor's appointments, virtual visits now. So, we are doing everything with the screen. And I think stress, if you have an underlying condition, then it makes it harder now. You're more stressed, and that shows up in your eyes.

Health Hats: It seems to me that being an eye doctor is a high risk now because you're up in people's faces. How has your practice changed?

Aparna Raghuram: I'm a pediatric optometrist. I used to see patients that are considered non-urgent. I follow many patients post-concussion, having learning issues, or just routine eye exams. For an optometrist, it is just a reduced amount of seeing patients now because all of the appointments are being canceled. We are advocating for virtual visits, and that's a tool to learn for us as well. How much are we able to do children to come in, look at their eyes and check all that we need to do by doing virtually and having the child's attention and the parents help to do all those things. So, it's a process. If this is going longer, we are going to be advocating for it more, at least families to get a consult done, do the virtual visits more. The front-line ophthalmologists and emergency care fellows, and residents are face-to-face. In our hospital, we have an ophthalmologist of the day who goes through all these virtual visits, the calls that come in, figuring out who is urgent, who needs to come in, who doesn't need to come in. And then there are fellows and residents who are naturally are supposed to be there, and they are the ones who are taking all these urgent care visits and seeing patients in the hospital. The department is taking good care that we have protective masks and gloves, but there's a shortage. How you use them and how you protect yourself is something very concerning. The department is handling it a lot, but it is something that is coming at our face now, and the more this goes for a longer period, they have to figure something out. But they are. Some surgeries are non-urgent. Those are being canceled. If

something that is going to affect their child's vision that they see if we don't do it now, those are the surgeries that are being mandated and going through, but it's a risk for everybody, the hospital, the anesthesiologist, everybody's exposed. I would say for me, personally, I'm probably on the second tier of things, not really in the front line. They're advocating for us to all stay home and try to do these virtual visits. I go periodically to see my research patients or the ones that I really need to see. And the residents and the fellows are enduring it.

Health Hats: And your family is good?

Aparna Raghuram: Yes, good. I have one daughter. She's the one who came in while we were talking. She is good. She's two weeks into it, so it's almost like a vacation. But you have to figure out how to teach and how to educate the child.

Health Hats: Thank you very much. This is great. I appreciate all you have done for me. Like I said, I feel like you saved my life.

Aparna Raghuram: You were my favorite patient. I always look forward to seeing you.

Reflection 28:36

Not only did Dr. Raghuram help me retrain my brain and my vision, she worked with the optician at Boston Children's and a lab technician to create a fused bifocal lens for my glasses with a prism on top for distance and no prism on the bottom for reading. (I still needed computer-midrange glasses) It was an expensive new technology - \$1000 per set of lenses. But the solution took me the rest of the way there. Remember, the exercises improved my vision 80%, this was the remaining 20%. Since the opticians and lab tech developed the lens fusing technology in 2009, many children have been able to use that technology and the cost has come down considerably. These exercises taught me the value of a small repetitive practice that changed my brain pathways, my vision, and my life. I still have to convince Medicare that its reasonable for a senior to be treated in a pediatric facility. I'm more able. Ain't it grand?!!.