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Experiencing Solutions-Based Auditory Processing
Evaluation and Therapy
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Presenter: Angela Loucks Alexander, AuD, MNZAS, CCC-A
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- [Female] At this time, it is my pleasure to introduce our guest presenter, Dr. Angela Alexander. Dr. Alexander graduated from the University of Kansas with her AUD degree and found her passion in the treatment of auditory processing disorder. She was mentored by Dr. Jack Katz, a world leading expert on APD. Dr. Alexander and Dr. Katz worked together for seven years building their knowledge and their expertise. With the Auditory Processing Institute, Dr. Alexander is looking to train her peers in the skills needed to provide effective APD diagnostic and therapeutic options. At this time, I'll hand the mic over to you, Dr. Alexander.

- [Angela] Hi there, I'm Angela Alexander and thank you so much, Kristy, for the fabulous introduction. Anyway, in case anybody saw all of those letters on the screen after my name, I am originally from Kansas, but I currently live in New Zealand and so if you see MNZS, or MNZAS on the screen, that means I'm a member of the New Zealand Audiological Society. So here are my presenter's disclosures. I just want to let you know that I do teach courses in auditory processing disorder. I also have an online teletherapy option. I will not be discussing either of those during those course, this course. I'm having my data analyzed by the University of Buffalo and I'm also a part of the International Guild of Auditory Processing Specialists. We're gonna talk about a lot of really fun stuff today, and I can't wait to get started, but basically, it's, I feel like it's really important to connect why we do what, with what we do. I heard about auditory processing disorder for the first time in 2004 when Dr. Jack Katz was giving a similar talk to what you're going to see today and APD absolutely blew my mind. For me, I had always been wondering why, why I actually struggled to understand things and this is really personal for me because I have one of these really weird stories out of the US where my parents actually kept me lost, locked in a basement because they said I wasn't listening or following instructions. So while I can't prevent child abuse, I do strongly believe that we should be the person we needed when we were younger and for me, I feel like auditory processing disorder often has a lot of unfairness associated with it. People will mistreat people they think aren't hearing and listening and they legitimize that mistreatment because a person isn't paying attention. So that's why I

care so much about this and I hope that I get to show you more about that today. So, first of all I wanna talk about APD from a different perspective than we're used to thinking about it, and I want to use something called Erber's Model. So Erber's model is all about auditory skill development in an incremental way. We need to be aware of sound first of all. If we are not aware of sound, we may have hearing loss, or we may have auditory neuropathy, but if we do not know that sound exists, then it's going to be very difficult to process it, or process it, and often what we use for awareness, if awareness does not exist, is devices. We'll use a hearing aid or a cochlear implant in order to increase a person's awareness. The next step on Erber's model is discrimination. Not only do you know that that two sounds exist like mmm and enn, you're aware of them, can you discriminate that there is a difference between mmm and enn? They're very similar to each other. It might be easier to discriminate something like behh and mmm. You need to have awareness and discrimination in order to get to the next level, which is identification. You know, that mmm and enn exist. You're aware of them.

You can hear the difference between mmm and enn but can you identify that mmm is M and enn is N? You need all four of these, or all three of these, to lead up to the last one which is comprehension. A lot of audiologists in particular get so focused on the awareness piece that we lose sight of discrimination and identification. We think that just because we've given someone hearing aids, they're automatically going to comprehend everything everyone says, but if a person has an auditory processing issue, in addition to a hearing loss, we may need to actually address both discrimination and identification as well. I'm going to show you ways in which we identify that today, ways that we, ways that we evaluate auditory processing issues, and also how we remediate these difficulties as well. I want to show you this through a real human being. This is Jackie and, of course, her name has been changed. She's given me permission to share this with you and she signed consent forms prior to any recording taking place. While I'm showing you samples of adult testing, 95% of our clients are children but that's changing. I would say that a few years ago, maybe 99%

of our clients were children. More adults are realizing, yes, they're struggling to hear and understand and maybe this is not their fault. These are her audiograms. So Jackie first went to a, an audiology clinic in October of 2013, and she said, "I'm not hearing." The audiologist did some testing and found that her hearing sensitivity was essentially with, was essentially within normal limits. In the report, the audiologist notes that she believes that auditory processing disorder may be this client's issue but, at that time, there were not audiologists who are focused on doing this work in adults in New Zealand. I had just started here. In May of 2019, she went back to her family doctor and she said, "I am not hearing. "I am not understanding. "It is really frustrating "and it is changing my quality of life." Her family doctor said, "I know this talented otologist, "I'm going to send you to him." Mr. Wouter Ten Cate in Tauranga New Zealand said, "I think you might have an auditory processing issue "and I would like for you to have some testing done, "but before you come to my office, "I would like you to have an audiogram done." This audiogram done, was done in may of 2019, showed essentially the similar test results to the test results in 2013 and the audiologist also preferred, performed a QuickSIN, a quick speech in noise test, and those test results were found to be within normal limits and the audiologist suggested no further testing Based on her complaints, he felt like it was still necessary to send her to me and so let me show you why he sent me, sent her to me.

She had difficulty following conversation in background noise. She works in HR and has regular meetings and reports struggling to hear during these causing difficulty. She has to have subtitles on to follow dialogue, and she reported learning difficulties as a child. We use the Hearing Handicap Inventory for Adults. If you're not using some kind of formalized questionnaire like this in your clinic, even if you just have a dispensing clinic, I highly recommend using something like this. It is a questionnaire that has 10 or 25 items. The screener has 10. The, the longer one has 25 items, and it's not for APD. It's not APD specific, but I'm finding it to be potentially really sensitive for an adult with no hearing loss as well, and to pick up on APD concerns. So there's 25 questions and a person answers, yes, sometimes, or no. If they say yes, it gets four points.

Sometimes it's two points and no is zero points. So out of 25 questions, if they're answering yes, all the time, it means that hearing is really impacting their daily life and their score is a hundred and it's awful. If they answer no to everything, they have a score of zero points. This Hearing Handicap Inventory can be used for free and I have the reference there at the bottom of the screen so that you can actually utilize this with your clients. Let's see what Jackie has to say to some of these questions. Questions and I just want you to answer yes, no, or sometimes. Does a hearing problem cause you to feel embarrassed when you meet new people?

- Yes.

- [Angela] Does a hearing problem cause you to feel frustrated with talking to members of your family?

- Yes.

- [Angela] Do you have difficulty hearing or understanding coworkers, clients, customers, or wait staff?

- Yes, definitely.

- [Angela] Do you feel handicapped by a hearing problem?

- Yes.

- [Angela] Does a hearing problem cause you difficulty when visiting friends, relatives, or neighbors?

- Yes.

- [Angela] Does a hearing problem cause you difficulties hearing the movies or in the theater?

- Sometimes, yes.

- [Angela] Does a hearing problem cause you to have arguments with family members?

- Sometimes.

- [Angela] Does a hearing problem cause you difficulty when listening to TV or radio?

- Yes.

- [Angela] Do you feel that any difficulty with your hearing limits or hampers your personal or social life?

- Yes.

- [Angela] Does the hearing problem cause you difficulty when in a restaurant with relatives or friends?

- Yes.

- [Angela] Okay. So you can see that during, while I was asking these questions, she was answering yes to quite a lot of these. Remember her audiogram was essentially within normal limits, but her score to the HHIA when we saw her in June of, on the 26th of June of last year, was 82 out of a possible 100 points on the 25 item questionnaire. Hearing problems were greatly affecting her life. So we use the Central Test Battery. On the Central Test Battery, we use three different tests to evaluate how a person is processing auditory information. First, we look at how a person is hearing in quiet and

how they are using hearing in noise. We also use the Staggered Spondaic Word Test. Don't let these words overwhelm you, I'm gonna show you actual samples that will help them sink in a bit more. We use this test that shows not just how a person is understanding speech, but how they're also integrating it, integrating sound that's coming from both of their ears individually and then we also use the Phonemic Synthesis Test. It's a sound blending test that I'll show, test that I'll show you shortly. So let me show you some actual test results of Jackie's. A few more disclaimers, she's a Kiwi and materials are in my dialect. Results were analyzed carefully with that in mind and you're only seeing short segments of testing, not complete results. So I'm only going to show you a little bit of speech and noise in the right ear, but we also did this test in the left ear and for many more items and learning effect has not been observed.

- [Jackie] Sharp? Tanned. Ate. Can. Boil? This. Luve. That was really hard.

- [Angela] Did that actually make you feel like you normally feel in a noisy situation?

- [Jackie] It made me feel stressed, emotional and frustrated but the emotive response, yeah, the emotional response was exactly the same as what it's like to be in a social situation where I'm just guessing it, 'cause I have no idea.

- [Angela] No clue.

- [Jackie] Shove. Tan. Ate. Camp. Oil. This. Do.

- [Angela] Fantastic. Hopefully you could hear a difference between her pre and post test. I also really want you to focus on the fact that there's a, this is at a five DB, a positive five signal to noise ratio, five DB signal to noise ratio. So that means that the speech was louder than the noise and it seems to be at this level where people with auditory processing issues struggle and it's really important to see this. So let's also show you her Staggered Spondaic Word Test. Now the SSW test was created by Jack

Katz and it uses spondees to see how a person is integrating auditory information. So the stimuli you here is normally delivered to each ear in this order. In the right ear, you might hear upstairs and in the left ear, you'll hear downtown, but the words stairs and down are presented at the exact same time. If you haven't listened to a test of binaural integration, it might sound like you're on a cell phone in one hand and a landline in the other. So it feels a little bit crazy trying to go between the two. Now, the way that you're going to hear it from my speaker monitor is going to have them completely overlapped in presentation. So do not diagnose yourself with APD if you struggle to repeat the item back correctly. This is not a test for you. Let me show you what Jackie's responses look like.

- [Male] Are you ready? Fruit juice cup cake.

- [Jackie] Fruit juice, cupcake. Fruit, juice, fruit, cake.

- [Male] Are you ready? Night light yard stick.

- [Jackie] Night light, yard stick. Night, light, yard, stick.

- [Male] Are you ready? Bird cage crow's nest.

- [Jackie] Birdcage, crow's nest. Bird, cage, crow's, nest.

- [Male] Are you ready? Book shelf drug store.

- [Jackie] Bookshelf, drugstore. Book, shelf, dog, star.

- [Angela] What did you think of that one?

- [Jackie] That was quite tricky.

- [Angela] You did it, well done.

- [Jackie] Oh, that was fun, that one.

- [Angela] Was that fun?

- [Jackie] Yeah.

- [Angela] You actually enjoyed it?

- [Jackie] Yeah, weirdly.

- [Angela] Yeah.

- [Jackie] And I keep waiting to become exhausted. I know, I was like --

- [Angela] High five to you!

- [Jackie] I am really concentrating but this is quite fun and I feel like I'm doing really well.

- [Angela] That's so cool! Come on out.

- [Jackie] I really wanna know how I did on the hearing test because it's like, I'm sure it wasn't, 'cause it wasn't easy but I feel as though the first time I did it I was like, "oh my God, this is so so hard!"

- [Angela] You're right! You're right! Last time, you did say, "Oh my God, this is so hard."

- [Jackie] And I feel like with that one I'm like, okay this is really cool.

- [Angela] Yeah! And it was really cool. So there are a few things that I really want you to focus on from what you just saw. First of all, using the Central Test Battery makes us do something that we don't normally do with audiology testing, and that's looking at quantitative versus qualitative results. Quantitative results tell us, did a person get something correct or incorrect? Yes, No. It's a one. It's a zero. A qualitative error is not just how a person, if a person was correct or incorrect, it's what did it take for that person to respond? Did she have to do, did she have to delay and actually think about it and use cognition? Because if she delayed, which we mark with an X, it tells us that she needed more time to process something. And if we know that, if we can see that hint, we not only know that they are compensating, it also lets us make the test more sensitive to pick up on things that probably would have been an error if she wouldn't have used her brain, so if she wasn't using automatic auditory processing, and it also gives us a hint on how we can help them on the best way to intervene. So we aren't using this to help us spot fakers. We're not judge and jury. We want to help these people move forward.

So these are her initial test results from the 26th of June, 2019. Now I like to use this colorful format. I kind of robbed it off of Feather Squadron, Acoustic Pioneers' Feather Squadron. I just like that bright visual format to help a parent know if we're, if we're seeing a bunch of ketchup and mustard on the screen, yikes! So red, for me, is three standard deviations from the mean. Orange is moderate. Yellow is mild. Green is normal. So according to ASHA and triple A, if a person is falling outside two standard deviations on two probes, so if there's two oranges on any of this, on two different tests, then a person qualifies for, quote unquote, qualifies for a diagnosis. If they fail by three standard deviations on even a single test, then they would, quote unquote, qualify for a diagnosis. So two, two oranges or one red gets us the diagnosis. You can see very clearly on the 26th of June, she, she won. She won the prize for APD, but then

also if you look at normal to be within one standard deviation, could still mean that 85% of her peers are performing better than she did on the test. I think it's really easy to think one standard deviation, Oh, that doesn't, that seems pretty, quote unquote, mild, but 86% of the population is doing better, hmm. Anyhow, on her retest, we pulled her in for a retest on, in January of 2020 before the world changed and her hearing, or her auditory processing test results were all within normal limits. The best way to do a post test, a pretest and a post test, are to use the same measures to act, especially if they don't have any learning effect, we want to see what has actually changed. Like I said, 85% of the population could still be doing better than she is so we need to look back at how this relates to her day to day life and if she actually saw improvements in that and what better way than to use an HHIA? Let's see what Jackie has to say. Oh, I'll show you another set of phonemic synthesis tests 'cause hers is a little bit too normal, which makes it too boring. Does a hearing problem cause you difficulty when listening to TV or radio?

- No.

- [Angela] Does it cause you to go shopping less often than you would like?

- No .

- [Angela] No! Not getting in the way of that! Does it, does a problem or difficulty with your hearing upset you at all?

- No, not now.

- [Angela] Good. Does a hearing problem cause you to want to be by yourself?

- Can I elaborate?

- [Angela] Yes.

- I mean, because I'm an introvert, and I need time to recharge.

- [Angela] Okay, so sometimes?

- Yeah.

- [Angela] Okay, does a hearing problem cause you to talk to family members less often than you would like?

- No.

- [Angela] Do you feel that any difficulty with your hearing limits or hampers your personal or social life?

- No.

- [Angela] So her retest on the 10th of January 2019 was 24 out of a possible 100 points on the 25 item questionnaire. So if we can look at her HHI test results, IA, test results over time, on the 10th of June is the first time I saw her in her, in our clinic and her score was 82. We started therapy on the 30th of June and did a quick HHIA right before it and her score had increased slightly. Maybe she was a little bit more aware of her hearing problems and because I said she did have some, she did have significant findings, maybe, maybe this kind of made her think differently about her hearing problems. We completed 12 sessions of auditory training. On the 13th of October, we retested her age and her score was 30. It took a while to get her back in for a reevaluation thanks to Christmas and the holidays and, but her retest on the 10th of January was 24. I called her as a followup on the 16th of June 2020 as a six month followup and her score is now 14. So what do we get from this? APD is treatable. How

do we treat it? Don't worry, I'm about to show you. Here's the phonemic synthesis test of another client and his name is Steve and he's given me permission. Once again, I'm only showing you a few items and he wore hearing aids for both the pre and post therapy evaluation appointments. He now wears cochlear implants and reports great acceptance.

- [Male] You were going to hear some words that I will say in a funny way. When you hear this sound, you say the word the right way. If I say shh-E ,

- [Steve] She.

- [Male] You would say she. E shh.

- [Steve] Eat.

- [Male] Shh, uuu.

- [Steve] Shoe?

- [Male] B, oat.

- [Steve] Boat.

- [Male] B, Aaa, ke.

- [Steve] Oh, bake.

- [Angela] Good job.

- [Male] D, og.

- [Steve] Dog.

- [Male] E, chh.

- [Steve] Nt, nt.

- [Angela] It's okay, you're fine.

- [Male] Sh, ooo.

- [Steve] Shoe.

- [Angela] Good job.

- [Male] B, oat

- [Steve] Dote.

- [Male] B, ake

- [Steve] Bait?

- [Male] D, og.

- [Steve] Dad?

- [Angela] Fantastic. So what we're seeing here, he has hearing loss, but he also has some difficulties with something called decoding. Decoding is the ability to quickly and accurately digest speech. Even though he was aware sound was happening, his brain

was having a really hard time using what we think with Erber's model, not just going from awareness, discrimination between discrimination and identification piece. So that, in my eyes, is true auditory processing disorder. When a person is really struggling to both discriminate and identify sound. Woo Hoo! We get to talk about experiencing therapy. What is the therapy that we do that makes such fundamental changes to the auditory system? Well, let me show you. So there are four pillars of the auditory training system with the Buffalo model. Jack Katz created this. It has the phonemic training program, speech sound training, words and noise training, which helps people in background noise and also with some short term auditory memory, which is the second one, and then also phonemic synthesis. That same kind of exercise you just heard in the test, but from a therapeutic side. Once again, a whole bunch of words thrown at you, let me help you experience it so you know what the heck I'm talking about. Once again, let's talk about Erber's model. This initial part that I'm talking to you about is discrimination and identification. We want to increase a person's ability to decode what they hear quickly and accurately.

- For this next part, I'm actually going to need to have my face come up on the screen. Here I am. Hi, just saying hello. I'm going to give you a live demonstration of what the phony phonemic training program looks like. I need you to grab four pieces of paper near you. So grab four note cards. You may need to pause me for a moment, that's okay, I'm not gonna go away, I promise. Okay, now that you've got your four pieces of paper and a pen, I'm going to have you listen to a sound. Listen to this one. Deh, deh, deh. We hear words, this sound in words like dog and dig and card and my daughter's favorite, dinosaur. So what I'd like you to do is I'd like you to write the letter, this is the grapheme D that represents the phoneme Deh. Write that on the piece of paper and put it right in front of you. Now I'm going to use this visual filter that's not an auditory filter, it's got nice speaker material here, and every time I say deh, I want you to take your finger and tap that card. Please point to deh, deh, deh. All right, it's going to get more complicated than this. Every now and then I'm going to say a sound that's not in front of you and at that point, I want you to point up. If I'm doing it over Tele-health, I'll

have the person point up in the air, but if I'm sitting with the person, I'll have them tap way to one side of the card or way to the other. Just do not tap that card. Let me know that it's something else. So if I would say Sha bah lah bah lah bah lah, tap to the side. Deh, deh, deh, chh. Deh, fantastic. Now we're going to take this one and we're going to put it over to the side. The next sound is this one and my vowel sound has changed slightly because Kiwi dialect has, is a little bit different than the US one. So bear with me if this is slightly different than, from your sound, eh, eh, eh, like end, extra, endometriosis, excalibur, all right? This is called the short E. Now we know it's the short E because it has this little smile above it and kids are shorter than adults and they smile more often, right? So put this short E in front of you, this one's in Ed, Edgar, the elephant. So if I say eh, tap that card. Please point to eh, eh, eh, vvv, eh, good. Now let's go ahead and bring the deh back in. We're going to put those two next to each other. Please point to deh, eh, deh, zzz, eh. Good! Now let's put those over the side. The next sound is mm, like mum, Michigan, Miley Cyrus, munchkin, Sir Mix a Lot, mm. Write that on a card and put it in front of you. If it's an adult that I'm working with, I do this exact same therapy. Swear to God. Sometimes I like to throw in, you know, an expletive just for fun.

Listen to this one. Mm, please point to mm. Where is mm? Can you find mm? Wonderful. If I'm working with an adult that has hearing loss, I don't use carrier phrases because that's too much for them to try to decode. Let's bring the D, the short E, and the M back in. Please point to deh, mm, eh, eh, mm, ff. Good job. Oh, and Jack says, "Always end back on one of the phonemes here "to keep it ringing through their system." Deh, good. All right, the last sound is this one. This one is, lel, lel, lel. Now I thought this sound would sound like le, but we don't eat le-all-lee-pops. We eat lol-ee-pops, lel. This was actually, I'm Angela Loucks Alexander, and the L sound is actually really hard for me. I may have had some middle ear fluid that we didn't know about when I was little, but the L sound is actually like my hardest sound to say. So if it sounds a little bit dirty, Jack hates my L sound, I'll be honest with you. Anyway, so when I say, lel, you take your finger and tap that card. Please point to lel. Where is lel?

How about, lel? Good, wonderful. Lemon likes Listerine. All right, anyway, let's take all four of those and put them in front of you, in front of us. Woo Hoo! Got all four sounds, I've got them sitting right here. Woo Hoo! Please point to deh, mm, eh, lel, lel, ttt. I can't trick you! You're too smart. Where's mm? You got it! Wow, you're so good. The next thing that we do is something called, we take that, that's the beginning of phonemic training, we add four sounds a week unless the client is really struggling with things and then we just do three sounds a week, and then we slowly build. And you notice that there's a lot of difference between the sounds that I just presented right now. Next week, I would start by re-introducing these, and then I would add four more and the four I might add are beh, ah, enn, ff, or phh, ih, sss, el, pistle. So, and you also have to watch out to make sure that you never combine cards that make a bad word. For the young children, the parents are not impressed. So that's the phonemic training program we build and build and build. While each person with an auditory processing disorder has different things that they have issues with, we only have so many speech sounds in our lexicon. Why not start there and build good building blocks? The next thing that we do is something called itch cards. Not only do we have the speech sounds, we want to put it back into context and make it less boring so that we can continue on this phonemic training task to help with decoding.

So I'm going to say a sound deh and I want you to read my mind and think of what word I'm I'm using. So for this one, this is a word for something you have after dinner, and it starts with deh. Did you say dessert? Can you believe I just heard you through the screen? I didn't, that's a lie, but what I'd like you to do is I would like to take the card that has deh on it and write dessert on the back and then underline that D, deh. When I say deh, you tap the card, and you say dessert. Deh, deh, now are you saying that tea really clearly, dessert? I hope you are. Here we go. Please point to deh and the same thing that happens. If I say a sound that's not in front of you, you point to one side or the other. Where is shh? Good job. I'm going to assume you did a good job. Is that a good assumption? We'll find out. The next sound is eh, eh, and this is a large animal that lives in Africa. Did you say elephant? Wonderful. And do you remember if

that's the long E or the short E? Did you say short because you can tell the smile?
That's amazing! That's exactly right. That is the short E sound. So if I say eh, you tap that and say elephant. Eh, eh, je, eh. Fantastic. All right, let's put the elephant sized dessert, Let's put deh and the eh next to each other. Please point to deh, eh, eh, deh. I hope that you read my mind and were saying the words out loud. The next one is mm, mm. Let's say that it's starting to rain and you're standing in a big pile of dirt. What's that going to turn into? Did you say mud? 'Cause you're totally right. It's definitely mud. Please point to, or write the word mud on the back of your M card. Mm, mm. Fantastic. Desert elephant, mud. We keep going. We layer there. Then we add lel, lost, and we finish that out with deh, eh, mm, lel, eh, deh, you get the point. Anyway, so we keep layering so that we can build up a person's identification, discrimination and identification of speech sounds. How young can we do this work with? I mean, some people think that you can't diagnose a kid until they're seven years of age. At our clinic? We work with kids as young as three and a half. We'll do assessments with children who are as young as three and a half, but we can even do therapy earlier. Check out my daughter.

- Izzy! We have a new game. Are you super excited? Check this. Let's see. What do we have? Oh, whoa, whoa. Look at all these sounds. Whoa, do you know any of these sounds?

- Y!

- [Angela] She's one year and 10 months. Yee, yee. Cool. What else do you know?

- O!

- [Angela] Before making this a speech and noise test, she is one year and 10 months at the time of this video. Oh, cool. A! Awesome! What about this guy?

- I!

- [Angela] It's R, err, err. Well, what's, what's that one?

- A!

- [Angela] A! How 'bout this one?

- Q!

- [Angela] Q, that's right! What about this one?

- E!

- [Angela] E! What about this one? B, beh, beh, beh. How about this one?

- Sss. Snake!

- [Angela] That's right! Snake! That's right, snakes start with sss. What about enn?

- Smeagol.

- [Angela] Smeagol starts with S too, that's right. This?

- T.

- [Angela] T and it says teh, teh, teh. Good! How about F? Feh, feh, fish, flip, French. What's this one, lzz? So we should never wait in order to improve a child's life. The next thing, so we start with phonemic training, the next thing we do is words in noise training. So normally it's 80 words, but we're going to rush right through this. So we

start with no noise. Then we add noise at a 12 DB signal to noise ratio and then at the very end, we're at a zero DB signal to noise ratio. It increases every 10, the noise increases every 10 units, every 10 words. So what I'd like you to do on your side is just listen and repeat the words back that you hear Jack say and do as well as you can. Don't be afraid to guess. Try to say it back as soon as you hear it too, really quick.

- [Jack] Paste. Yard. Hurt. Smell. Job. Sleeve. Thanks. Ground. Oh. Horse. Blue. Print. Men. Ask. Falls. Sun. Okay, so obviously the louder or the further on you got the harder it probably was and maybe the less accurate you were. Usually when we start on these lists of 80 words, a client who's just beginning therapy might miss between 25 and like 32 errors and our goal is to get eight or fewer each time. It's 600 randomized words that set, that are separated into about seven word lists. So anyway, it's really fun to watch those errors decrease and to start seeing them get words that they hadn't gotten previously. Anyway, the next thing that I want to show you is short term auditory memory training. Now, normally I would need another participant for this, but basically there are a couple different things that we do is short term auditory memory. Our goal is to increase a person's auditory memory by at least one unit. So if we see that a person is actually only getting three words on the SSW test, but they can only remember three numbers, the issue may not be a binaural integration problem, it may be that they have a short term auditory memory difficulty. So if we can increase their memory unit from three to four, oh my goodness, that could improve quite a lot of things for them.

So we'll use different things. If a person is an adult, I may just use lists of numbers and teach them some chunking strategies. If the person is younger, I may hold a ball, say a few numbers and then roll the ball to them. They have to wait until the ball gets to them and sometimes I wrote roll it really painfully slowly, before they can respond with what the number was. So for me, APD is, can a person quickly and accurately get things, their reaction time, how fast are they? And then how long can they hold onto it afterward? The phonemic training that I showed you was that quick part and then this

part is, how long can you retain it? So we want to increase by one unit numbers, words, and sentences. One thing I love to do is memory interference training. That doesn't work very well without another participant, but basically a person will say a number. Actually, I'm going to make you my, my participant over here, just the person in general, listening to this, you're going to try this, give this a crack. I'm going to tell you a number. Just remember that number. It's just going to be one digit. Then I'm going to tell you a second number and I want you to tell me the first number I told you. I'm going to tell you a second number, or I'll tell you a third number, I want you to tell me the second one I did. I'll tell you a fourth one. I want you to tell me the third one I said. Here we go. Let's try this out. I'll say the first number. Don't say anything back. Five. Two. Did you say five? 'Cause you're right. Nine, three, four. Did you say three? And the last number I said was four. Did you find that tricky? Let's try it one more time. I'm going to say a number. You don't say anything back. Five. Two. Nine. Three. Four and the last number I said was? I hope that wasn't absolutely in shambles for you because it potentially could have been but that's okay, it's the first time I've done it like that. It's really good to decide to do things on a whim. The last thing that we're going to do is the phonemic synthesis and this is a sound blending task. This is lesson four. There are 15 lessons of this. See how you do. Here we go.

- [Male] Phonemic synthesis, lesson four.

- [Male] In this game, you've been hearing me say some sounds that you've put together to make words. Let's see if you remember them. Don't say the word until you hear the . Shh-E . Ehh-gih . T-ouu . S-ah-k . Ee-t . How about these? The first one is a boy's name that you've not had before. Ready? Jih-Oh . Was that Bill? Mary? Robert? Was it Joe? Yes, that's right. It was Joe. Let's try this one. Mm-eye-k . What name is that? It's one of these: George, Walter, Mike or Scott. Here it is again. Ready? Mm-eye-K . You did nicely on those names. So let's try something else. What is this? K-Ow . Listen. K-ow . Good. It's cow. Listen again. K-ow. Now this one is a little different. K-

ow-ch. What is it? Listen, carefully. K-ow-ch . Is the word cow or couch? Listen. K-ow-ch .

- [Angela] So in 2008, I started an online searchable map for APD professionals so people could find the professional nearest to them and there were only 250 people on that map, 250 audiologists and speech language therapists who consider themselves specialists in APD. I did an update of that map in 2018, and there were still 250. Some had quit. Some had retired and some had added it to their practice, but we stayed stagnant. In 2020, we have increased the map number to 334 and I'm about to do another map update, which is going to have another jump. My personal goal is to double this map in five years time, actually three years time, but I'm just going to be nice to myself and five, say five, but this is the crazy thing, based on the last ASHA survey that inquired, how many audiologists test for APD? 1.4%. If the conservative estimate of 5% of the population have APD, how many English speakers in the world would have auditory processing problems, approximately? 300 million. Now the whole idea that APD may be over identified means that the 334 of us doing this work must be working our buttocks off, right? To get 300 million, woo! If we're going over 300 million, that is one busy week. So do you think you want to join the team? I love auditory processing work. I have now made the decision never to be a dispensing audiologist again. This is 100% what I'm doing. So thank you so much for listening to this presentation. Please do not hesitate to reach out to me with any other questions and I will go to the live question and answer period now. Thanks for listening.

- [Christy] Thank you so much, Dr. Alexander. We're going to go open up the floor for Q&A now. We do have several questions coming in. This first one here is from Kaitlin. Dr. Alexander, Caitlyn asks, "Does it matter which hand they point with, "like does handedness play a role?" I'm thinking this was in relation to something earlier on in your presentation.

- [Angela] Yeah. Yeah, I think that's what the phonemic training program. So, okay, so if, handedness does matter on testing, but if you're talking about the actual physical interaction of the client and the therapist, when we're doing the auditory training, you will, Jack Katz believes that there is something to the audio visual integration piece that's happening during that task and he feels like that adds a bit of richness. Here's the deal though. It's just important that the child uses one hand. You will see kids who are going to try to do this, like a type, a typewriter or something, where they're going to double tap with two different hands and that is an absolute, that's a disaster waiting to happen. So for this task, as long as the child is using the hand they feel most comfortable with, the finger they feel most comfortable pointing with, that's fine.

- [Christy] Thank you, Dr. Alexander. Julie asks, "There are several APD tests out there. "How do you know which ones to use "or how many tests you should perform during an assessment?"

- [Angela] That is an excellent question. There are obviously a lot of different camps when it comes to APD. I am firmly in a camp where I believe that we should not over test these children and I mean that we're not doing more than one or two hours of testing in total because then we're testing exhaustion as opposed to their auditory processing abilities. So for me, I do not want to add a test unless it adds something to the picture that helps me understand the child more. When I moved to New Zealand, I switched and I used a model that's a little bit more commonly used and after doing the testing, the parents would look at me and say, what does that tell you? How does that relate to what we said? And I had a really hard time relating what I was seeing on the testing to what they had actually said to me. So I feel like this is highly relevant, what you find with the Buffalo model. So I believe there was a study done maybe by Janine Ferry that said that, that you need to do two to three most ideally, but of course there's a lot of, there's a lot of difference in what you think, which tests you think should be done, because I was just talking to a colleague, Honey, I believe she's in on this presentation, and she said that she believes that there's a difference between testing

for function and then ADL like that activities of daily life and I would say that this is more, the Buffalo model uses testing that is looking at, looking at the auditory processing in a really sensitive way. If a person comes to me with a problem, I need to quantify that problem. I need to get baseline data and then I need to find a very clear way to make that issue dissipate so I hope that answers your question. Oh no, it's audio cutting out. That's too bad. I'm so sorry. Let's see here.

- [Christy] Thank you, Dr. Alexander.

- [Angela] You've lost my audio. That's unfortunate. Yup, hold on. Can you hear me now?

- [Christy] Yes, we can.

- [Angela] All right, fantastic.

- [Christy] We have a question.

- [Angela] All right so, wonderful.

- [Christy] Why are there so few APD specialists, does it not get reimbursed?

- [Angela] The reimbursement rates can vary really drastically. When I was living in the US, insurance wasn't as big of a deal as it has been. Over the last nine years I've been in New Zealand and prior to that point, I was just doing private pay work in the US but insurance is dictating quite a lot of what is happening in the US at this, at this stage. I think that auditory processing is a little bit of a gray area and I think, I feel really comfortable in gray because I can see potential improvement and I think many audiologists feel most comfortable when things are really dichotomous, really black and white. So, but I hope to see this improve because I think it's the most interesting

and enjoyable part of AP or audiology, and for me, I find it burnout free. Okay, all right, so the next one, I believe Julie also asked, "With developmental disabilities, "do we use chronological or developmental age?"

- [Angela] This is also divided into two different camps. Some people would definitely say developmental age. As a parent, I want to know where my child compares to peers that are the same age. So I usually go chronological age because we're, these kids will be in classrooms with their same age, if they are not in the, in classrooms with the same age, then maybe we would look at a developmental age. The next question I see is, are there APD evaluations developed for other languages? Yes, there are. There are the SSW test in particular, I believe is in Farsi, potentially Spanish. I do know it's sometimes difficult to get Spondees in other languages. So yes, there are definitely APD evaluation or tests in other languages. The next question is, I've often heard of dichotic testing being used with APD diagnosis. You did not mention it. Fair enough, Evelyn. The SSW test is actually a dichotic test. Next one. How do you work with children with attention deficit disorder? Well, I often find that attention deficit can be easier to work with, or I'm sorry, auditory processing disorder is likely going to be easier to address compared to ADHD. If I was a parent who had a child who had attention deficit and auditory processing issues, I would certainly want to have the APD issues remediated just so that we can really clearly see what the problems are with executive function and see if we can help their child just perform better in their daily lives.

Next one. Do you think that the reason there are not many APD specialists is largely due to reimbursement? Yes, that's true. Sorry, is being solely an APD audiologist sustainable, particularly if offering the auditory training? I, how long did I run my practice? I ran solely an APD practice twice, due to restraint of trade kind of issues, and I did find as a sole practitioner that I had a very sustainable livelihood and also my costs, my overhead were so low, it was really surprising to me when I started a dispensing practice to see how, how much higher all of the costs of sales were. I

apologize for my audio too. All right, do I ever incorporate other tests or therapy outside of the Buffalo model? That is an excellent question. I do sometimes add tests. I'm going to be adding probably the LiSN-S but not in the diagnosis portion, but maybe as the first session of therapy, because I would really like to gather information on what is happening with spatial abilities. So do I often add a lot of extra tests? No, I do enjoy using Acoustic Pioneer before and after therapy because it gives me a really nice objective measure through the iPad. It's bright and fun and also, while, while the child is doing Acoustic Pioneer, I'm observing them and I use it sometimes just to buy myself a little bit of time to figure out how I'm going to proceed next. As far as therapy is outside the Buffalo model, there's great therapy that deals with, with auditory processing issues that are a little bit higher up, closer to that comprehension end, so I might add something like Hearbuilder, or actually Acoustic Pioneers' therapies are a little bit more on the basic side, not as much language based, but anyway, so yeah, I definitely dabble in the other fun things that audiology has to offer. Where do you obtain instructions for the training program and how often is training and how long are the sessions? Excellent question. You can get information. Jack Katz actually has a book, a manual, on how to do the therapy and that's available through the Educational Audiology Association.

Unfortunately, I believe some people there are furloughed, so that book is on back order and, of course, I teach a course on that. The training sessions, we generally do 12 to 14 sessions at about one hour a week for 12 to 14 weeks. The typical length of treatment to reach success criteria with adults is generally around one round of therapy, which is that 12 to 14 sessions. I will be honest with you, there are not a lot of adults that I have worked with in the clinic that will come for 12 to 14 sessions. Their lives get in the way. Plus, APD is their normal. They're not, they just cannot even believe that this could potentially change. My online program sometimes works a little bit better with getting adults to completely finish it. But yes, we do want to see a significant reduction in their HHIA score. Fantastic. Have you ever worked with clients with fetal alcohol syndrome and do you find that they have APD issues? Jack Katz said

something really brilliant last week, he said in any population, you're going to see a high percentage of people having auditory processing issues. For example, people with long noses. I thought that was really funny. But, yes, if a child has something that's gonna make them neuro atypical, we are going to see a higher percentage of difficulties. So I have worked with a number of children who have fetal alcohol syndrome. Most of them with a diagnosis are, of course, adopted because you know, who would want to have their child diagnosed with that? I get that. So we can still make these changes because neurons that fire together wire together, and we can definitely change the brain using neuroplasticity. Have I ever worked with autism? Yes, a lot and it's great. I ran into a mother last week and I had worked with her son about five years ago because he was having a hard time understanding. He's high functioning and she told me they had just gone in for some dyslexia testing and we had already done a round of therapy and she said that his auditory comprehension was at the 96th percentile. So I'm really excited that he's continued to blossom since we worked together. Yes, we definitely work with autism as well. Fantastic, thank you so much. I've really enjoyed talking with all of you today. Thank you for sticking around and don't hesitate to reach out to me if you have any other questions.