Improving Visual and Auditory Processing in Preschoolers with ASD, presented in Partnership with Thieme Publishers

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- [Amy] Hello, everybody, and welcome to this SpeechPathology.com e-learning seminar, Improving Visual and Auditory Processing in Preschoolers with Autism Spectrum Disorders. This is part four in a four-part series on incorporating movement to comprehensively treat preschoolers with autism spectrum disorders. And this series is presented in partnership with Thieme Publishers. Our presenter today, and for all four parts of this series, is Kelly Vess, MA, CCC-SLP. Kelly has over 16 years of experience specializing in preschool-age intervention. She researches and develops evidence-based assessment and treatment practices that focus on optimizing therapeutic gains within realistic caseload and time demands. Kelly is also a clinical instructor for Wayne State and Eastern Michigan Universities. In collaboration with Wayne State University's SLP program, she develops and directs evidence-based intervention programs for diverse populations of preschoolers. And Kelly is also the author of "Speech Sound Disorders: "Comprehensive Evaluation and Treatment" from Thieme Publishers. So welcome, Kelly. I'm gonna hand over the mic to you to continue on with part four.

- Thank you so much, Amy. I'm so happy to be here. I am a full-time speech-language pathologist at Barnes Early Childhood Center. And I am the author of the forthcoming book "Speech Sound Disorders: "Comprehensive Evaluation and Treatment" for Thieme Publishers, in which I receive royalties for book sales. This book is expected to be released in April 2020. I also received an honorarium for this presentation. Autism is a multifaceted disorder, and it requires a multifaceted approach. There was a team of people who contributed across disciplines to this presentation. I did not do this alone. Those include occupational therapists Joe Evens and Dianne Stall, physical therapist Jordan Kondrat, early childhood researcher Julia Smith, early childhood preschool teacher Dorothy Heitjan, certified music therapist Heather Dean, behavioral specialist, and my mentor, Susan Lucchese, social worker and friend Edward Trainor, and the wonderful Wayne State University clinical director, Karen O'Leary, who has made all of

this possible. The movement activities were developed by Wayne State University speech-language pathology graduate students Katelyn Adams, Holly Flynn, and Torey McNally alongside myself. Katelyn, Holly, and Torey are presented in the webinar videos in this series. So before we move forward, let's take a step back and get an idea of where we are in space. I wanna talk about how it is that we're targeting the cerebellum. If we look at these four circles in front of you, the green, yellow, blue, and red, we're looking at areas that children with autism spectrum disorder tend to display deficit. These areas are largely controlled by the cerebellum. For this, in targeting the cerebellum, we wanna create challenge. Because challenge creates change in the brain.

So when the child is challenged to do something the child cannot currently do, neuronal connections are made. So how does that happen? Well, the brain is kind of like a helicopter parent. It monitors the child at all times, 24/7. And when the child engages in a new, more complex behavior that they've never done before, the brain creates neuronal connections. So by incorporating task-orientated, challenging, and engaging activities, and letting the child independently and creatively struggle, we are basically rewiring the brain. So that is the idea of how we're treating the cerebellum by incorporating task-orientated, meaningful movement activities. So let's move forward into our last webinar series. I'm kind of sad about that. This is such an amazing topic. But it's Strengthening Visual Motor and Auditory Processing Skills. So the series goals: one, participants will be able to identify evidence-based practices that comprehensively treat preschoolers with ASD by addressing motor skill development within therapy sessions. Two, participants will be able to name task-orientated movement activities to improve motor skills, joint attention, and executive function skills within therapy sessions. After this course, participants will be able to identify visual processing challenges and describe intervention strategies to improve visual processing skills, identify auditory processing challenges and describe intervention strategies that improve auditory processing skills, and lastly, describe responsive,

evidence-based strategies that improve auditory processing and language comprehension in preschoolers with ASD. So let's move to the first part of our last webinar, Improving Visual Processing in Preschoolers with ASD, a research review. Children with ASD are more likely to present with an increased visual perception capacity in comparison to neurotypical peers. This can result in sensory overload. We've all experienced this before, increased visual perception on sunny days when we're driving home. For a moment, you are blinded, because you've received too much visual stimuli, like these children have. So this can result in sensory overload, and it often does. On a sunny day, car accidents are up by an average of 16%. Difficulty with visual orientation of your body in space would also negatively impact proprioception. So we've all been in our car before in a parking lot, and there's a car next to us in the parking lot, and when that car next to us pulls back, for a moment, we don't know if we're moving or if it's the car next to us. Visual fixation on objects and action, the child could watch the wheel spinning 'round and 'round and 'round, and when the name is called, "Look, Stevie," the child could not shift the visual attention to the parent because of visual fixation difficulties.

Children with ASD are also more likely to present with improved language learning with visual input initially, but they benefit from visual and verbal input over time. So we always wanna pair the visual with the verbal. An example of that is if you forget someone's name. First you think about, what does that person look like? What does this person do? And then you say their name sounds like it's just one syllable. Is it Jeff, is it George? Is it Joe, is it Jack? We use the auditory and the visual realm for our memory. Reduced visual attention to a speaker's eyes and facial expression and increased attention to the mouth. So what we're talking about here, when I teach graduate students to work with preschoolers with ASD, even though the child is right in front of their face, I want them to pretend that that child is in a theater and is in the back row in the balcony seats. So we really have to exaggerate our vocal inflection and our facial expression so these children can perceive it. Next, stronger visual processing

skills than auditory processing skills. So you and I, we use our auditory and our visual skills at the same time to understand speech. So we're looking at someone's mouth, and you're hearing the signals at the same time to perceive speech. It's known as the McGurk effect. It's simultaneous. If you're a child with autism spectrum disorder, the research indicates it's more like a poorly dubbed foreign film. So you have the visual, the video is moving at fast-forward, and the auditory is moving in slow motion. Now, think about that. Because we create the maze. We can show speech if we go slower visually and slower auditorily. And they can too benefit from the McGurk effect. 'Cause we can slow, as I'm gonna show you later, the signal and match it to the auditory. So I'm just gonna give an example of each of these concepts that are related to visual processing.

Form consistency, these are the children that, on the iPad, they're 100% with letter and number identification, but on paper, it's 0%, and in the magnetic, three-dimensional form, it's 0%. Now we're going to get into the next ideas. I'm going to move it. Pretend that you have all of these winter clothing. You're getting ready to go outside. So you have a hat. You have a coat, you have gloves, you have snow pants, and you have boots. So you have this big pile of navy blue, and the child needs to get ready to go outside.

Visual closure, if the child only sees part of the boot, perhaps the child doesn't see a boot. The child might have to see the entire boot to know that it's a boot. Visual discrimination, the child might have one glove but not be able to match it with another. Visual figure-ground, the child might just see a sea of navy blue. And there's a blue hat on top. You're saying, "Pick up the hat. "Let's put the hat on first," but the child cannot discriminate because of the visual figure-ground. Visual agnosia, there's some children I've worked with in the past, and I wonder if they recognize my face, even though I worked with them three years, four days a week, and I have so much fun in therapy with them. And when I come down to see them to start therapy, they look at me as if

they're seeing me for the very first time. That could be visual agnosia. Visual fixation we discussed already. Visual memory, if I build a train with blocks, and then I crash that train, can the child build a train with blocks as well? Visual motor integration, suppose you're building a tower. You're using your fine motor, you're using your gross motor, and you're using your visual spacial skills simultaneously to build. Visual scanning, what is your ability to look left to right and up and down? The children that are poor at this do really badly at our obstacle courses we create, where they have the children go to the left, go to the right, make a U-turn, go diagonally. These are the children that are falling off of the obstacle courses.

Visual sequential memory, can the child write their name? If the child's name's Tyler, can the child write T-Y-L-E-R? Visual spatial orientation, we've talked about these children before. They're bumping into people. They're bumping into things. In a fine motor perspective, these are the children that have difficulty putting a peg in a hole or putting a coin in a bank. Visual tracking, these are the children, when you're playing catch with them, it looks more like dodge ball. So you throw the ball to them. They're not visually tracking the ball coming to them, and it just bounces off their chest.

A good starting point in ball skills is to use a balloon instead so it'll slow the throw for these children. Topographic orientation, many of our children we work with have never learned to walk. They are being walked from point A to point B to point C and so forth. It's very important that we get our hands off of these children and stop holding their hands when they walk. Because when you're holding their hands, you're doing the motor planning, programming, initiation, execution, and cessation, and reprogramming. Okay, within the context of educationally rich, task-orientated activities, some things we could do to improve visual processing skills is organize toys by category. So this is where people go. These are where animals go. These are what vehicles go. Make a focus window with a hole in the paper so a child can attend on the contents inside of the window. So here is an example of a focus window. We can also place Post-its on

pictures so the child could focus on the picture that we are focusing on, especially during testing. Now, providing multimodal, verbal, tactile, and gestural cues concurrently helps with the visual input. An example, I teach everything multimodally to all of the preschoolers that I work with. An example is follow every direction. This is how we do it. So if the child needs to self-correct, I can just say ut-ut-ut, and the child self-corrects. Set the child up for errorless success through a multimodal, most-to-leasting prompting hierarchy of cuing to ensure an 80% accuracy level. There's no reason why any child on your caseload should not have a minimal 80% accuracy level.

You create the maze. You create the challenge. You decide how much prompting this child is going to have. No child should be successful less than 80% of the time. There's no reason for it. You create the maze. So I'm going to give you an example of the most effective graduate student that I've ever worked with. So I've researched perhaps over 30 graduate students in speech sound disorder intervention. And the one that was by far, two times better on average with her eight clients than any other graduate student would have to be a person that really, truly adhered to the 80% accuracy level at all times. She was meticulous about her data, and she never, ever let any of her children go below 80%.

After five 45-minute sessions, her students averaged two years gains in speech articulation. Okay, and these are some environmental modifications. I'm sure you're probably already doing these, and I just included them for your reference. The first video we're going to look at is world traveler Liam, who has to save the flags. Now, what I want you to pay attention to with Liam is that Liam has a very short attention span. Liam's attention span is three to five seconds on average. So I need more attention for learning to occur. So my goal is, for him, he normally speaks in one- to two-word utterances unintelligibly, and he's three years old with ASD in this clip. My goal is to increase the duration of the attention. So what I have him doing is requesting,

with a paragraph, access into this activity. Now, I don't care how clearly he's speaking. I don't care if he's motor-imitating. I just care about increasing the duration of his attention. So let's see this. Also, look at his postural control. It's very poor, poor postural alignment. You're gonna see postural sway. And you're gonna see his hands either on his lap or on the chair to keep his posture erect. This is how the movement disorder impacts communication. We care about the core. The child's not able to engage in motor imitation. And when he does try, you're gonna see sway all over the place. Oops. Oh, here we go, let's play this video. I'm going to be talking over it. So he has the flag of India. Now, India is the closest flag. He has a photo, and he has a fabric, so you're seeing form consistency. This is nice visual-motor integration. He's squatting and putting the flag in a test tube.

- You have another one.

- And he's going to go back to his chair. I want you to notice in this clip that when he sits down, he checks out the joint attention.

- Are you ready to take Canada back?

- When he's moving, the joint attention is very, very high. So when the body checks out, the mind checks out as well. They're interrelated, they're interconnected.

- It out, please. Where are your hands at, please.

- Now, notice he's holding himself up, so he can't do the motor imitation. His hands are on his lap.

- Can you--

- And he's swaying.

- Raise it at me?

- And then he's kind of under-aroused.

- Lastly--

- So you're gonna see some yawning, turning his head side to side.

- Can you She's doing an amazing job being persistent and keeping his eyes on the prize, and keeping his attention, 'cause we wanna increase the duration of his attention.

- Please. There they are, yeah. Because And what you're going to notice, with each flag that he finds, he improves.

- Are you ready to take Canada?

- Let's find Canada. Canada's on the left of the screen, and it's in a very distracting visual foreground of the bookcase with lots of books on it. It's also only partially exposed. He has poor visual closure. Unless he sees the whole flag, he can't see it.

- [Therapist] Do you see it?

- She's using a proximity prompt here.

- [Therapist] Bahamas, that's not our flag.

- He thinks it's the Bahamas, Canada. He does poor visual discrimination.

- It's there.

- [Therapist] Do you see Canada anywhere?

- He still doesn't see it, full exposure.

- You found Canada, yay.

- Now, he has great topographic orientation. He's gonna quickly turn around and go back to the flag post there.

- Wow, traveler.

- Wonderful. And then he's gonna go to the red chair.

- How many do you have?

- You're gonna see, when he sits down--

- One, two, three, four.

- When the body checks out, the mind checks out. The joint attention is going to significantly diminish when he's seated compared to when he's moving. The mind and the body are interconnected.

- Wow, look at you following every direction. High five.

- You're gonna see some yawning, under-arousal.

- Bahamas. Bahamas.

- He's holding himself up once again, postural sway.

- You scrape it out.

- And you're gonna see at the end of this, at one point, she tries to get a high 10 out of him. And his postural sway is just going back and forth like a surfer when she does.

- [Woman] To pick up one.

- Then can you raise it at me?

- So remember, the core develops first, then gross, and then distal. We can't just go right to the distal, the pointing, and the talking and pretend that the core doesn't matter.

- Where's our bees at? Uh-oh. Please. Because I have--

- Wonderful. Angry.

- So he just said a paragraph. The goal is increase duration of attention. And there he is. Did you see the wiggle that it took to give her a high 10? Now he's looking for the Bahamas. Look at the joint attention. The body's engaged, and so is the mind.

- Does that look like that one? No.

- No.

- [Therapist] Where do you see it? You found it.

- See how he's getting better at visual discrimination?

- You can get it.

- In this kind of approach, it's through experiences that you improve. He's saying he can't get it. He's saying, "I can't, I can't get it." It's through these children's struggles that they're going to become neuronally stronger, independently and creatively. You can't do these children's pushups for them.

- [Therapist] Wow, traveler, look at you.

- And then we're going to see the next flag. He has visual memory. When he sees Australia, he's gonna immediately point to it from his memory from before.

- All right, now we have Australia.

- [Woman] Stick out your tongue.

- So once again, he's seated. The minute he sits down, the body checks out and so does the mind. The minute the body's engaged, so is the mind.

- Scrape it--

- It's snowing.

- It is snowing.

- Out, please.

- You're gonna see yawns, it's under-arousal. Remember, when children are in a state of under-arousal, they're also more likely to engage in restrictive, repetitive behaviors, which are just poison to the brain. We really don't wanna see that.

- At me. Lastly, can you--

- She's doing a wonderful job. He's turning left to right, and she's sticking with him. She's like, I'm still here.

- Please. Oh, where are your bees at?

- There's the under-arousal, being seated in therapy.

- Please. Because I have angry--

- Dog teeth.

- Dog teeth. All right, let's go find Australia. Where's Australia at?

- Look, he's doing the kangaroo hop on the floor. So he's following the kangaroos, and he's going right to it. So you saw how, with experience, there's improvement in visual, look, and this is a great fine motor technique. He throws it up and catches it. It's pretty cool. See, if she would have done it for him, she would have taken that amazing learning opportunity away from him.

- All right, let's take it back, was that our last flag?

- What we do in this intervention is we create meaningful activities that are worth the struggle, and we step back and let these children independently and creatively challenge themselves. And that's when neuronal activity is going to occur, when they're doing something they've never done before. So briefly, looking at form consistency, he compared the picture to the fabric. Visual closure, when the Canadian flag wasn't in full view, he continue see it. Visual discrimination, at first it wasn't good at all. He thought that Canada and Australia were the same, and they're quite different. But it improved through experience. Visual figure-ground, it was really difficult in the bookshelf, but it wasn't so difficult on the black chalkboard or the orange fabric. Visual memory, he remembered Australia immediately and said, "Australia's over there," the minute he saw it. Visual motor integration was excellent. He was squatting, and he was putting the flag in the test tube.

Excellent use of gross motor, fine motor, and visual spacial skills together. Visual scanning, it improved over time, looking to the left, looking to the right, and looking up and looking down. He showed excellent topographic orientation. After finding those flags, he immediately went to the flag post. So what therapist actions, what helped Liam's engagement? The mind, the challenging skill was for Liam to say an entire paragraph, a child that typically says one- to two-word utterances. Because we wanted to increase the duration of attention. The heart, she was so engaging and so excited about each of the countries that they were going to visit. And he picked it up, the enthusiasm, and was running to get those flags back into the posts with the important work he had to do. The body, task-orientated, challenging skill, at first he couldn't do visual discrimination. But by the third time, he got it. Now we're moving into Improving Auditory Processing in Preschoolers with Autism Spectrum Disorder, the second part. Children with ASD are more likely to present with an increased auditory perception capacity in comparison to neurotypical peers. This results in sensory overload. So

we've all experienced sensory overload as well. If you're in a really busy restaurant, and you're hearing classical music over the loudspeaker, and you're hearing dishes clanging, you have conversations going around you. There's the bus boy. There's the waiters and waitresses, people yelling orders. And the person across from you, two feet across from you, you can't hear a word that they're saying. That's what it's like. You take in too much information, and it cancels everything out. You're not able to perceive anything.

Auditory hypersensitivity, this is the most common sensory difficulty for children with ASD. And it's estimated up to 90% of children with ASD present with this. This is where the vacuum cleaner and the blender hurt their ears. And if they do have greater auditory processing difficulties, they're more likely to have another sensory issue as well. Children with ASD are also more likely to present with the RRBs and producing loud sounds and hitting others and covering their ears in louder preschool classrooms. They make greater use of the visual cortex in response to processing auditory stimuli than their neurotypical peers.

So we wanna take advantage of that and teach communication skills visually. Now, lastly, they're more likely to atypically process sounds, which is related to social, cognitive, and communicative impairments. I wanna share a story with you, because this is my favorite research project that I've ever done, and I haven't presented it yet. I can't wait to present it. But I was at the elevator with a preschooler with ASD. And he said, "Elelator, leaze." And he was a three-year-old. And he had these perfect Ls and perfect Rs and perfect Zs, and he was just learning to talk. And I was like, where is P and T? Why are you breaking the universals of speech sound development, in which the stop consonants always develop first of consonants? Who are you to break these rules that are universals in speech development? And why are you breaking these rules? So then I thought, I have to research this. This is way too cool. So this is called my snake in the grass study. What I did is I looked at how children produce the word

snake that had speech sound disorders, preschoolers. And I matched the groups. So I had about 13 preschoolers with ASD. I had 13 preschoolers with speech and language impairment. And I had 13 preschoolers with speech-only impairment. I wanted to see, how do they produce snake? I found that the preschoolers with speech impairment, displaying ASD, I'm sorry, with ASD, they produced the S, and they deleted the N. So they're producing a much more difficult sound instead of a simple sound that is a part of a core vocabulary, the word no, in the language. They're producing a sound that develops at least a year later than the N.

So the children with the speech and language impairments, the other two groups, they would say, they would delete the S. 'Cause the N's the simpler sound. And I even had statistical significance with this small of a group size of 13, in which I found that they're more likely to produce the S instead of the N, where the other group is more likely to produce the N instead of the S. And then I started seeing this in many of the children I worked with. They had difficulties when they started learning to talk with the stop consonants, the oral and naso stop consonants. So what are the ramifications of that? The ramifications are huge. Because we call our parents mama, dada. These are stop consonants. It's cross-linguistic.

Children refer to their parents using stop consonants. Think about that. If you don't perceive it, and I'm saying, these stop consonants, I think, my theory is, they're not perceiving it, 'cause they're the shortest consonants in the language. They're very short in duration, 30 to 50 milliseconds. You can't produce it, where the sounds they are producing, S, L, and R, are three to five times longer in duration. So that, they can perceive. So this, they can produce. So if you have difficulty producing stop consonants, the ramifications are huge. In addition to that, what do speech-language pathologists usually do? They see this child with ASD, and they're like, "I'm going to teach you to talk. "And I'm gonna ball, bubbles, in, out, "my turn, bye-bye, go." It's all stop, stop, stop, stop, stops. We have to consider that these children have auditory

processing difficulties. So we need to stop doing therapy in autopilot. And we need to pay attention to these neurological differences and change what we're doing in response. So auditory processing difficulties may manifest and behaviorally, socially, and delayed speech development, language development, literacy development, and misinterpreting environmental sounds. So the ambulance that's a mile away might sound like a fire alarm to a child on the spectrum with auditory processing issues. So when we're looking at auditory signals, auditory processing, these are some concepts we can pay attention to. I'm just gonna give an example. Auditory attention, the ability to shift attention, when someone says, "Look, Stevie," can the child shift and pay attention to that signal?

Auditory discrimination, so an example of this is, I asked the other child in the video, I'm like, "Oh, there's a call," and the child said, "Moo, moo." He heard cow. Auditory sequential processing, how do you spell your name? And the child's name's Tyler. And he's saying Y-L-T. Auditory tonal processing, do they hear the inflection in my voice? When I was saying, "You want a ball?" is a question. "You want a ball," is a statement. Auditory memory, is the child able to store and recall auditory information? So I work right after our occupational therapist, and she'll be working on a circle with a child. And she says, "Around and stop." And maybe I'm doing an activity where the child's finding the number five.

Okay, circle the number five. And the child will say, "Around and stop," because of the auditory memory. Auditory figure-ground processing, oh, a good example of this is our literacy groups. If one child in the group cries, it's a domino effect. None of the children can perceive language whatsoever because of that background noise. Auditory sensitivity, we've talked about that before. And the hyposensitivity, what I do, they seek more input. So to teach them to talk, I get really close into their faces. Like, I'm talking like two inches close into their faces. They love it, by the way. And it's like I'm an air traffic control. I'm like, my movements are so huge, I'm like, I'm gonna break this static.

You're gonna perceive this speech. And they like the vibration. So when I'm talking with them in unison, I would be like, "La." And they're saying that with me. But they're seeking that input. They need that input in order to auditory process. So I've been very effective taking advantage of that hyposensitive nature and saying, oh, okay, you want all in. You want me in your face. You want me going slow. You want it vibrating. You wanna feel it, that speech. Language processing, okay, they may, how many times have you asked the children, "How are you?" and the child said, "Five." They thought you said, "How old are you?" Auditory temporal processing, so this is a very important concept. We've talked about this before. We need to realize they have a slower rate of auditory processing.

So if we want to give them the effect of, hey, I can pair the visual with the auditory, let's slow the visual and slow the auditory so they can perceive it. And they too can benefit from the McGurk effect. We just wanna make the McGurk effect happen. So phonemic synthesis is what they refer to as blending in our field. And I like to teach blending like this. Let me show you. I like to have the child take genie arms, and they make genie arms with me. And I will say, "Okay, say the word with me, "/c/, /a/, /t/. "Did I say cat, or did I say car?" I teach every concept multimodally. And it does make a difference. I've researched it.

The multimodal gets better results, incorporating movement. Okay, within the context of educationally rich, task-orientated intervention, we can attain the child's attention by being at eye level. You saw in every video in this web seminar, we're always at eye level, using increased volume, just break through that static, and a slower rate to overcome environmental distractions. The same thing as the visual processing applies. Pretend that that child is in the back row of balcony seats. And you want that child to hear every word that you say. Coupling speech with visuals, always provide speech in unison with visuals. Okay, so I think that you probably are already doing that, even if speech is not the strongest domain. Capitalize on hyperlexia. Everything single thing I

try to present with the written word. We've taught so many children to talk that learn to read first. That's great, we'll take that door. That works. Even silent reading builds neuronal connections. Now, get attention before giving verbal directions or questions. Have a goal of no blow-offs. So if you put that question out there, it needs a response. You're teaching them social interaction. If you put that direction out there, it needs a response. Now, you might be saying, "Well, this child doesn't follow any directions." Well, then you're not creating the correct maze. You always create the maze. Can you give the child preferential directions to start?

Everyone needs to be 80%. Can you say, "Hey, take this cookie. "Oh, thank you, you're following every direction. "Hey, drink this juice. "Thank you, you're following every direction." When the child's already engaging in sitting down, "Oh, sit down. "Oh, you're following every direction." Some of these kids are failing 80% of the time. That's unacceptable. Everyone needs to be successful 80% of the time. And you create the maze. You create the challenge. You create the demand. You ask the question. Ask a question that you know the child can answer or that you know the child will answer, because it's preferential.

And follow up, "Do you want a cookie?" If the child doesn't say yes, say, "Yes or no?" You need to respond. Okay, within the context of educationally rich, task-orientated intervention, we can heighten joint attention by using heightened emotion to the child's behaviors, sounds, and words. This is really, really researched. It's the best thing you can do if you wanna improve joint attention. Heighten your emotional responses to them. Play sportscaster to the child's interests and actions. Follow the child's lead and provide an enthusiastic play-by-play description of the child's interests using a diverse vocabulary of verbs, and nouns as well. Check for comprehension of directions and questions. This is a technique that I use when children engage in restrictive, repetitive auditory behaviors. I want them to talk, because that's incompatible with it. So I have them complete a completion prompt. So if the child is making vehicle sounds, like

repetitively over and over and over again, then I will teach the child this. I'll say, "Trains make," and the child will say, "Sounds." And then I would say, "People say," and the child says, "Words." But because speech is incompatible with that restrictive, repetitive behavior, go ahead and give 'em a completion prompt so they have to say a word and stop their restrictive, repetitive behavior. Always think of what's incompatible with RRBs. And that's what you want the child doing instead. We talked about purposeful movement. Now we're talking about purposeful speech. So within the context of educationally rich, task-orientated intervention, we can use grammatically correct, longer utterances.

Yay. Way to go, Vanderbilt, on your great research recently and really saying, you know, telegraphic speech is not the way to go. Telegraphic speech is short, ungrammatical utterances. These children benefit from longer, more complex utterances, and with a diverse vocabulary. More is more. Less is less. Speak slower and couple speech with large gestures. Make speech more prominent by using it in unison with grand gestures to emphasize meaning of words and encourage the child's verbal engagement. I'm gonna give you an example of this. You saw in that video Liam, who was speaking at the one- to two-word level. That was eight months ago today. Today, I'm working with Liam, and I'm having Liam describe processes. How do we do things? Multiple-step processes.

Because challenge creates change in the brain. And I wanna work at the highest level this child's possible with, of. So go back to the flag story, saving the flags. If I'm doing that activity with him today, this is what I'll have him do. Liam, how do we save the flags? And Liam will say, "First," and I give him cues, "First," and as he's talking, I'll pick it up. First, get the photo. Then, and I'll do this, he'll say, "Find the flag." And then I'll say, "Lastly," and he'll say, "Put the flag in the tube." Then you say, "Because that's "how we play the," and I'll do that, and he says, "Flag game." So that's what he's doing today, a child that was speaking one to two utterances two days ago. The visual

is helping. My multimodal cuing is helping. And I don't have to do any of the talking. He's coming up with the language. He's coming up with the work retrieval. And when he doesn't within a two to three second, I'll give him a cue. If he didn't know what a flag was, for instance, I might say, "/f/, /l/," and give him the thing, flag, give him that word, if he has some word retrieval difficulties. So that's the way multimodal cuing works. You can work at such a high level with scaffolding. So go there. Expansion, repeat back the child's utterances. I like to repeat back the child's utterances using complex sentences. 'Cause complex sentences are complex thoughts. So this last video that we're going to watch is of camper Ardo.

And Ardo is keeping Katelyn safe. I need to tell you a little bit about Ardo before we go on. Ardo is a three-year-old boy. He's largely speaking one- to two-word utterances. And he has an extremely sensitive temperament. So I affectionately refer to him as my tiger in the cage. Even the slightest provocation or demand can send him into a two-hour-long tantrum. So we really, these children, they too need to be successful 80% of the day. They should not be tantruming 80% of the day. That's unacceptable. But getting back to Ardo, Ardo also has a fleeting joint attention.

So Ardo's joint attention style is, he loves Thomas trains. He'll run up to you with a Thomas train, and he'll say, "Thomas train," and then he runs away. And he runs back, "Thomas train," and then he runs away. So that's the interaction. It's like one second long, it's Thomas train, and then he has to recover, like that's his struggle point. Then he comes back. What I wanna see with Ardo is I wanna see increased duration of joint attention. I wanna see back-and-forth turn-taking. I don't wanna see the one-second interactions anymore. So what Miss Katelyn does is she takes this one-second-interaction child, and she makes it a four-minute-long joint attention experience using imaginary play. And she uses it by following his lead and with a lot of enthusiasm. I'm very excited to share this clip with you. I hope you enjoy it. I will be talking over it. She's going to use complex sentences and complex language.

- [Katelyn] Turn around and around.

- Now, he's going to the bear.

- Whoa.

- He's going to attack her. She's pretending to be a bear.

- [Katelyn] Oh, no. Oh, but she's so scared because he flashed the light in her eyes.

- Oh, no, I can't see.

- Oh, look at that. He has control over the environment.

- I'm gonna get you.

- He has control over her.

- Oh!

- Look at that again. The bear is trying to get him.

- [Katelyn] Oh, I'm gonna get Ardo.

- And he blinds her.

- Look at me, I'm blinded.

- Here she comes. She's gonna use nice, complex language, and say, "Oh, you're going to go on the tallest river rock."

- [Katelyn] On the biggest rock.

- On the biggest rock.

- [Katelyn] Whoa, don't fall in, the aligators might get you.

- Watch out for the aligators. The aligators can get him.

- Oh, you made it.

- He's coming back. He's gotta get the binoculars for her to help.

- Oh, okay, the binoculars.

- Yeah.

- Oh, thank you.

- He said, "Hold these." "These are binoculars," she says.

- Come on. Now, here he's going to use language that she modeled for him before. He says, "Come on, let's go over the bridge now."

- All right. I'll come to the bridge.

- He learned that today from her, that's a new complex behavior that was modeled that he's now using. Now, listen to this. They're for the animals.

- Do you see the owl? Hoo-hoo.

- See that there?

- That's a train. He's looking at the chalk and he's saying that's a train. She doesn't understand him, so she said, "Yes, yeah, it is. "Oh, my goodness."

- Do you see the bear?

- There's a bear.

- Right there.

- Oh, right there. There it is. What's up there?

- She's following his lead.

- Oh, it's a squirrel. Do you see the squirrel? He's getting some acorns.

- There's a squirrel getting acorns.

- He's on the tree.

- Like this.

- Oh, I had it the wrong way. Yeah, okay, thank you for helping me. Okay.

- There, I saw it.

- "There it is," he says.

- Yeah.

- She doesn't understand what he's saying, so she just says, "Yeah."

- Do you see a deer way out there?

- Yeah.

- Yeah. I've got the flashlight.

- The raccoon.

- There's a raccoon. She's trying to come up with as many animals as she can.

- Oh, the light's off, now we can't see. I can't see anything, the light's off. Oh, now I can see. Whoa. Do you see the bat? He's flying in the sky. Look, look, he's flyin'. Do you see him?

- Oh, he sees the bat.

- Yeah, he's up in the sky.

- Look at all the enthusiasm.

- Do you see the elk way out there, he's goin' through the river.

- There's an elk going through the river.

- He's going through the river. What do you see over there?

- Yeah, he scared me.

- Yeah.

- Oh, he scared him. The elk scared him.

- Oh, it's a train.

- It's a choo-choo.

- Oh, choo-choo train.

- Now he's bringing a choo-choo train in. She's now saying we're not talking about that.

- Oh, it's bringing some trees from the forest.

- The choo-choo train's bringing trees from the forest.

- No, that's it.

- He said, "No, there's the train, right there." Symbolic play.

- Out there.

- Okay. Light's off, now we can't see. Can't see anything--

- So what he does matters.

- In the forest.

- He has control over her and his environment.

- It's on. What can we see now? Do you see the snake? Look at it.

- Large gestures.

- Right there.

- Yeah, there it is.

- He said it's right there, he's seeing a snake.

- He's gonna get us. Turn the light off, turn the light off, before he gets us.

- No.

- Oh, you want the snake to get us? Yeah, turn it off, turn it off. Oh, thank you, you saved us from the snake.

- Yeah, I did, yeah, yeah, that's off.

- This is beautiful.

- Yeah, the light's off.

- High-state joint attention.

- You saved us from the snake.

- Yeah, I did.

- Yeah, light's off.

- High-state joint engagement, sorry.

- Light's on, okay, let's see. Who else can we see? Oh, light's off.

- So she's using a responsive approach, because he has a very sensitive temperament. Okay. Okay. So here we have camper Ardo. Let's see, how does she attain attention with exaggerated motion? So you saw her saying, "Here comes the bear." See, that's what I'm talking about. She's reaching a child in the back balcony. "Oh, my goodness, I'm so scared," so he can perceive those emotionals, those expressions. She couples speech with large gestures.

You saw her with the snake, "It's a snake, can you see it?" And sure enough, he engages in imagination play, and he says, "Yes, it's right there." She couples speech with visuals. He's like, "Yeah, this." And she's like, "Binoculars. "This is a flashlight," with the visuals. She uses a diverse vocabulary. She probably said about 12 different animals. And then she was kind of, "What is that called, a raccoon." This is challenging, coming up with all these animals. She sportscasts with long, complex

sentences. And then he comes back and uses those sentences later on in the session. It's brilliant therapy, if I do say so myself. Way to go, Miss Katelyn. Okay, so here we're looking at how does she engage the mind. The imagination was so high-level, the imaginary play was. I would say that really stands out in my mind, but also engaging that back and forth, and engagement for four minutes long. He wanted to stay with her. Because when he was with her, he had control. He had control over her, over the environment, over the activity. I think a lot of our children, it feels as if, I'm not gonna be a psychic, so I'm not gonna say this. I'm not even gonna go there, cut that. Okay, so let's go on here. So how does she engage the heart? She does it with a lot of warm enthusiasm and following his lead. I love it that he mentioned the train, which is a restricted interest of hers. And she said, "There's the train. "And it's carrying trees from the forest, yeah." She's not in control of the experience. It's a balance of the two. It's a back-and-forth dance. It's just beautiful. The body, task-orientated, challenging motor skills, so he had to go on the river rocks, but the even more challenging motor skill was manipulating the flashlight.

It took visual motor integration, and he had to move that flashlight in every direction to keep them safe. He had an important job to do. And he creatively and independently struggled. During the course of the flashlight, during the course of his movement, you saw his movements became more efficient as well. So what individual child characteristic would indicate a more responsive approach as seen here over a direct elicitation of language approach is his sensitive temperament. And he still is producing nice long, complex sentences, or in this case, expanded sentences due to modeling. We don't need to always be demanding language or having the children have to request. So the takeaway tip to improve auditory and visual processing skills tomorrow is always pair auditory and visual stimuli in helping children learn language. Even though children from ASD tend to show greater benefit from visual prompts in the initial stages, research indicates that the pairing of visual and auditory cues results in increased language learning over the long term. So here we have a child engaging in

pretend play with yoga. She is engaging in the tree pose, pretending to be a giraffe. So she has the picture, she has the giraffe. And we're using the words, "Pretend to be a giraffe. "I want you to hold your hand up "and pretend this is your neck, "and you're eating leaves from the tree. "Oh, you have to be on your tip-toes. "You have to put one leg up and reach really, really high." So we're giving her all that rich language as well as the visual support. Now, this is where we're gonna end things, eight months into the future. You saw these children eight months ago.

Let's talk about where they are today. So Ida you saw on the first two videos of this series in the first two seminars. Liam you saw today, saving the flags. And Ardo you saw today, keeping Miss Katelyn safe. These three individuals, eight months later, well, when I started working with them a year and a half ago, they were all pre-verbal, and they were all around age three. These three individuals today are having back-and-forth conversations that are contextually appropriate and using language spontaneously. The last child, Davey, is having more complex vocalizations. And he's vocalizing more frequently. I think the big milestone that I hit with him, however, is I taught him motor imitation with multimodal cuing.

So I couldn't, last year, lay my hands on his hands. So I couldn't teach him motor imitation, because he had tactile aversion. So we spent a little extra time incorporating activities that would expose him to new textures to improve his tactile sensations perception. So today, this year, I've been able to go hand-over-hand. And I've been doing multimodal cuing with him. Let me explain what that looks like. So suppose the word is look at balls. What I do is, first of all, hand-over-hand, I have him cue with me, and bigger and slower. I'm not going to go that slow and that big in this little screen. Look at balls. I hold it out for a long time. Do you see how I'm using the McGurk effect? I'm using the visual with the verbal so he can better perceive language. And he can better perceive the language and join me in producing the language by myself going slowly. He's also imitating me. So you don't have to do hand-over-hand with him

anymore. Now he's imitating the multimodal cues of speech and language. And he's producing more and more sounds. It's wonderful. But most importantly perhaps is, remember before, I told you about the mirror neuron activity. When we have a child engaged in motor imitation, you are doubling the mirror neuron activity. Mirror neuron activity is what is going to develop these children's social skills internally. So I needed to worry about the tactile aversion, because that would impact his ability to engage in motor imitation. I couldn't wait to get my hands on him last year, but he just wasn't there yet.

And I needed to respect that. So Davey today would do the cues with me, whatever the words are, as I slow them down, and doing them in motor imitation and producing so many more sounds than he did before and at such a greater frequency. Now, I wanna tell you one more thing about Davey. I've learned this the hard way, because I research every detail of my practice, and I'm really glad I did. Because it's made my practice evolve and improve. When I first started out as a speech-language pathologist, I would demand speech. Nothing is free. Okay, if you can vocalize, you have to vocalize. If you can talk, you have to talk, or you're not getting these cookies.

And what I noticed in my data is the children were talking less and producing less vocalizations and producing less verbal output. My nothing-is-free approach was making them quieter. It was doing the opposite of what I wanted to do as a speech-language pathologist. Remember that we know about the cerebellum. We know about brain research. We know that the cerebellum is responsible for consistency in speech. How many of these children do people say, "He can talk, he's just being lazy," or, "He can talk, he just is stubborn"? No, we know there's differences in the cerebellum. And we know that they cannot consistently produce speech yet. And we need to be a voice for these children. And that's why I think the neuroscience research will give these children a voice, and we're going to be able to better treat these children. And I see a day when we see a brain scan. Because of the great research

they're doing right now at Harvard University in which they're looking at the cerebellum and finding out what each lobule is specifically responsible for and what each location of the brain specifically does in the cerebellum. And they even have research to say, this is what the brain of someone with ASD, what their cerebellum damage profile would look like. And this is the brain of someone with dyslexia and what their damage in the cerebellum looks like. And this is the brain of someone with attention deficit hyperactivity disorder and the damage in the cerebellum, and what that profile looks like. And they're very distinct from each other.

So I foresee a day in the future, and it might seem a little science-fictiony, I think that we're gonna improve intervention by leaps and bounds with this information. Because we're gonna be able to look at the brain scan and see where the damage is and create meaningful, engaging, hands-on activities that target those behaviors, that challenge the children in those areas. And the challenge will equal change. Because we have that helicopter parent right here that monitors the child 24/7. And if the child does a new behavior that they haven't done before, they're gonna make a neuronal connection for that. So that's where I see the future. I think the field of neuroscience is going to improve outcomes for these children by leaps and bounds. And I would encourage you to look into research that's coming out of Harvard right now, and I'm gonna say this guy's name wrong, Jeremy Schmahmann and Catherine Stoodley and colleagues, and it's really gonna improve your practice the more knowledge you have about the cerebellum. Thank you so much. If you have any questions big or small, this is a topic I'm extremely passionate about. Please contact me through my website, kellyvessslp.com. I love research. So if you have any exciting research to share with me, please do. Back you, Amy, to wrap it up.

- [Amy] Thank you so much, Kelly. Really enjoyed this part four, and in fact, the entire series. I have a couple question for you, maybe for the average clinician out there. You've talked a lot in this series about how important it is that what we do in therapy

has a strong evidence base, and how it's good to keep on top of the latest research and so forth. And I know that one thing a lot of in-the-trenches clinicians will talk about is, you know, when do I find the time? Or how do I do that in such a way that I can at least try to keep up but not take hours more after I come home from work to do that? Do you have any tips for people as to where they can, I don't know, easier ways to keep on top of the latest research? Or when they have extra time, how to dive into that?

- Yes, I think Google Scholar is really an excellent resource. Because with Google Scholar, you can just say, I wanna see 2020 research. I wanna see the latest research. And you'd put in a couple of keywords, and they basically, they have abstracts almost for everything out there. And then if you just read the abstract, you're going to have good information in better treating these children. And it's just wonderful. The research, for instance, I'm so excited about the research coming out from Vanderbilt that supported complex speech development and longer utterances. That's gonna change this exponentially for people. And all that would take, or if you go into ASHA's, look at the keywords search. I find that when I have questions, like, is it better to do A or B, I'll just write the specific sentence. Is it better, do children with autism benefit from longer utterances? And you're going to find an answer to that question. And I really think, if there's a time crunch, abstracts will answer your question for you. You don't have to read the entire article.

- [Amy] Great. And do you know if there's any of these research sites, do any of them have an RSS feed or something like that, where you're automatically sent an update or an email or something if new articles become available in the topic of interest?

- Yeah, myself personally, I love ResearchGate. And my research is all on ResearchGate, if you're interested in any if it. But it does, it knows you so well. And it

tells you the latest articles that are coming out, and in specifically what you're interested in.

- [Amy] Great, all right. So I just wanted to wrap up here by reminding the audience or the participant about the fact that this is a four-part series. The other videos are available right now in our library. Under course 9096, that was part one, where Kelly talked about using movement to improve joint attention and executive function. And then we had part two, 9103, that looks at targeting balance and increasing intentionality of motor movements. And then part three, under course 9115, which had to do with complex motor coordination and perception of tactile stimuli. And then we wrapped up today talking about auditory and visual processing. And it's been a really fabulous series. I love the way one part has flowed to the next. I love the video examples, and as we were just saying, all of the great evidence base that you instilled into all of these presentations and the reference lists that you provided with that. So Kelly, thank you so much. I can't tell you what a joy it's been to sit in these events. And we really appreciate it.

- Thank you so much to continued and Thieme, and to you, Amy Natho, for this wonderful experience.

- [Amy] You are most welcome. We'll go ahead and wrap it up here. I hope everybody has a great day.