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CAPITOL 5

BRAIN ARCHITECTURE: FOUNDATIONS FOR THE FUTURE

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>> Hi, my name is Mariah Proper, and I hope we're here for the same lecture. Brain Architecture: Foundations for the Future.

We are going to have a little bit of a break, and if you haven't had -- in a little while, not right now, of course. If you haven't checked in yet, please see me at the break to make sure that we get you checked off the list, and I'm going to turn it over to your presenters to introduce themselves and get us started.

>> Good afternoon, everybody!

Hello! Hello!

I'm so excited to be here today. I'm excited to see all of you, kind of starting this conference off, learning about some brain architecture. I think everything goes back to the brain, so this is a great way to, I think can, start off this great conference, so I'm really excited you're here. I'm Lindsay Zombek and I'm a speech language pathologist and I work with University hospitals Cleveland Medical Center in Cleveland, Ohio. And, again, very happy to be here. I'll be presenting with Sherri Fickenscher today. Sherri works at the Clarke Schools in Philadelphia. Sherri and I have put up with each other -- I mean, had the pleasure of working with each other for -- wow, 11 years now? Something like that. About 11 years. I think you're going to be very excited with all the information she's going to be sharing as well. Thank you, everybody, for coming. Again, we're really excited you're going to be part of this today. So we're going to be talking about brain architecture and brain development. We're going to talk about how we can work on brain development and we're going to talk about some things about genes and expression of genes, and more specifically we're going to talk about how this relates to children who have hearing loss and how we can help avoid some negative -- risk for negative impact on brain development. And then we want to make sure that you all leave feeling like you have strategies and things to do to help in this area.

So, let's get into it. So as we hear at more and more conferences, when we talk about listening, we don't listen with our ears. What do we listen with?

Right, our brains.

So it's important to remember that hearing and listening are different. So hearing is going to be just the process, that physiological process of getting the information into the brain. So the sound is brought to the brain. It's what the ear does, it's how we get the sound there. That's what hearing is. When we start talking about listening, the major difference with listening is that's the point where we have meaning and we're applying meaning to that sound signal that is coming to the brain.

So hearing and listening are very different. I think we all are familiar with the jokes and the stereotypes of children and spouses who maybe hear but don't listen, and there is a very big difference between those things.

So if we're talking about the brain being what is helping us hear, then what about brain development? Let's talk some about brain development.

Just in general, to give us some information about the brain as a whole, when we start looking at the brain, an adult brain is about 3 pounds and about 6-inches long but it doesn't start out that way. For comparison sake, when we start looking at a baby's brain, a newborn's brain, it's only about three-quarters of a pound. The big change that is happening over time is the development of more neurons. So neurons are going to be these building blocks that help with building up the brain and the nervous system. They're going to be the way that the brain transmits information between different regions of the brain and allowing those regions to communicate with each other.

So we know we have approximately 100 billion -- and that is B, billion -- neurons in the human brain. When you look at a brain, we're used to the kind of caricature of the brain, which has that nice wrinkly surface. As we get older, it gets more wrinkly. It's not a bad thing, it's not bad thing with the brain. The wrinkles are because of the neurons, so we want a wrinkly brain. We want as many neurons as possible on the brain. We hope to see an adult with tons and tons of wrinkles, and it's a good thing for the brain.

So when we're looking at the brain in general, just to kind of give us a review to make sure we're all on the same page with our information about brains, the brain is made up -- the brain exists and then we have different regions of the brain. A lot of researchers talk about how the brain is a series of mini-brains put together because different areas tend to control different things. It's way more complicated than that, but when we bring it down to kind of an easier more fundamental level, certain things happen mostly in certain regions. Certain areas of the brain are designed and primed to process certain types of information. So, for example, when we look at the frontal lobe over here, the frontal lobe is going to be things like executive function. It's going to look at reasoning and intelligence. That area is primed for that.

If you're looking more at the parietal lobe, you have overlap of intelligence and reasoning, but you also have some language, some sensation, some of the reading skills are going to be in that area.

Occipital lobe over here is really primed for vision. And processing visual information. Our cerebellum down there below the occipital lobe is going to be your balance center your coordination center. If a person has an injury they may look drunk walking around, they may stumble more and their speech may be slurred. All that is controlled in that area.

Your brainstem is vital to survival. That is going to be all those things that you don't think about and you just do. None of us are sitting -- I hope none are sitting here thinking about every breath we're taking in. If you are, there are probably medics somewhere we can call. But we're not telling our heart to beat once every second or something. That information happens on its own.

When we get to the temporal lobe, this is a region that I think is going to be very important for everybody in this room. So this is the area where we start talking about speech and listening and how we process both of those pieces of information.

Now, as I said before, it gets a little bit more complicated. The temporal lobe isn't the only place this is happening, and these regions work together, and it's through these neuron connections that we're able to transmit information from one cortex of the brain to another, or one region of the brain to another.

So, when we're thinking about the auditory cortex, the auditory cortex is going to be in the temporal lobe and that is the area that is going to be the most involved with perceiving sounds and working to make those sounds meaningful.

So here on the slide, in the pink we've got the little 41 and the 42. So those are Brodmann areas, and that is a classification system that allows people to specify where damage is done in the brain, to help kind of localize where in the brain we're talking about for research purposes, medical purposes and so forth.

So Brodmann area 41 and 42 are the auditory cortex, and that's where sound is perceived and where we get that sound in and where the brain starts working to make meaning out of the sound.

Right behind 41 and 42, so if we're looking -- whoops, there it is -- in this area, that's where we're going to have Wernicke's area, and that is going to be part of comprehending language and our understanding of language. So that one is nice and close, but we need neurons and neuron connections between those two areas so that we can help understand a message and understand what somebody else is saying.

Way in front of it, over more in this area we have Broca's area, which is Brodmann areas 44 And 45, and those areas are supposed to be for more your production of language, knowing what to say and in what situation you're going to say those things. So that's -- that language processing and production processing happens more in the front of the brain. And, again...

[ speaker is off microphone ]

>> Let's bring a mic to you.

>> So when we're talking about language, are we talking about all language or just spoken language?

>> The language -- so language processing is going to happen all over, but language is happening in Broca and Wernicke areas, but visual forms of language you might see more in some of the visual processing areas as well, as the brain starts connecting.

>> Thanks.

>> LINDSAY ZOMBEK: Uh-huh.

So one area of the brain I want to bring up, that is a little different than the auditory cortex is the amygdala. And this is going to factor in with the information we're learning today. The amygdala is going to be part of our limbic system in our brain. It's this little tiny purple dot over here. It's called the amygdala because it's derived from a word meaning almond, so it's almond-shaped. It's a bit of a misnomer because only a portion is almond-shaped and it's a little bigger than that, but locating it quickly in a picture, look for the almond. But the amygdala is going to be responsible for processing emotions and for -- in the sense of looking at an emotion and figuring out how the body should respond to an emotion.

So, for example, when you're talking about that, if you think about the old classical conditioning type studies, the Pavlov studies, where somebody or something maybe hears a sound and then there's some type of reward, that's going to be happening in this area. A lot of times when we look at the amygdala, the first thing that you hear about and the first word you read is "fear." This is kind of your fight and flight center. And this is what the brain is telling -- the amygdala tells your body, this is a dangerous situation and we need to respond to this situation.

That being said, more and more research is starting to focus on how the amygdala functions and it's not just fear. It also has our positive reward system there, pleasure and so forth, all in that area.

So it's not solely fear, but if you go into the research, you're going to find a lot more studies on the fear aspect.

So basically it helps you pair up situations. And it's -- you know, the thought is that it's for survival. So you hear an alarm and we know that means danger, or that we need to pay attention to something. If I start smelling food, my stomach is probably going to get really loud in here, so I hope that doesn't happen.

But our body knows how to respond and it's really our amygdala that helps us figure that out.

We technically have amygdalae, meaning we have two amygdalaes... that's hard to say... woo!

I didn't make them up. Not this time.

So, you have two amygdalae. So basically if you take the -- I'm not hitting the laser, in case anyone was wondering what was going on there.

So, if you took the brain and cut it in half, the amygdala in general is going to be about at the level that if you made the line from your eye and your ear and those two lines intersected, that's about where in your brain your amygdala is. So it's kind of -- it's deep in there. You have two of them. And they're processing information in hopefully milliseconds so your body is reacting as fast as possible to any type of perceived danger or any situation where there's going to be a consequence. So we can make decisions about that consequence.

I just want to make sure we know about that amygdala because we're going to talk about the amygdala and how our body responds to different external stimuli as we go forward.

Now we're going to jump back and go back to the auditory cortex.

So the auditory cortex and the neurosensory system for hearing are all things that develop in-utero, and they're usually happening prenatally by the 20-25 weeks gestation. It can be completed earlier than that, but that's usually when we've got a system in place. So the hair cells by that point are able to transmit information to the brainstem and then that gets carried to the temporal lobe. In-utero learning is already happening. We'll talk about that in a little bit. So a baby, before it's born, is already able to learn a lot of auditory information. And then at that point the system still can -- at a genetic level can already be altered by the environment. So being in a noisy environment, having chemicals introduced to the system, or if the fetus isn't getting appropriate nutrition, all of that can already be impacting the child at a genetic level.

So this is kind of the development of the ear system in general.

So this is looking at some different pictures of embryos at different stages. The numbers in there -- because I spent a lot of time at first trying to do the math and it wasn't working out. Those are embryonic stages. So don't try to figure out, is that a day, a week, what is going on there?

So basically when we look at the first one, stage 14, and really stage 13 is where we start seeing the development of the outer ear system.

So, it's really starting about week five, which is 13 and 14. And so at this point it doesn't really look like anything we recognize as an ear or an outer ear at that point. By the time we get to the 19 stage, this is about week seven of development, at week seven we start getting this little ear down here. So we're starting to see the formation of an ear. You're kind of starting to get the auricle, the outside part of the ear developing, and then by the time we get down to this 22, 23, which is week eight, you've got a pretty well-formed ear. This is the adult model, just in case anybody doesn't know what an ear looks like.

So you've got pretty much a complete outer ear at that point.

But we know that the outer ear isn't the only factor of hearing and the only thing that makes us hear.

So let's look at the middle ear. The middle ear ossicles, the malleus, the incus and the stapes, middle ear bones, start beginning to develop between weeks four and seven. And so when the embryo is developing, there are some cartilages, and these pharyngeal cartilages, and they end up stretching and developing into all sorts of different body parts. So when we're looking at this first one here, which is Meckel's cartilage, that is important for hearing, because that, as the embryo develops becomes your lower jaw, your sphenoid, part of your eye socket, and then it turns into eventually the malleus and the incus.

The cartilage below it, which is Reichert's cartilage, that becomes part of your hyoid, part of your throat and larynx structures, a bony structure in your throat, and then that goes up and also becomes part of the stapes. So these ear bones have been developed in the kind of fourth to seventh week of gestation. It's a little bit different. It's not necessarily the system isn't ready to go at that point because the system becomes fluid-filled, so even when you're looking at month eight and month nine of the pregnancy, it's fluid-filled, so a fetus is not at that point going to be listening through air conduction, any anything they're getting is through bone conduction. So they're there and ready to function but probably not working because they're swimming in a lot of fluid at that point.

I don't think they're really swimming, but... (chuckling)... that was a really weird way to word it. I apologize.

So let's get into the inner ear. So this is development of the cochlea and the vestibular system.

So most of this is developing between the fourth week and the 25th week of gestation. So when we start looking at these pictures, this picture A is about day 23, and at day 23 it's not really looking like anything we would recognize as our inner ear system.

By day -- where it has B here, this one, this is about 30 days. And at 30 days we're starting to get a little bit of a cochlea developing here, and we're starting to get a little information about the vestibular system, the vestibular canals, but not a lot happening. By the time you get to C, which is 41 days, and so that's going to be about six weeks of development, now you're starting to get a system that is resembling a little more what we're familiar with. We don't have all the turns of the cochlea by any stretch at this point, but we're starting to get a turn, and we're starting to get some of the semicircular canals of the vestibular system. D here is 50 days, and this is -- this has come a long way in this short amount of time. There's a lot more. You're starting to get a major turn of the cochlea and very clear canals.

This bottom one is 56 days. It's two different views of the same system. And you can see that we have the turns of the cochlea. We have a pretty complete vestibular system in place. And at this point, by the time we get to about 20 weeks, all of the hair cells are also developed in the cochlea, so at that point we're starting to have functioning hair cells and could potentially be getting sound transmitting to the brainstem to be carried to the brain.

Are you still with me here? Everybody good?

I apologize. It's a dry portion. Sherri gets to be the fun person and I get to be the one where everybody is like, is she finished now? If anyone wants to see a cartwheel and wants to volunteer to do that cartwheel, that would be good.

Okay. So, as we mentioned before, before a baby is born, they're already able to learn and do some auditory learning. There's a lot of evidence in the research that supports this. So there was some studies that showed that if you give exposure to sound in-utero, as long as the baby is also getting rapid eye movement sleep, and they amazingly have ways to verify that the baby is able to get it before they're born, they're getting rapid eye movement sleep, that the fetus is already developing auditory memories and developing neural synapses already. So that's all happening well before birth.

They also had a very interesting study, I thought, that if you expose a fetus that is 30-40 weeks gestation to intense low frequency noise and then you don't have it constant but you intersperse that with periods of quiet and absence of voice, so no talking, when the infant is born at 40 weeks, they're classified as having a language delay of two months already. In terms of what they should be doing from an auditory perspective.

So when they don't have access to a mother's voice and they don't have access to music and some of these meaningful sounds, they're not developing the same language skills by birth.

Research has also showed that immediately after birth, a fetus can identify their mother's voice and distinguish it from somebody else's voice. They can identify their mother's native language and will have a different response if another language is spoken with them. They are familiar with certain vowel sounds, more the low pitch sounds that are able to -- that they're able to hear a little better through bone conduction. They recognize music and songs that have been sung to them. And then also they can recognize some of those early super-segmentals. So the pitch and rhythms and loudness levels.

So that kind of poses an interesting question to us, because some of or our children develop hearing loss after birth but we all probably can name some children who had hearing loss at birth, and for anatomical reasons or genetic reasons haven't had hearing -- don't have hearing at birth.

So what we have to be careful of is that these children are not going to be born with the same auditory and language skills typical of newborns if they're not getting that information through bone conduction. And so these children are already behind.

So, how does this happen? How does a fetus listen, a newborn listen? So, it's the same pathway in everything that we as adults use. They're taking a sound and attaching meaning to these experiences that they have with the sound. It's going to be different from an adult, clearly, I can hear an alarm going off and look and see a clock and the fetus doesn't have the ability to have that information. But they're still going to be able to develop normal pathways that help them learn and also help them more efficiently and more quickly process that signal.

So these kids are already building through neuroplasticity. Neuroplasticity, I thought this was a really nice definition. This resonated a lot with me. It's the ability of neuronal groups to adjust function based upon input. So what does that mean?

So basically what this is saying is that when a stimuli gets to the brain, the brain has to figure out what to do with this sound. A neuronal pathway is created. But, the system has to adjust based on new information, another presentation, an inefficient design of getting from one region of the brain to another. So the system is adjusting consistently based on the input you're putting in.

In the auditory cortex, for example, your auditory system is going to be interacting with some of the cognitive systems in different areas of the brain associated with various cognitive functions, and it's trying to build new pathways and new responses, and it's trying to figure out the most efficient way to do this.

So with neuroplasticity, we know neuroplasticity is the greatest in the first three and a half years of life. So this is the time period where neurons and pathways are being created rapidly. But what is interesting is if you look at slides of these neuronal pathways, if you look at slides of them, a newborn has the least number of neurons, which I think makes sense. Then if you compare a three-year-old to a teenager, a three-year-old has more pathways than a teenager does. So that to me kind of seems like it should be opposite. Oh, if we're always developing pathways, shouldn't we have billions of them by the time we're a teenager? But really what ends up happening is that the system starts pruning the pathways that aren't useful. The pathways that aren't efficient. Just because a pathway is created doesn't mean necessarily that it was the best way of doing something. The brain is always adapting and learning different ways.

So after four years of life, pruning starts occurring and the pruning gets rid of the unnecessary neurons and synapses to try to make more efficient systems.

What we start seeing is that in these situations you can have cross-modal processing. So, for example, in the auditory system you can start seeing touch being processed or vision being processed. If a region isn't -- if the neurons aren't being used and those pathways aren't being used and been pruned, the brain isn't just going to let the area sit there. It will start looking for other things to process in that area, and that can hinder later processing.

So let's kind of go over the facts, do a quick review here.

So we know a child with a hearing loss is already potentially behind at birth. The critical window for the auditory cortex, when they've done the studies on that, is coming out to be birth to three and a half years. After three and half years and by the age of seven studies are showing that touch and vision are processed in the auditory cortex. The critical window for language we know is more the birth to three. Some people have, extended that birth to five. By critical window I mean when the brain is most rapidly developing these neurons and connections, the brain is doing the most learning.

There is a great study that looked at what children need to develop the neural framework for literacy and that study showed that children need over 20,000 hours of listening experience before the age of five. And we know that the greatest time for neuroplasticity is in the first years of life, especially birth to three.

So we also know that for a child with a profound hearing loss, that the FDA currently tells us that you can't get a cochlear implant until the child is a year old. So this is a major problem. This is a big problem that we're getting started so late. So what can we do?

For our kids with a severe to profound hearing loss, the appropriate amplification may not be available for a year for them. To develop the auditory cortex we know that waiting a year is already too late. So how do we do auditory therapy with a child who is profoundly deaf, if we know they're not getting enough benefit from hearing aids or spoken language, what can we do to develop the auditory cortex? We've got to develop the auditory cortex. So what can we do for this population?

And luckily I don't have to give you the answers to that one.

[chuckles]

And that is how I throw Sherri under the bus and welcome her to our presentation.

It wouldn't help if I just wear it for the rest of the presentation?

>> SHERRI FICKENSCHER: It's clear why I partner with Lindsay, right? Because she's the real brains in this duo here.

Yeah, so what do we do?

We had the answer, right, we wouldn't have to spend so much time being here.

We can maximize hearing. I mean, that's the bottom line, right? We can maximize hearing. Which what we're going to talk about today is, in a sense, maximizing brain development. Because the hearing centers are part of your brain and the brain doesn't work like all those little sections. So how do we do that? How do we do that?

We need really appropriate amplification. This is not stuff that I don't think we need to spend a lot of time with. I think most people know all this that is here. Full-time use of amplification. I find that to be one of the most difficult things. Especially the greater the degree of hearing loss, the less the parents are seeing any benefits from this child wearing their hearing aids, especially if they have a severe to profound loss. They're less likely to use their hearing aids. This is the one analogy that really hit -- I just came up with this one day, but I'm going to share it with all of you because the parent was like... wow! Oh, I get that. I used it a couple times. This is what I say to them...

I say to them, you know, I kind of look at it like, take the analogy of a farmer, right? And your brain is like the field. And does the farmer go and just... eh, here we are, time to harvest, let me throw some seeds out here, right?

They don't just take the seeds and throw them all on the ground, right? They prepare the soil, right? They till it. They rake it, they do whatever they need to do to that soil. That's like the brain. You know?

And then they put the seeds down. And that seed then becomes a cochlear implant.

So I know for a fact that we may not get a lot of response from kids that are severe to profound. I've worked with plenty of kids. They're fit well. They're just not giving me much response. What am I going to do? I'm just going to keep wearing those hearing aids, because I'm not going to take the chance that it's not doing any good, because it's brain development. It's the brain, and we don't have time to waste. We've got to get something in there. Even if it doesn't appear to be meaningful to the children.

You need appropriate therapy services. And we need auditory therapy. We need some work on the auditory skills. There are very few children that do not have some amount of residual hearing that we can potentially tap into. And today we're going to talk a lot just not about the auditory piece but other things that we know now about brain development and how do we pair that, how do we make sense out of all that?

So let's look at this fun little chart here, huh?

So let's take a child that has a severe to profound loss, right? I'm thinking if they're fit appropriately, we can get some access here, maybe 250, 500. Would you agree or disagree?

You can say "yes, I agree." Nod your head. Yeah, we can get some sound.

I'm going to tell you in that first year of life, there's a lot that you can do with a kid that's got a severe to profound loss that is appropriately fit with hearing aids. That's a whole 'nother presentation. And we're hoping to do -- if we have time at the end we would like to come back to the chart and maybe brainstorm all together, because I think that's the best thing about these conferences, is that you get to hear other people's ideas how they do things.

So we will come back to this. If we have time we'll come back to this, but we really want to get to building the brains and stuff like that too.

There's the idea of normal auditory skill development. I would like us to stop talking about degree of loss and how that affects children. Especially once we get a cochlear implant in. The degree of hearing loss does not have the same effect that it had 20 years ago. But in that first year of life, if I have a child that has a moderate loss and they're fit by four weeks of age, this gap is closing really quickly. I can get them almost age appropriate by time they're a year. That's pretty much what we're saying where we work. It's pretty much what we see across the board. There are lots of kids that are different. And that's the fun about the brain science that is intriguing me over and over again, because I feel that you can have a child that is fit really appropriately and parents that are really engaged and a professional that knows what they're doing, and you have two kids that have those same things, but you get this one kid that is like the superstar, right? Like what is going on here!?

That's what I think we need to be thinking about. I think it's about the brain. You know, I think it's about the fact that we all have different brains and our brains are going to develop in lots of different ways.

How do we get this message across to the parents? You know, we're all talking about the brain now. But this is scary for parents, you know? I heard a professional say, I started saying, do you want your child to be smarter? You know?

How are you going to get your child to be smarter, right? It's continued brain development. But we say this thing like it's all about the brain. What does that really even mean? Like what does that mean to a parent? And once we start talking about the brain, which we clearly need to do with parents, I don't know if we don't do it properly, but it doesn't increase their anxiety when you start talking about the brain. So we're going to talk about the brain, we need to be able to talk about the whole process, not just -- we're not here today to talk just about the auditory development of the child. I don't think that's where we want to go. I don't think that's where we're going to get our best results.

But we do need to think about how we're interacting and how we're talking with parents. So here is our brain. How does it develop? It develops over time. It's like a house. It's like building a house. The first things that we get from the bottom up are hearing and vision. Those are the first foundations that are laid in the brain. Then we've got all of these connections and we have circuits that are reinforced through repeated use. Circuits are reinforced through repeated use. If it's not used, it gets pruned away. The brain is prime real estate. If something is not being used in the brain, an area of the brain is not being used, is not being tapped into, that area of the brain will not stay dormant. It will be used for something else. That's why it's important, again, for full-time hearing aid use, so that we continue to exercise the auditory centers in the brain, that we continue to make those synapses, until later we can begin to layer meaning on top of that, but at least we have that area of the brain that is still being activated.

We've got this intertwining -- I really like that word. How does this work? Here we go...

Intertwining. I think we forget about that. I mean, I think we forget about it sometimes. With kids it's like the ears, auditory development. It's like it's not -- it's not just that. It's the intertwining, not just in your brain but in your therapy, in your sessions with parents. It's cognitive. It's emotional. And it's social capabilities from the beginning from day one.

Down here, this is my little plug here. You see

Developingchild.harvard.edu. These slides we developed and you should have access to them. Spend time at that website. Almost everything you hear about today is on that website. Amazing research. You will get lost in it. A lot of it is really good for parents too. They've kind of taken a facet of trying to hit all different audiences. A lot were pulled from the developing child videos. I encourage you to go back and look through that.

We're thinking about brain development and what influences brain development. It's the age-old question of nature versus nurture, right? One or the other.

So, for a little bit of fun, we're going to do a -- has anybody used -- raise your hand if you're used the Mentimeter polls before?

Some people have. If you're able to use your phone and you want to participate, you can get your phone out and you go to Menti.com.

See on the bottom?

When you go there it will pop up and ask you to enter a code, and you just put that code in there.

Another reason why I have Lindsay... ah, technical... (chuckling).

We're going to pose these questions on the Mentimeter poll and see what you think about nature versus nurture.

It will come up again. Go to menti.com. When I pull it up on the Internet, the code will come up again. I'll tell you what it was as we're waiting.

62...

If it worked a little faster. Oh, there you go. 62...

Oh, yeah, everybody's guessing!

Those were the questions. The questions are -- you think that genes are set at birth. You think genes are not set at birth. You don't know, but you want to learn. Or you want to leave. Please don't put that, because I'll start crying. My amygdala is a little off on that. I cry very easy. I'm sure someone put that and it would be an accident... (chuckling).

So it looks like genes set at birth is winning. It's in the lead.

Okay. That's what I used to think. That genes are set at birth. There's a new field of study that is called epigenetics. I want to talk a little about that.

She's so good to me, isn't she?

Lindsay... Lindsay... Lindsay... Lindsay... okay, there we go.

>> LINDSAY ZOMBEK: That wasn't annoying... at all.

[chuckles]

>> SHERRI FICKENSCHER: We're talking about epigenetics --

>> LINDSAY ZOMBEK: Go back.

>> SHERRI FICKENSCHER: It's okay. Like epigenetics, I was like, I got to talk to Lindsay about that, what does that mean?

(chuckling)

We're going to watch a little video on it, and then we'll talk a little more about it later on.

I think it's going to work, if I just...

>> LINDSAY ZOMBEK: Give me thumbs up when they...

>> ... now, you might think they look a lot of like. That's because they're identical twins. Imagine them being raised in completely different environments. They turn out very differently. Lucky Lyle is a model citizen, goes to work, pays taxes, treats others well and gets an education.

Trouble Tim is on a different path. He robs banks, doesn't pay tacks and gets his first prison sentence at the same time Lyle gets a diploma. Genes are identical, so it must be separate environments that made them so different, right? There's more to it than that. Much more.

We need to rewind a bit in time. You see, one of the great questions of humanity is, what makes us "us"? Hmm...

Early explanations had a hint of the supernatural about them.

[ thunder ]

As the centuries whizzed by, science emerged and fought a tough battle to gain credibility.

Eventually social science emerged with a popular theory that our environment is what makes us "us."

Let's call this nurture.

Undaunted, biological sciences presented another theory. Genes. An unchangeable blueprint from birth decides everything. Let's call this one nature.

So, are we a product of our genes or of our environment? The battle raged on.

Observations in a newer field of study suggest that both are partly right. This field is called epigenetics. It means above genetics and has to do with how nature and nurture interact.

At the heart of this discussion is one simple question asked by researcher Michael Meeney. What makes a good rat mama?

Well, for a rat mother, nothing says love and care like nice vigorous licking. The higher the number of licks, the more love and the better the mama.

With this in mind, the researchers compared two groups of rat mothers. One that licked their babies a lot and another that didn't.

They found that when babies group up, they carried their mama's behavior with them and passed it to the next generation and the next one and so on.

But could it simply be this particular group of rats was genetically predisposed to produce caring mothers? Well, to test this the researchers took newborn babies from low licking mothers and fostered them with high licking mothers and vice versa. It turns out that if the mother is a high licker, the rat baby becomes a high licker too, regardless of whether it's genetically related to her or not. So genes really don't have anything to do with it then?

In true scientific fashion, the researchers dove right into the brains of these rats to see what, if anything, was different in the brains of the babies of high licking versus low licking mothers.

When they looked at genes that possibly play a role in motherly care they found crucial differences.

Newborn rat babies have clusters of molecules called methyl groups attached to these genes. These methyl groups silence the gene, effectively switching it off. The researchers discovered that while the methyl groups in rats from low licking mothers were still attached, in the rats from high licking mothers, these methyl groups had disappeared. This was also true for the rats that had been adopted by high licking rat mothers, the care these rats received from their mothers actually physically altered their genetic expression.

Now, that's all fine and good for rats, but what about people?

Well, the same is true for Lucky Lyle and Trouble Tim, and you and me. The genes you're born with are the genes you've got. But lifestyle and environmental influences, smoking, stress, love, affect your biology. The bright side is epigenetic changes happen throughout our lives and choices can make real differences in how we develop as human beings.

>> SHERRI FICKENSCHER: I had to watch that many times.

What does this mean for us?

They pointed out four things. They talked about nutrition, exercise, smoking, stress, love.

Of those five things, what one thing do you think might be different for parents who have the diagnosis of their newborn baby that they have a hearing loss? Stress.

Hold on to that, because we're going to come back to that later. But the genes are altered by the parents' interaction and response with their babies. The genes are altered. They're changed.

So, we have the nurture, that's our environment, right? What makes us "us."

And then we have the nurture. The nurture is what makes us "us," nature, our genes are what we get. Epigenetics is combining those two. It's taking how nature and nurture interact, and that's what we call epigenetics. And there's more and more science out there that is saying that genes are altered very early on in life by experiences that children have.

Now I'm going to try to get my PowerPoint back up again.

Oh, thank you, Lindsay.

So here is another complicated slide about how this happens. So if we look up here we start, number one, we've got external experiences. Again, stress, nutrition, toxins, all of these things that are encouraging interactions between the neurons. Okay?

Then we've got neural signals here. And we've got gene regulation going on inside our cells. Here is the neuron and here is the cells right here. Then we blow this up and make this really big and this is getting so science-y that it starts to make me nervous, but I remind myself that I can do this. Who here in this room, raise your hand, if you were like -- you loved science and you were the researcher, you were figuring things out. Yeah? Not that many of you...

[chuckles]

Look around. Because they're the people you want -- Lindsay, you're supposed to be raising your hand right now. They're the people you want to pair with. They're the people that make you feel smarter and explain things in a way that help you to understand them. And it's really important for us to do this, because we've got to get this information to parents.

In a way that helps them to understand that what they're doing with that little tiny baby of theirs is affecting the rest of their life. Especially in those first three years.

So we've got all this stuff going on. I'm not going to go into all the science. Really she should have done this slide, but she threw me under the bridge -- under the bridge? -- I mean under the bus. I don't know.

We're going back to epigenetics, two little definitions that we're talking about. And the bottom line is that there are factors that your genes are there, but how your gene is expressed is what changes at the molecular level. It's pretty interesting, isn't it? No?

Okay. Good. I'm glad you think it's interesting.

We've got another video. And, again, this video -- do you mind?

All of these videos are available on the Harvard Developing Child again. I don't know if anybody has seen these videos. Can you raise your hand if you've been there? Is it not an amazing site for everybody? It doesn't matter what communication method. That's the best thing about this. Can we agree, everybody? We can agree on so much. There's so much that we can all come together on. And this is one of them. We should be talking about this with parents.

But just make sure the captions are on.

>> More and more of our children...

More and more of our children...

>> SHERRI FICKENSCHER: Sorry, for some reason it's not starting at the very beginning of it.

>> More and more of our children are growing up under conditions where their brain architecture is threatened by the experiences they are having or the experiences that they are not getting.

>> The first four years of a child's life are crucial to her later development. It's during those years that the brain has its largest period of growth in the areas of hearing, vision, language and communication.

[ children talking ]

>> However many children are not getting basic care required to support this phase of their development.

>> Especially in these times parents get busy and easy to plop a child in front of a television set. Parents need to be very aware that engagement is one of the most important things they can do for their child.

¶

[ baby cooing ]

>> What is missing for many young children is something called serve and return.

Serve and return describes the fundamental adult child interactions, which help a baby reach her full potential.

Serve and return is something that is as basic as playing peek-a-boo.

Or adults talking to an infant as they go about their daily routine.

>> Babies are actually learning words. They're forming language. The part of their brain that is able to produce language is working long before the first word is heard.

>> It's simple things like getting on the floor an playing with kids, looking into their eyes when speaking to them, reading to them, singing to them.

What that interaction does is it provides a solid framework for kids.

>> Serve and return doesn't always mean verbal interaction between an adult and child, especially in infancy. It could occur during feeding or bathing, as long as the adult is responsive, the child's brain is getting the stimulation it needs to develop.

>> So the brain will formulate an idea. I'm going to smile. And smile, and then someone responds to that smile, and the very process of organizing that smile is confirmed with a positive feedback, and that confirms those neurons. It says, oh, you sent a good signal, this is a pathway we're going to keep.

>> Research shows that a child surrounded by caring and responsive adults will start elementary school with better social skills, better emotional regulation, and a better ability to focus than a child lacking in positive adult attention. While it may not be readily apparently, children in infancy are developing parts of the brain that are crucial to their later social and academic lives.

>> One, two...

>> Moreover, science shows it's effective to strengthen pathways while still developing rather than try to rebuild them later.

>> So the question is, if you want your child to be a good reader, when do you start putting effort into that? Well, you start at birth.

>> Serve and return communication, because really reading, writing, it's all communication. It's about communicating information.

¶

>> A lack of serve and return is one of the causes of the education gap seen in society today.

>> Most common form of maltreatment is babies are neglected and young children experience neglect. The absence of stimulation, the lack of sufficient serve and return means I can't confirm much and more than should gets paired away.

>> Without healthy brain architecture children are at risk of falling behind and never catching up. Asking elementary schools to fix problems rooted in infancy sets schools up to fail and is not the best way to use resources.

It's imperative that communities come together to provide families with educational and financial support that can make a difference in the lives of infants and preschoolers. Strong communities create strong brain architecture.

>> I often talk to parents about building scaffolding for their children as they develop, and when we build scaffolding, it's not just the family that is building it, but the entire neighborhood in the community.

>> There are a lot of people in children's lives who help develop that healthy brain architecture, by being a part of that serve and return, where the child's brain is able to think about important and wonderful things.

¶

>> SHERRI FICKENSCHER: Ladies and gentlemen... I think sometimes we're sending the wrong message to parents. I think for many parents, the diagnosis of a hearing loss interferes in a big way with their serve and return. Their thoughts are -- you've heard them, these are the thoughts parents tell me later, you know... how will I communicate with my baby?

I get a little fired up about this topic. Parents intuitively know how to communicate with their babies. And that's what we need to tell them. Your baby cries, you go, you pick them up. You feed them. You change their diaper. I know we have to worry about language. I'm not saying we shouldn't worry about language. I'm saying our first message to parents should be the message of serve and return. How are you going to interact with your baby? We've got new studies out there now on eye gaze. I don't know if anybody read the new studies now on eye gaze. Right?

Share eye gaze with your baby. And you've got serve and return. I think we need to be careful about the way we send messages to parents. I think we need to be really careful. Because interfering in any way, making them think they don't know how to communicate with their baby is going to interfere with the number-one factor that influences brain development. It's serve and return. I don't care what the family's chosen outcome is. I don't care if they want to sign to their baby. I don't care if they want listening and spoken language. I care about serve and return, because that is what is going to happen later on in their lives. That's critical. If someone wants to clap, go ahead.

Sorry, I'm going to get off my soapbox there, my message.

So I think it's the most vital message that we can send, serve and return.

Oh, a question. Okay, hold on. We've got a microphone. Go ahead.

>> AUDIENCE MEMBER: I just wanted to make a point. The video talked a lot about financially at risk families and I'm seeing more and more with the rise of technology and smart phones how we are seeing this as a ubiquitous issue, the eye gaze and that serve and return, because families, upper middle class families, upper class families are just as digit tally distracted as needy families and we're seeing families, oh, your baby will be smarter if you give them a Smart Phone at three months.

>> SHERRI FICKENSCHER: All forms of neglect. I think we think neglect and we think it's only the kids in poverty. Not the case. There's also great studies on, if a parent is -- I'm going to turn to my smarty-pants over here because she probably knows it. You know the study out if parents interrupt an interaction with the phone, do people know what I'm talking about, the study? Have you read that one yet?

It affects their language levels.

So look that up somewhere. I don't know, Google Scholar it.

So this serve and return, I'm not going to go over this slide, but I'll let you know, this is also one of handouts that I put in for upload. Again, all is available on the Harvard Developing Child, but this kind of was just me. This you would give to parents. It's parent-friendly. You know, you go for your first session, the parent wants to talk about, what do I do, the hearing aids, the this, that... and this is what I'll say. We'll get to that. This is what I want to talk about today.

I want to talk about how you're interacting with your baby or your two-year-old or three-year-old or whoever it is.

Megan Gunner is the person -- was the speaker on that last video. I am going to get back into a little bit of the auditory development here when we do skill begets skill, so after I do serve and return, I'm obviously going to start talking about, how do I pair that now with some auditory development?

Early on. Regardless of the hearing loss.

What does responsive care giving even mean? You know...

I talk about it now in my sessions, but I didn't used to talk about it in those terms. Just a session on what does it mean to be responsive. I don't know how many people are parents here, but I would have liked somebody to have told me that when my kids were little. I think I was a fairly responsive mother, but...

And I do have one thing to say. The video is a little upsetting to me because my son's name was Tim and it was Troubled Tim. I was always like, I'm not so sure...

He was a little troubled for a while, but he's okay now, thanks for asking.

So this is going to create a stable environment. This is going to create an environment where the child feels safe, feels happy, feels responded to, feels part of a greater good.

So we're back on the brain architecture. I would really like us to start using that term instead of brain development. Brain architecture. Because it's built, right? And we can do it. We all have the skills to build brain architecture, and these are the things we know. The children who had positive adult interactions, adequate nutrition, and that last one is the one I always keep coming back to. Minimal exposure to stress. I think we need to be careful and we need to really pay attention to the caregivers that are working with the children that we work with, what is their stress level like. You know, then we go in. We go, okay, so what do you want to play with today? You want to do this? These are your toys. Okay, get this toy and do this... if you're like me, that's what you do. Not anymore, but...

We're excited, right? We're excited to be in there working with a four-week-old. Woo-hoo! Look at this!

The parent is not feeling excited. The parent is not feeling excited that you're there showing them how to interact with their baby. But it's our challenge.

Who is ready for it?

Some people... okay, thank you.

So how do we build a healthy brain? This is what we know now, that it's the genes and the experience that shapes the brain. This helped me because I need simple things when talking about science. Have you seen this analogy before? The genes are the hardware, it's what we get when we're born, but the experience is the software. That's what influences the genes and make it work. Babies will learn in the context of relationships. Emotions. Drive learning.

We forget about that a little bit too. Not just with babies. You know, a lot about adult learning theory now, right?

And what is the parent's emotional status? It's not always the parent sitting there crying their eyes out. It's the parent that everything is fine with, everything is great, it's those parents, too, that we need to be really listening to.

Okay. So, I think we're going to take a minute, we're going to go back to our Menti, and we're just going to talk about what kind of activities -- let's say you're going to go into a session with a family, after you go home from EHDI, and you're going to say, we learned a lot about serve and return. Let's talk about it. Let's brainstorm some ideas. How would we work on serve and return? How are you being responsive to your child?

Okay, so we're going to go in and you can type your answers in to your Mentimeter and it will come up in a word cloud on the screen, so everybody will get ideas how you can do it. So the code is 628322. It's the same one.

So I love these words, they're my favorite words. Coach. Engage. How do you really do that? What is the activity that you’re going to do? What are you going to do with the parent?

Eye contact.

No, you're putting your own in. You can put one in.

I'll come help. You can enter three, yeah.

Yeah, just one at a time.

>> SHERRI FICKENSCHER: I love singing. It's my favorite things to do with parents. I always feel like they lose their voice. They get the diagnosis and all of a sudden these parents don't have a chatty voice anymore. That's a great way to be responsive, little lullabies in their arms, rocking, singing, great for auditory development as well.

>> SHERRI FICKENSCHER: Here we are, people. Number-one thing. Isn't that exciting? It plays up there.

I mean, I don't know if you're like me, but I feel like six years ago play wouldn't have been the biggest thing up there.

Right? I think we're kind of growing into that, thankfully, right? Let's play.

I was thinking peek-a-boo. I was thinking, you know, you have the blankets that you put over the -- you know, you do blanket things over their heads, it's fun. You crawl on the ground when they're crawling on the ground. How about when you feed them? You go mmm-mmmm... or do an M sound because it's low frequency, right? It's a nasal sound. They can hear that, probably.

So we want to have as many positive life experiences as we can. And what positive life experiences mean is that the basic needs are always met. Parents need some serious coaching on understanding the difference between needs and wants.

Okay, we still have a lot of parents out there that are of the mindset that you're spoiling the child. If they're under a year old, you're not going to spoil them. You're going to make them feel secure. You're going to make them trust their environment. You're going to make them feel healthy and happy. They really only have needs under a year of age. You have to meet them.

Some other good ideas about how you can do some positive life experiences. I don't think I need to go...

Okay. So, we're... we're going to jump from that, from positive experiences, because everything that you put up on the word -- you know, on the word cloud, I think that most of you have a good idea of how to encourage positive experiences. But what I have learned a lot about over the past two years maybe -- and another thing I will encourage you, another little sidebar, if you go on to Harvard Developing Child, I'm proud to tell you that both Lindsay and I are brain story certified (chuckling)... there's a fabulous course, it's 30 hours. It's called the Brain Story Certification Top Leaders, top research, and you can do it at your own pace. So there's videos, some handouts. It's from Alberta wellness center, but if you go to the Harvard site, scoot around there and you'll find it. It takes a lot of time. I'm just here to tell you I failed some of the quizzes. They let you take it enough times until you -- I was like what!?

I felt so happy when Lindsay failed the quiz. Sorry, I didn't mean to tell your news.

She failed once.

So we've got three types of stress. Stress is not always a bad thing, right? Sometimes we have a stress response within our body. It's a normal healthy part of our development. So when a child feels stress, their diapers -- you know that little baby cry... aaahhhhh!

That child is feeling stressed. It's temporary, short-lived. It's part of the positive stress response. It's mild. There's a brief elevation in cortisol and the stress hormone, not a big deal, okay? It goes back to normal pretty quickly.

And then we have something called tolerable stress. And that's where your body alert system is activated again. But you have it for longer periods of time. Maybe you have a parent who is not so responsive and that little baby that is ahh-ahh-ahhh... it's going on 20 minutes and nobody is attending to that baby, right?

That tolerable stress may become toxic stress and we're going to talk about that next.

So your brain, again, we're talking about what your brain and your organs -- and that's what was most interesting to me about the Brain story Certification Lindsay and I did, they were not just talking about the brain. They were talking about how it affects your organs, your heart, your liver, your kidneys, long-term impact from the time that you're a baby.

So, if you have continued tolerable stress but you have an adult in your system, an a adult in your world who is able to help you deal with tolerable stress, maybe you've got a baby that is sick and they do cry a lot. The parent can't really make them stop crying, but the parent is responsive to them. The parent is holding them. That stress becomes tolerable because there's a caring person in their environment who helps them. Toxic stress is major, frequent and prolonged adversity. And we have a slide on that that will be coming up next and we'll talk more about it.

This is when you don't have a caring adult. Here is some adverse childhood experiences. There's a whole big study done on that that we don't have time to get into today, but these would be some of the things that would cause toxic stress in your environment. Abuse, neglect, inconsistent relationships, nonresponsive caregiver.

For me, this is the biggie here. Just because we don't have a lot of research on it, but we do have some research on the diagnosis, time period, and the depression that that causes in parents. You know, mothers in particular. So I think we need to be very mindful of that and know when it's like... wooo! Out of my wheelhouse. Maybe we can encourage mom to get help with this.

And here is what we have. We have negative life experiences over here. We have positive supports, and that then creates resiliency. And a child who has a high level of resiliency will perform better at school.

So, we're going to take a small little break right now. Everybody needs to stretch after we've done some brain talk. And then we're going to come back and we're going to do something called a Brain Architecture Game, and we're going to build a brain.

So, what we need you to do for that, ideally they say four to six people at a brain. So we're going to probably pull an extra table over and we might get a little tight in here on space. I would say no more than seven at a table or else you're just going to be a spectator. If you're just one that -- there are some that just want to sit and watch everybody else do it, then okay. No! Lindsay says no.

So, we have a 15-minute break. Yes, we're going to come back at 1:30. And we're going to try and -- there's a table there, a table there. One, two, three, four, five, six... you're good.

Seven... they're tolerable.

Okay, you guys have to split up. Maybe some can go here. You guys have to split up. Maybe some can go here. And we can pull out a table over here.

We can put some extra brain stuff there, okay?

1:30. Thank you, everybody!

[ break ]

>> Before the break we had a question asking about access to the slides to the presentation, and they are working on getting those up and available, and you'll be able to access those through the EHDImeeting.org, and the detailed agenda go to schedule and presentations, view detailed schedule, and then click on the title of this session and all of the PowerPoints will be available.

>> And scouts honor we uploaded them.

>> We did. I confirmed.

>> By the date.

>> If you want to see me afterwards, if you want me to walk you through that path, I'm happy to do that after or in the break.

>> Okay, I think we're still missing people.

We're going to get more people, we hope.

>> They have six.

>> Yeah, so I don't think they're all back.

>> Okay, everybody, we're going to get started on building our brain.

Okay, the first step is we're going to watch a video that explains everything that we need to do to build our brain. On your table there's a packet that has all the materials you need inside. Okay?

What?

[ off microphone ]

>> Yeah, we probably need to caption that.

>> These ordinary people are building...

>> Okay, here we go.

>> It's small again.

>> We'll fix it when showing the video.

>> We're showing it now...

No, I don't have a lot to say. Whoops!

In your bag -- you're going to have to process it, right? So whoever is at the bathroom, be kind to your table mates and help them come back an understand. We're here for questions. There's a rule book and life journal and all the materials you need. We'll stop the video at various times to do the work. They do have an upload your picture of the brain architecture. Is anybody averse to having a picture on -- I don't really need a picture but it may be fun to take pictures of your brains. I mean, not your "brains" but your "brains."

¶

>> These ordinary people are building brains. It takes a little bit of skill. A little bit of luck. And a lot of teamwork.

As you build a brain, you're going to learn how environments, experiences and genes act together to shape brain development.

Ready?

It's the Brain Architecture Game. Before we start playing, let's learn some brain science.

To help with that we need a scientist.

>> My topic today is the brain. We think of the brain as just one thing, but really it's like a lot of little brains all inside one organ. Just like a house with many rooms, each room has a different function.

Brain cells are the building material. What happens is that experiences you have cause brain cells to connect together, like a house that is getting wired up.

Basic sensory abilities like vision and hearing are the first to get wired up. These act like a foundation for other abilities to be built on. As you age, the right experiences build new rooms. You learn how to walk and talk, and eventually how to do more complex things, like arithmetic and planning and reasoning. These last rooms are still getting wired up in your teens and beyond. And that's great news. Because it means that parents, teachers, coaches, and all of us who spend time with kids can influence the development of these abilities right into a person's 20s.

But it's built on a foundation built in the earliest years.

>> So who is going on inside the brain that causes certain abilities to develop in some people and not in others?

>> This is where experiences really matter. Genes who have the basic instructions to tell cells to connect to each other, but it's experiences, like all that time spent on peek-a-boo, learning to read or just playing together that cause certain circuits to be wired and strengthened during development.

Wiring that is used less does not become as strong. And it gets pruned away. So it's up to caregivers in communities to make sure young people have positive brain building experiences at all ages of their development.

Of course, not all kinds of experiences are helpful. Really bad experiences that are intense, frequent, or prolonged, like violence, ongoing neglect, cause stress that is so serious it can have a toxic effect on brain development. Brain experiencing toxic stress will have weaker architecture. And that can lead to a whole range of problems later in life. Sometimes we have experiences that could turn toxic for the brain or not, depending on who is around to give support.

Imagine a tragedy like death of a parent. A child left to grieve without adult support will suffer severe stress that lasts a long time. If caring adults work with the child to soothe the body's stress response and teach coping skills, the experience won't be toxic for the brain.

When caregivers prevent severe stress experiences from turning toxic, scientists call it tolerable stress. So, communities and caregivers are very important, whether they're actively encouraging healthy brain development or working to prevent toxic stress from harming the brain, these interventions are very important for the long-term health and wellbeing of both individuals and the community as a whole.

That last point is what I want you to think about when you play the Brain Architecture Game, because as you'll learn soon enough, brains don't build themselves. It's group work. So get all the help you can and go build some brains!

>> Okay, newly educated brain experts, are you ready to play?

Your goal in the Brain Architecture Game is to build your brain as tall as possible. You want a strong brain too, so it won't collapse under the weight of life's stresses.

To play the game you'll need pipe cleaners, supports. They kind of look like straws. A die, weights, life experience cards, and a life journal.

The game starts as life does, with a roll of the dice. What is your genetic starting point? Roll the die and check your life journal. Then build the corresponding base.

Next you need to find out the number of social supports you have at birth. Roll the die again and collect that number of supports to use later in the game. Mark the results of both rolls on your life journal.

Now that your brain is born, life happens. For each year you draw three life experience cards. Their effect on your brain can be positive...

[ speaker off microphone ]

>> So get all your things out -- you also see your game and your life journal.

>> Okay. Everybody got everything out?

So, because the video is so nice and fast and there might be at least one person in the room who feels like they didn't catch all the details of what to do here, there is a handy game rule book in there. So that's going to be your rules and it's going to explain what you're going to do at each step. There are, I believe, two rules we found that kind of -- there was a discrepancy between -- well, they tell you too late, so we're going to give you the scoop, the inside scoop a little bit earlier.

So, at the very beginning on your first turn, when you get the genetic buildup of -- am I jumping ahead?

So you get the genetic lottery for your base and then you're going to get another roll for straws, and you get the benefit of using your supports, your straws, at any -- it says any point in the game you want, but we'll give you the heads-up that that is any point in the game up through year four. So don't try using it in five through eight because we'll yell at you. Not really.

And then the other big rule that they don't state until way at the end is once you have connected parts of your brain, you cannot go back and reorganize anything.

So what you do, very much like real life, influences the future, so there's no going back in time and changing things. So, again, they don't tell you that until the end of the book, so no changing.

Okay. So then the other piece of paper you have is your life journal. It's a single sheet. Did everybody get a life journal, hopefully?

Okay. So everyone has their life journal. So at the very top there, you're going to fill this in, every round, so every year. And make sure you fill in all of the holes and dots and spaces and anything you can, because that's going to -- that's going to impact years two and three and four and future things. Okay?

So, we're going to start the game and we're going to give you 30 minutes to build years one, two and three. Okay?

So that's about -- for people who want that broken down, think of kind of 10 minutes per year. So don't get really hung up in each year.

And if something isn't clear, just get our attention and we're happy to explain what to do.

And you might have to beat this brain. They won the genetic lottery.

So go ahead and start.

>> I may have made a bit of a mistake in jumping ahead. That might have been the confused looks that many were giving me. For right now we're just building the base. Just do the base portion. Your 30 minutes has not begun.

>> I'm just being nosy and seeing what everybody got.

>> For a point of clarification, if you get one of the bases where you do get a straw, you get to put the pipe cleaner inside of the straw. So you get both together.

>> Everybody, there was a good question in the other group. I want to make sure everybody is looking at your life journal, okay?

Do you see the little pictures? Look at number one that is the triangle. Number one is the triangle with no pipe cleaners on it. So if you roll number one, you're building a triangle with no pipe cleaners on it. If you rolled number -- if you rolled number two, you get three pipe cleaners with one straw. If you rolled number three, you get three pipe cleaners, three straws.

If you rolled four, you get four pipe cleaners, one straw.

If you rolled five, you get four pipe cleaners, two straws.

If you rolled six, you get four pipe cleaners, four straws and you have hit the genetic lottery!

[ cheering ]

>> Hey, nice! Look around, that's your competition, people!

You're making it look like the picture on the top of your life journal, your base.

>> So make... so right now you're just making the base on the picture and then your creativity is going to come in after we have -- this is just the newborn baby.

It will get a lot less complicated after this.

There's more video as soon as everyone has their base made. Okay?

Does every group have a base put together?

You want all the ends to be closed at the end. This first round should look like the picture on the top.

 And also make sure you filled in the little circle next to the pictures of bases for your social supports. So go ahead and roll the die to see how many social supports you get for the future.

You got a base. You guys did yours perfect. You guys have a base together and you got a circle, this little thing.

Just making sure you've got it.

>> I think most people have their bases built. I'm going to... okay, here is the next part of the video that is going to explain what you do from here, okay?

>> ... at birth. Roll the die again and collect that number of supports to use later in the game. Mark the results of both rolls on your life journal.

Now that your brain is born, life happens. For each year you'll draw three life experience cards. Their effect on your brain can be positive, toxic or tolerable, which determines the materials you have to build with. Each time you draw a card, it's important to keep track of what type of experience it is in your life journal.

How do life experiences affect brain architecture? If you draw a positive experience, you'll collect a pipe cleaner and a straw as building materials. Because positive experiences, like learning a new skill are the building blocks of strong brain architecture. What happens when you draw a toxic stress experience card? It's bad news for your brain, because it weakens architecture. Whenever you draw a toxic stress experience, you get a pipe cleaner but no straw.

Sorry!

If you draw a question mark card you may or may not get a support. Add up your life experiences in the game so far. If you've had more positive than toxic experiences, take a straw with your pipe cleaner. If you've had a pile-up of toxic stress you probably aren't getting the caregiver support you need, so no straw for you.

If it's a tie or if this is your first life experience card, roll the die. Even rolls mean positive. Odd rolls mean toxic.

As you build your brain, keep in mind a few do's and don't's. Do use all the materials you collected in a year before moving on to the next year.

Do attach pipe cleaners at the ends. Build closed structures at the end of each year. Don't leave open ends to tie up later.

Okay, did you get all that? Positive experiences earn a pipe cleaner and straw. Toxic stress earns just a pipe cleaner. Tolerable experiences turn positive or toxic, depending on the balances in the game so far.

>> Clear add mud?

>> So you've got your cards. Don't look at them. They should be upside down so that you don't know what you're picking.

Honesty!

So for each year --

>> I have a question. With the number of straws we got, and we need to use them all in this year or can we save some for later?

>> It's a good question that -- okay, you have your straws. They say in the video you have to use them each year, but the straws you got at the beginning, you know, rolled your dice and put that in your number of straws, your social supports, you just have to use those before you get to year five.

So at the end of year four, you don't get any more straws you can't use them past four, okay?

>> So the ones you get in year one you have to use in year one. Those additional ones that you got at the beginning, when you were, quote, born, those are the ones you can use whenever you want. But anything you use in year one you have -- or you get in year one, you have to use by the end of year one. Anything you get in year two you have to use by the end of year two. Does that make sense?

You're pulling three cards per year.

Your cards are clearly marked year one, year two, year three...

>> It may be easiest for the groups if you draw one card at a time. It may ultimately be three, but draw one at a time.

>> Remember to close each year. So at the end of your year, all the pipe cleaners have to be connected at both ends. You can't have an open structure at the end of a year.

>> The third column you're marking is your social supports. Do you see that?

You're only marking when you use one of the straws that you got with your original roll. That was in your circle from the beginning. You don't have to continue to mark as you go along in your years. It's just so you can keep track of how many social supports you have used.

>> Just a reminder that your goal here is for all the brains to be going upwards. So the end of each year, you want to make sure that you don't have to hold the brain to have it stand together. It should be able to stand with no hands on it.

If the brain falls down, it's the equivalent of collapse. So make sure at the end of each year your brain can support itself without hands on it.

>> If you guys could also get our attention when you've finished year three, that way we know you're done with three.

Yeah, stay at three for a minute.

So when you're done with three, make sure we know, just so we can tell when each group has finished.

>> I think I stopped by every table. All groups done through year three?

>> So we're just going to pause a minute and see if anybody wants to share any observations.

Is it difficult for you to think about the structure you're building as a brain? Let's keep remembering that.

So two questions: What observations can you share? And the second one is: What are the predictions for your brain?

Remember, we are trying to build the tallest brain and the strongest brain. So if anybody... we have a volunteer back there. Let me run.

>> You're welcome to run.

>> Okay, now that they can't go back, I'll share what we did. So we tried to build it as strong as possible at the bottom and then we're going to go up, because if we went up first, then maybe it wouldn't be -- tolerate the weight as much, but if we have a secure base and then go up we think it will tolerate more.

Very strong base.

>> Anybody else want to share your predictions for your brain? Do you think your brain is going to withstand some stress?

Yes, they're very confident about their brain.

[chuckles]

We took a similar approach, like we made the bottom really strong, and thinking about in terms of brains, some parents are always trying to push their kids ahead than not giving their kids enough chance to have that strong base, so not focusing on those developmentally appropriate play skills and working on reading at 18 month, you're leading to a --

>> That is an awesome -- I have to repeat it so everybody heard it.

>> Can we hug you? That was great!

Sorry, we actually will hug you.

>> What is your name?

>> Jill.

>> They’re trying to build a strong base as well and linked it to sometimes how parents are pushing, pushing, pushing, to do things not developmentally appropriate or trying to get to that next phase instead of building that strong developmental base. Did I get it right?

Anybody else -- what is your prediction for your brain?

They have a strong brain. What is your prediction for your brain?

>> [ off microphone ]

>> They're cautiously optimistic about their brain.

>> We had -- our base -- the initial base was not as strong, but we have a lot of supports, and so I -- I think it's pretty strong going forward.

>> How about your brain? Are you feeling good about your brain?

They're not sure about their brain. We're going to hope they get a lot of positive supports and not much toxic stress.

Okay. Anybody else have some comments? How do you feel about your brain over here?

Hold on.

>> We have the tallest brain. They do have the tallest brain. What is your prediction?

>> Maybe not as stable.

>> The tallest brain but maybe not as stable.

Our friends up here are still building. How is your brain?

>> I've had some critical experiences, and we are finding the resiliency and the viability of the straws and having to be creative about making the connections within the different parts of the brain to compensate where there isn't an immediate connection. It's not reinforced.

>> Whoa... okay. One final thing.

A couple things.

All of your things need to be tied off. Somebody's brain had things... huh?

Did I forget a group? Oh, my gosh. How is your brain? Do you have anything to comment on?

>> [ off microphone ]

>> Wait, wait...

>> Our three-year-old has been wearing her hearing aids every day from, you know, four weeks on and we're feeling pretty solid about it. She's in baby music and we're feeling good about the foundation.

>> That's a positive experience. They read... oh, that's so good. What a nice little brain. Okay, that's good.

So make sure you tie your pipe cleaners off. No loose ends, all right?

So now we're going to look and see -- well, no, you're going to continue playing four and five. Four, you can still use your social supports from the beginning. Five, you cannot.

And then after five, the rules change a little bit. Okay?

So let's finish up year four and five. Maybe 15 minutes.

>> I always wanted to be a runner, but I'm not. You can tell by the way I'm running...

>> Okay. So I think most groups have finished through year five. If you're not quite finished, that's okay, we'll let you finish it, but we want to start moving on to years six, seven and eight.

So I'm going to...

[ clapping ]

She's good!

This is why I present with her!

It's a teacher thing. I work in a hospital setting. I don't get to clap at children very often.

[chuckles]

She said, or with doctors. There are times it would be useful to clap at... [ clapping ]

No, so for those still working on five, I think there's only a couple, but you'll be able to finish it, but we're going to move on to years, six, seven and eight. The rules are going to change. We're going to watch another video. Pay attention, because it will be a little bit different.

¶

>> Your brain saw some pretty remarkable changes from birth until the end of year five. From here the pace of development slows and the rules change, just as they do in life. Starting in year six, you can't earn any additional straws. Your base is already built. But your brain is still developing. So now a positive experience earns just a pipe cleaner. And a toxic stress earns a weight. Attach each weight to the tallest point on your brain. Tolerable stress turns positive or toxic, like before. The game ends when your brain finishes year eight or collapses or tips over. Whichever comes first. Remember the goal is to build the strongest, tallest brain you can. Work together. Have fun!

And once you've finished, talk with your group about what happened to your brain.

¶

>> Okay. So, now no more straws. The supports aren't going to be -- no new supports, I suppose, based on that. So you're going to continue playing the game but with your toxic ones instead of -- I'm saying this wrong, aren't I?

>> No. No straws.

>> No straws.

>> Pipe cleaner or weight. Positive experience is pipe cleaner. Toxic is a weight. Tolerable is -- pipe cleaner or a weight... depending on your life experiences.

>> Should I say that one more time?

>> I think they got it.

>> Make sure you tell us if your brain collapses so we can laugh at you.

Ah, just kidding!

We're not really going to laugh at you.

>> But the development is over if the brain collapses. If your brain does collapse, don't keep doing the other years.

>> So you have to use your materials as you draw them. You don't draw three cards, get your materials and then do it.

>> For groups who have finished, if there's questions up here, where it says post play questions to ask, those are some of the things we're going to be discussing as a group, so if you want to start looking at what the questions are and discuss with your group. I understand they're very small. My eyes are not youthful enough to see it, so you may have to send somebody up.

>> Is everybody finished with their brains?

Okay. I'm going to come around and try to measure whose brain is the highest. I didn't think to bring a tape measure. And then we're going to take a break and then come back and discuss and wrap up with a few more things with Lindsay and I to talk about. So I think there is... what's that?

[ off microphone ]

>> This is like the -- what's that? Let's Make A Deal. She's got a tape measure in there!

>> She completely supported us instead of a toxic stress. That was very tolerable.

He said he would have bartered that for three more pipe cleaners.

All right. Brain number one.

Oh, where am I?

We'll do inches.

Hey, listen now!

Where do you think you are? You think you're... 23. And a smidge. I'll put my thing there. 23.

>> Tiny but mighty.

>> It doesn't mean you're a loser. It just means you didn't win this time around.

>> Well, we're going to talk about that. I do want you to talk about that. I want to be fair. I want to measure everybody. Sometimes your eye is off, you know what I'm saying?

So close.

Considering the start...

I think there's only one brain giving you some very stiff competition over here.

Do you mind if I get in there and measure your brain?

[ gasp ]

This is the our winning brain!

[ cheers ]

This is really stressing me out. Do you want me... oh, it was the hearing aids. Do you want me to give you a little massage? A lot of stress building brains.

Okay. We're going to take a little break. It did get a little hairy. There's gang activity...

We're going to take a ten-minute break. Come back at 3:15 and we're going to do wrap-up discussions about your brains and wrap up with some other slides we have for you.

Thank you!

[ break ]

>> Okay. Let's get going here again.

So we're going to go around to each group and if you want to have somebody in your group say what was something that -- what was an observation you had that was the most surprising to you, what was something that you felt really surprised you as you did this activity.

>> Or you could just tell us about your brain.

>> Or you can tell us about your brain.

>> No, the cards are for later, but I was handing those out now.

You ready?

Okay, everyone.

>> Because we had so many good social supports we didn't end up with any weights, so that was great.

>> No weights. And isn't your brain that you talked about at the beginning, you had a --

>> Yes, we -- so we did not win the genetic lottery.

But we had a lot of supports. Our brain had a lot of supports. And so kept strengthening that foundation and there was some toxic stress early on but because of the supports, they were able to continue and later on, even though they there was a lot of tolerable stress, there were enough supports that they were able to keep going pretty positively.

>> And we were talking about that's that classic brain, when you talk about a child who may be in a very dysfunctional home and needs to be removed from the home, right? Exposed to a lot of toxic stress, maybe some abuse, maybe some addiction. And so they had a lot of stress in the beginning, they had a lot of things going against them in the beginning, but then maybe if they're put into a foster care or, you know, an area where they get more support, they're able to kind of strengthen their brain and turn it around.

Do you guys want to talk about your brain? It's got a heart at the top. Who wants to talk about the brain?

>> Kind of like with our group, though, it's kind of surprising we didn't have more weights, and we really tried to build that solid foundation first without going up first.

>> I was just going to say, as we were pulling the cards, it seemed to be there is a lot of tolerable stress cards. There seemed to be a lot of those, and I think that -- yeah, there could be a lot of situations that could go either way, but depending on the supports. But we didn't know if that was part of the game.

>> I think life is that way too. A lot of things that are tolerable to one child are not tolerable to another. It kind of depends on what else is going on in your life. And I just think -- I mean, I remember the first time I started doing this and they said, starts as your life does, with a roll of the die. And I was like... yeah. You're born into this situation or you're born into that situation, and that's just luck of the draw. You know?

So I think it's interesting to look at it that way too. Would you like to talk about your brain?

Anybody?

>> Like them, we made an effort to really take the first three years and build up the support at the very bottom so that when things happened later on...

Like looking at the numbers, like... whoa, hi!

Looking at the numbers similar to this team, there's so much tolerable stress. We had so much of it, but because we had so much positivity, it all went to -- it was all positive and none of it was negative. So, I don't know, it's the same as everyone else, but I'm just emphasizing.

>> He had some pretty horrible things he had to deal with, but it was, you know, the tolerable -- we had earthquakes and hospitalizations and two job losses. Which seemed, you know, to us seemed like horrible things. But he had a really strong base, too, so we had the luck of the draw at the beginning and good supports the rest of the way and it turned out.

>> Do you know that that's the number-one form of maltreatment, is neglect, not abuse. Neglect.

Well, what do you want to say about your brain?

It's a winner!

>> We started by winning the genetic lottery, which was pretty lucky. But I think we got a little bit, like, yeah, we won the genetic lottery, we don't have to worry about this stuff on the bottom, and that bit us in the butt at the top, it got a little unstable and unsteady. So the genetic part is part of it, but you have to really continue to focus on all the supports around it to -- yeah, don't rest on your laurels knowing you won the genetic lottery.

>> I was going to say we started with a strong base and reinforced, but we didn't think about the genetic lottery, being lucky.

[ cheers ]

>> Who was number two?!

Who was number two?!?

>> I wonder what this would -- how many people, raise of hands, work in early intervention?

Ah. I wonder what the brains would look like for people that were building brains that didn't work in early intervention, would they be so thinking about, we got to build a strong base?

Wanh-wanh.

Brain topple. What happened?

>> We ran out of supports and we had tolerable stress that turned into toxic.

>> What was your base like at the beginning? you didn't have a --

>> Number two.

>> Number two. What year did you topple?

>> Seven.

>> So you made it up to seven. And you have three weights.

With no weights it was standing, right?

Ah.

How about your brain?

>> Well, we kind of started off on a -- we started off not super-strong, but I think one of the things we thought about, we ended up with four weights at the top of it and it still didn't collapse, but we really thought about, the even if you don't have that great start in line, all the different stressors and things that come into play, if you can really think of ways to support that child, be very creative with your resources, kind of find the loopholes in the systems to really give that child those supports that they need to be successful even though maybe they didn't get the best hand starting off.

Anything you want to add?

>> Well, we only had five positives for the entire time, and we had 11 tolerables and we had 9 toxics.

>> Whoa-oooo!

>> So we thought we did pretty darn good.

[Applause]

>> And I would say -- I asked the question earlier, if the flex or accordion in the straw was having a support system or something supportive that really maybe isn't the best support system you have. Maybe it's the only one you have, but maybe it's not the best.

>> So I thought that was a great comment, because the last time we played the game, we didn't have straws that had the flex in them, and I didn't think about that. Like I just went and got straws.

Who knew!

But it's interesting, because I think that's exactly it. Sometimes you think you have a support but maybe they're not exactly qualified to be the best support.

>> We have a little song for kiddo.

>> They have a song!

[ music playing ]

>> ¶ I'm still standing... duh-duh-duh... better than it ever was... ¶

Give me a mic...

¶ catch me around 5:00 o'clock ¶

>> Yes, okay.

>> I'll intervene now. I will be your support.

>> Wait, there was one other thing I wanted to say. Here is what it was.

We had one team that had supports, but no pipe cleaner. And it was kind of like a little -- it was a little unfair, because we have these straws, we should be able to use these supports. We have these supports. But let's think about that in terms of the brain. And in terms of our real-life situations. How many people here are working with children that have awesome families and parents that are super involved but the children have multiple disabilities? Raise your hand.

It doesn't matter how many supports you get, the child's brain is still going to be better because of those supports, but there are sometimes things -- I just got little chills -- no matter how hard we try, no matter how passionate we are about the work that we do, there are some things we can't change, you know?

We just have to do our best, right? We just have to do our best every day.

Build those brains.

With that, I'll turn you over to the lovely Lindsay.

>> LINDSAY ZOMBEK: Why, thank you, Sherri.

Okay. How about I move the captioning bar so people can see it?

Okay. I'm working on it.

Why is it not changing?

It would make sense that at the very end the technology would fail, right?

There we go.

Okay. So we've been talking about responsive social interactions, what roles the supports play, what role our life experience plays. The epigenetics, that we can actually change brains and change people at the genetic level and how their genes are expressed.

So how do we tie this together with what we know about early auditory development?

So let's talk about and think about how hearing loss impacts development. So the neural pathways in the auditory cortex are not going to be as strong if they haven't been accessed, if we haven't been -- if we haven't built those neural connections and those pathways, then we don't have that strong region of the brain.

So, when we're talking about even the example of the group that had the extra straws, you can have all the supports, but if you don't have that brain architecture in place, the supports aren't going to necessarily contribute to it.

So if these pathways aren't being used or aren't efficient, then they're going to be pruned. That doesn't mean that they can't be developed and that doesn't mean they can't be strengthened. We know by age of seven the brain is starting to process the other senses, such as touch and vision in the auditory cortex not stimulated, and that's going to impact brain development and how our future skills build off of our current skills.

So that concept that we learned about from the video, that skill begets skill. If we're not developing the basic cortices and not getting the early brain development in those areas, then some of the future areas are going to pose more of a challenge for kids.

So if we don't develop the auditory cortex, spoken language development is going to be a lot more challenging. Reading. Higher language levels. And all these things we're really working towards and striving for for kids are just going to be a lot harder and more of a challenge if we don't have all our bases covered.

So, from the epigenetic level, why is hearing loss such an issue? And the answer, as we kind of referenced earlier, it comes back a lot to stress. There is a lot of stress on the child. They're working harder than their peers. They're working harder at home. They're working harder when they go to the grocery store. They're working harder when they're in school, because they're having to work harder to hear something to communicate. There's a lot of extra stress on the child to get all of that achieved.

There's going to be a lot of stress on the family. And when you think about a child with hearing loss and how many doctor appointments they have in that first year or the first two years, families are constantly going to appointments. Families are constantly facing financial choices. Families are worried about their children and what does the future hold for their child. Families are worried about so many different things. They have all these additional stresses that another parent might not have.

There is also the risk with hearing loss that we see in the research that is there a change in the parent-infant bonding.

So when the parent finds out that the child has hearing loss, does that change how they talk to the child? Does that change how they interact with that baby?

Does that change how they feel about how they can communicate? And depending on the supports they have and what message they're getting from professionals who maybe have a little more experience in this area, that can really impact the bonding. If we're saying you have no way to communicate with your child, then the take-home message to the parent may be, oh, no, I have no way to communicate with my child.

So that can add to more stress.

So those are all different things and ways that hearing loss could ultimately impact development as we're adding these additional stressors.

So we don't want to leave on that kind of depressing note, because as we saw with our brains, just because we don't have a roll of a six on the dice at birth, that doesn't mean that we can't foster brain development. So Sherri is going to talk a little more about fostering the brain development.

>> SHERRI FICKENSCHER: We showed you earlier the one slide that talked about what children can hear and what they can't hear, and I have a great story that goes along with this.

Because I always have to have a story about something.

The night before I came here, my son and his girlfriend came home to our house at 3:00 in the morning, okay? I'm trying to sleep. And he's, like, 23. He's not like little. He's 23.

24... how old is he? 23.

So he came home and I could hear them come in, right? And I'm trying to sleep and I think my mind was just, like, racing, couldn't quite get back to sleep. So I'm thinking about, you know, some of our topics. And I can hear them talking in the house. And I could hear who was talking, right?

I knew when it was my son's voice and I knew when it was his girlfriend's voice.

I had no idea what they were saying. Probably thankfully... no, just kidding. He's a really good kid.

But, I could hear them talking, okay? And I was like... oh, just like a kid who has got a severe to profound loss that can't get an implant until they're one year old, they can tell the difference when people are talking and not talking often. Not always, but often. Those are the things you're going to be working on with them, right?

They can tell if it's a female voice or a male voice or a child voice, if they have some hearing in the 500, at 1,000, those are the kind of things we want to be working on.

Blast the music and have a dance party, people! Maybe they'll hear when the music stops.

Have fun!

Those are the kinds of things we need to be thinking about. How can I engage in some auditory activities that are also building the brain?

It's the bonding. I mean, I had one family that I worked with -- I worked with their older son and then the second son was born and the mother was completely devastated. Even though the older son was doing well, he was speaking both English and Korean, you know, he had bilateral cochlear implants, she knew what to do. She was completely wiped out by the second child getting this. And I could see that it was affecting her bonding. And this little guy had not -- he was probably the worst ABR I ever saw. All the arrows are squiggly, just ugh...

And I had to come up with a way to have her hold him without it making like I'm saying you're not bonding with your baby, how about you hold him?

So I would say, let's pick him up and hold him close. Because then he's going to -- he's going to feel some vibrations from your chest if you do that, that will give him some extra auditory access. Really I was more concerned with... pick him up. Hold him. But on top of that, I was also thinking, right there in the hearing aids, if he's a chance he's going to hear you, it's going to be right like that.

So a way you can build auditory skills and still build the bonding.

I do think we need to talk to parents from the very beginning about responsive parenting. I'm doing a better job about that now. I try not to beat myself up too much about -- I don't know if the rest of you do that. Oh, my gosh, when I think back to some of the sessions I had ten years ago, what I wish I knew.

But I talk about it now in a big way and it makes me feel better. Not my practice.

Anyway...

Quantity and quality of words.

We have our heart study, the 30 million word gap, quantity and quality. It's not just talk-talk-talk-talk-talk...

Right?

It's some really quality interaction, some functional vocabulary as soon as you can, so that the child can get their needs met in some way to the parent.

I don't know if anyone is familiar with the name Warren Esther Brooks, but I went to a presentation at Clarke one year and he had a slide up that really impacted me. He said, what do you think is the greatest -- the thing holding children with hearing loss back the most? What do you think it is? He's polling the audience. They don't have access, their parents... blah, blah, blah... all these other things. He switches the slide and he said, now, the biggest thing holding children who are deaf and hard of hearing back slow expectations.

That's what is holding them back. You must know about typical language development.

And you have to hold the kids accountable for it. In whatever method you're using. But for me, because my world is listening in spoken language world, you know, that's the world that I live in.

I get parents sometimes that come and they're just happy that their child is talking at all.

Because their child is deaf, right?

I'm like... I know, I know how to read the audiogram. I know. But that doesn't mean we can't expect age appropriate language from your child. High expectations. And positive presuppositions. Meaning I'm going to assume the best of you, Mom. I'm going to assume the best, that you've done your best. It's sometimes hard to do when you go in week after week and you feel like... why aren't they doing what I'm asking them to do!?

Aren't you glad I'm not the one coming in here?

So here we go... there are elements out of our control, but we can identify resources. There's all kinds of great amazing websites, 0-3, hearing first website, I'm not familiar with a lot of websites for children who are learning ASL or using a visual means, but I'm sure they're out there, right?

Let's share those with parents, so that they can tap into it -- they don't have to rely on you to be their little helper all the time. You know, they become their own advocates for their child.

I don't know why the clip part is over there, but it's a nice little picture, isn't it?

Emphasize the things the families can control. You know, there's a lot they can control. But a lot of times they really want to talk about all the things that they can't control.

So, I'm going to move on to some scenarios. Scenario number one. We're going to work in your groups and come up with tying what we learned today into some shared knowledge here.

So you meet a family with a three-month-old baby diagnosed with severe to profound hearing loss.

The family thinks they may try to get a cochlear implant when the baby is old enough. They are not rushing to buy hearing aids because the audiologist and ENT said they would not help anyway.

Does anybody have that experience?

But somebody else said it, right?

So here is what we're going to take just a brief amount of time to discuss with your group. This is not going to go on for 20 minutes. We're going to try to wrap things up here. We want you to discuss with your group how you can apply brain development epigenetics when working with a family. So knowing what you know about brain development, what can you say to this family?

And number two, it's not really one-one. It's really one-two.

Two is... what can you say and what can you do with the parents to help promote positive genetic expression?

Okay, so let's do that in four minutes.

>> Two more minutes! Two more minutes! Till we stop... till we stop...... two more minutes!

>> Okay. Sounds look good discussion happening. We'd be interested in hearing if anyone is willing to share some of the ideas that your group discussed.

Any volunteers who would be willing to talk about some of what your group talked about?

>> ¶ at first I was afraid... I was petrified... ¶

>> If you volunteer, she stops singing.

Does anybody want to talk about what their group is talking about?

There we go!

Got a winner!

>> So I'm actually coming from the parent perspective and actually work with parents. For me, though, I went exactly the same way. Why do I need to keep these hearing aids on? Medicare is telling me I have to, that's the only reason I am. At that point I didn't know what neuroplasticity was. I started learning it after I went after her second cochlear implant. So I try to break it down with parents without getting into the big words or anything, you're just trying to keep that pathway open.

>> Simple but effective, right? Keep the pathway open. Anybody else want to share some of their little discussions you had with your groups?

>> One thing that has helped with several of the families that I worked with is helping them realize that the more they wear the hearing aid now the easier the transition to implants is. For one, they're getting presence and absence of sound, but even just wearing something, having something physically on their head can make it seem a lot less stressful than when you try to put something on that actually is producing sound. So that sometimes helps as well.

>> So in California we have a bit of an issue in terms of access to hearing aids. Medicaid, you have to be -- you have to qualify for a disability. And in California deafness is kind of not seen as a disability until you start proving that it's affecting the child, which doesn't really show until they enter the public school system.

There is a program called California Children Services. You have to qualify for that with an income of 40,000 or less for, I think, a family of four. And the Bay area specifically if you're not making at least 100 grand you're considered poor. You can't survive in that area without at least making 100 grand. For one person. So now you're looking at the families, you know, parents are working two jobs each, so that's another part of the -- let's have the family, you know, have that language input. There's no time there, because they're just trying to meet the basic needs.

So a lot of times -- we do have Stanford, who does loaner, but it's really hard for parents to get in there. A lot of doctors won't give them the referral. You have to have a referral to get in there or really good insurance. So a huge thing there is the access to the actual hearing aids or even the tests. So sometimes, of course, they're kids, they're not going to test very well if they're old enough to have to, you know, do things. And the insurances pay for their one time a year, and then the next thing is out of pocket. So I've had a lot of families where the tests aren't, you know, as accurate so they're not going to recommend anything. They have to wait until the following year to get that test. And it just spirals. And we cycle back. And so the parents that do have hearing aids have -- we know have really great insurance or have the financial ability to do that. So it's really hard to even have those discussions because it's an access issue, even if that family wanted to use hearing aids or any kind of amplification for their child.

>> I'm assuming they get the access but they've got to get earmolds and they outgrow earmolds and...

>> Yeah.

>> I think part of the problem here is that you're preaching to the choir. And as an audiologist, I really, really get upset when I hear an audiologist or an ENT say, don't mess with that, they're not going to do any good anyway. And who is going to be more credible you know, the ENT that you paid $200 to see or the early interventionist who comes to your house for free?

>> And I think part of that -- and then we -- this is so awesome we have all this discussion now, but we have to wrap it up. I forget what I was going to say. There was something that...

Anyway...

>> Something we also were discussing -- I'm from California too -- the idea of access is a lot of parents feel they have to be perfect at communicating before they start, but they just need to start, and so that can either be, you know, visual language, ASL, or also just jointed attention, interacting and speaking to their child. But just starting is important.

>> Do the next right thing, right? Just put one foot in front of the other. What I was going to say is maybe this helps. Maybe some brain science can help, you know, some research can help to show that we know what is happening in the brain, right?

So I think what we're going to do right now is we're going to skip over our second one because we're running out of time, but what adult learning theory tells us is unless we actually make a plan for change, we probably won't change. And so how many talks do you go to where you get the slides and you print them off and you're like wahoo, that was great! And you close the drawer and then when you go to clean your drawer, you go, oh, yeah!

So we would like you to take a card. There's one for everyone. You can write a key takeaway if you want to. I think what we're really interested this is what is your plan for change? Number one.

So number 1-1. What specifically are you going to do differently to help brain architecture of the children with whom you work?

Or maybe you're already doing it. What is something you learned? What is a takeaway?

And we're going to give you... you have a few minutes. Seven minutes. Unless you have... what?

Unless we want to share -- maybe somebody has some really great idea about what they want to do with this, that they would love to share with all of us.

That would be really cool.

I'm going to stop talking now.

>> As people are thinking about their ideas and writing them down, was there anybody who had anything they wanted to share?

>> We were just talking about -- I mean, just the whole first visits, like you said, encouraging parents about the whole share/responding thing, in the very early stages, you know, pick up on how they're reacting now to their baby. You know, they're already doing so much instinctively and I encourage that, you know, what do you do when your baby cries? You pick him up and love on him. When he's hungry you feed him and look in his eyes and just point out all of those early interactions and how that builds that brain architecture and, you know, so not just -- it's not just about hearing. It's visual, hearing, touch, everything. And most parents are doing a lot. So you just have to look at what they're already doing and help build upon that so they can feel good about it.

>> The other thing you might want to consider is some of the videos. Like the video I just showed you, you know, sharing those with parents, watching it and just saying, what do you think?

You know, tell me what you any about when you watch that. You know, so that you don't feel you have to be the one talking all the time you know? Showing them there are other places to get some answers.

Anyone else?

>> I'm coming here as -- I'm from a parent's perspective, and my daughter is six years old and... sorry... I had a great team, and both in Minnesota and in Massachusetts, and one thing that I remember is even just saying one word to them, it actually affects them and they remember those words. And one of the other -- like Lerna Sims, she's a grandparent of one of the kids in the center, and one of the things she told me was "love." That's all she said... "love." And you know what that is. You know what love is, so that's what you show your child.

And to me, from this session, there are two words that I could think of, and that's "engage" and "educate." Because parents don't know what they're getting into, so educating them is the best way. And it doesn't matter how you educate them, whether it is a video, it's just giving them a website, and if they're willing to do that, or even if they're not, tell them you don't have to do it right now, but if you have the time, when you've grieved or you're done with that and you want to take action, it's always open for you to check this out, you know, giving them that information, and you hope that they'll follow through on it. And I think that's where the advocacy comes in, because when you give them these short words, it clicks with them. I feel like it clicks with me. I don't know if you've ever had that experience, but just having those small tidbits of advice, and it's encouraging, and that goes a long way.

>> [ off microphone ]

>> Yeah. So not even having like this whole education thing where you just give them little small tidbits every time you see them, it encourages them to advocate for their family and for their child, but as a parent too. So, that's another word "advocacy," like someone used that.

>> Keep going!

>> Yeah, that was one of the words that was told the -- the speech therapist in Massachusetts told me, advocacy and language. She would just say those things and that kind of helps, makes it click.

>> And actually our time for this session is up, so I'm sure that our presenters would be available if we have more question afterwards.

>> And our contact information. We love email. Send email if you have questions. Anything we can help with.

Thanks, everybody!

[Applause]

>> And, yes, you can hand the orange or salmon colored evaluation sheets to me on your way out or you can leave them on the table and we'll get them at the end.

Thank you so much for the presentation!