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Pediatric Case Study: Child with Oculomotor and Perceptual Challenges

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- [Nika] I'm very honored to introduce today's speaker Dr. Nicole Quint, joining us to speak on pediatric case study, Child with Oculomotor and Perceptual Challenges. Dr. Quint has been an occupational therapist for over 15 years, currently serving as an associate professor in the Occupational Therapy Department at Nova Southeastern University, teaching in both the masters and doctoral programs. She provides outpatient pediatric OT services, specializing in children and adolescents with sensory processing disorder. She also provides consultation services for schools, professional development, and special education services. She provides continuing education on topics related to sensory processing disorder, pediatric considerations on the occupation of sleep, occupational therapy and vision, executive functions, leadership and occupational therapy and social emotional learning. Welcome Nicole, and thank you so much for joining us today.

- Thank you so much for having me. I hope everyone can hear me okay and see me okay. So I wanna thank everyone for coming, this is gonna be pretty quick and so I hope that we can get the most out of it cause it's tough to jam all this into one hour. So bear with me and if you have any questions, as Nika said, I'm more than happy to answer them. So you can see that the title is kind of focused on deficits but I'm hoping that by the end of this, you'll really see it's an occupation based focus. So the outcomes today, our participants will be able to describe Skeffington's model and OT assessment results in order to analyze a pediatric case for intervention. Participants will be able to list evidence based adaptive approaches to enhance school occupations from an immediate temporal context need and competently educate teachers and parents on efficacy in case study format. And participants will be able to describe evidence based remediation approaches utilizing biomechanical sensory and cognitive approaches to improve occupational performance again, in a case study format. Okay, so sounds like we have a lot to do in a short amount of time so I wanna introduce you to our case. And this case study format that I'm doing, it's really about maybe giving you a way, a conceptual way to think about how to intervene with a child

who has visual challenges that are affecting school performance, or even ADL performance or play performance, whatever it is that they're wanting, their occupations that are meaningful to them.

So with Patrick, he's a seven year old male in second grade, he has difficulties with reading, completing his homework and following instruction during his school occupation. He does not finish copying things from the board and tends to have difficulty with writing, coloring and ball sports. He uses his finger to read, loses his place and often complains that he can't find things in his book or information in his books. He is slow with dressing routines, buttons and fasteners are a nightmare, and cleaning his room is tough. He lives with his mother and father and two siblings, he's a shy child who loves dinosaurs, football and Avengers and he says he wants to be a firefighter when he grows up like his dad. Patrick was a normal delivery without complications but mom reports he was a fussy baby with colic. She also indicated he was slow with some developmental milestones related to motor, particularly balance related ones and object manipulation. She said that he has always had difficulty following directions and struggles with his ADLs, she calls him clumsy. And Patrick does have a history of ear infections and adenoid removal, he is on a second round of ear tubes. So I don't know how many of you this sounds familiar, but this is a lot of the kids that I see, these kind of clumsy kids who have some difficulty in school and it can often be misconstrued as behavioral. And if you know Patrick, he is a really sweet kid and it's not behavioral at all.

And so, I was talking earlier about having a conceptual view of vision and how we approach it with children, and so I wanna start out with the idea of what is vision first of all. It's really the total process of receiving information and then processing it cognitively. It's very complicated processes, it sounds like I'm making it rather simple, but I want you to think about the two different pieces of the puzzle here of how we receive information and that reception is related to sensory functions. We have to

extract information from the environment just like if you have your, I'm gonna sound old saying a camera, but your phone, if you take your phone and you have to move it to the right spot to take the picture. And if you've ever tried to take a selfie and you realize you're cutting off people's heads, you realize you have to angle it the right way to get it right. Well, that's reception, you have to make sure that you can actually receive that information. We also refer to this as oculomotor skills, visual motor skills. Part of the challenge I think in our profession in medical context and even just with vision is that sometimes we use a lot of things synonymously. But that's really what we're talking about when we say oculomotor or visual motor skills. Cognition on the other hand are the mental functions involved with vision. And so that's interpreting what is seen and that becomes much more subjective.

And, we talked about these as being visual perceptual skills, visual cognitive skills, but that's actually, again, I'm aging myself, the picture that you would get printed up when, back in the day, we used to go to the little processing place where they would print out your pictures and you get your envelope and you're all excited. Of course, nowadays we can just see it immediately on our phone, but that's the processing of it. And so those are two different things, but they are very much dependent on each other. When we think about visual function, if you will, that's really talking about visual acuity, visual fields, contrast sensitivity, kind of these basic kind of areas, but then you talk about functional vision. And our functional vision is really how we use it. And that's focusing on these ocular motor skills and binocular vision, so we have to use the two eyes together. So not only do I have to move the eye each one, I need to be able to move them together. And then on top of that, the third thing would be accommodation, can I converge and diverged as part of the movement? I'm sorry. And then accommodation is can I adjust my eyes if I am looking distant or near and back and forth? So if I'm changing from a near to far focus as well as maybe angles, can I do that? And accommodation is sort of separate from just your traditional oculomotor, because accommodation requires the integration of your lens and your ciliary muscle. So when

I'm talking about oculomotor skills, I'm not talking about accommodation. For me, the only way to really make a change in accommodation is for vision therapy. When I have kids that have accommodation issues, I send them straight to vision therapy because ciliary muscle is smooth muscle, and so it's much more challenging to affect change in that with the lens. So that's something important just to consider. So that oculomotor skills I'm talking about, your things like convergence, divergence, saccades, tracking, smooth pursuits, all that good stuff.

Okay, so what are the five functions of a mature visual system? It starts with the basic anatomy and physiology, but then we have to have the oculomotor, vestibular ocular control, can I move both my head and my eyes to collect that data? And sometimes I move my eyes with my head, but sometimes I might move my eyes just by themselves and do more subtle movements. Some of our kids might struggle with that and actually need like their whole body to move because they have difficulty with that dissociation. Effectively interpreting visual information. So, this is where we start to change into this cognitive piece of those visual perceptual skills. And then finally, we kind of move into this higher level ability of, can I now use my limbs with the visual cues in a responsive nature that's functional? And that's really visual motor integration. So a lot of people in OT might be functioning on the fine motor skills that go with ADLs, that go in the school system and things like that, and are having a hard time and maybe sometimes forgetting that there's this kind of hierarchy of development in terms of the complexity that's involved. Visual motor integration is extremely complex and a lot of times our kids are missing some of these lower level functions, and therefore, especially this area here, and therefore they're having a hard time. Cause then we're asking them to integrate all these functions in an occupational context, especially if asking for performance, that can be rather tricky.

So, this is the link that you have, and I do recommend that you go back and watch this afterwards. Some of it might not really be news to any of you, but it's always nice to

have that perspective of development on vision. And it has some good information in there. I like how they do it in kind of a visual support way and you'll see that when you go on there, they have animals that talk about the complexity. And so it's a really cool video. Okay, so I wanted to introduce to you Skeffington's model. And again, I don't know how many of you are familiar with this model, but when I started working at the university and working, I did program development over at the middle school for children who are in the resource program, I started working with optometry here at the university. And my background is in brain injury and then now I work with kids who have sort of similar issues with visual abilities and function as well as some of the struggles with attention in school. And I'd always work with optometrists so I always had this interest in vision. When I started working with these optometrists and they started talking to me about the Skeffington's model, I realized so much of what I was doing, or what I had been taught to do wasn't really working, and then I realized why it wasn't working.

So, the old way that I was treating a lot of the visual issues that I was working with with kids was I was sort of doing those kind of eye movement exercises and things like that. It just wasn't working and didn't really know where to go. And so this opened up everything for me. And so, with Skeffington's model, what we have is we have these four circles here, you can see on this Venn diagram that come together to really speak to the idea of vision. And so we have this concept of centering. Antigravity, which is really talking about vestibular and I'm gonna get into this here a little bit more. Identification and then language. And if we get these four working collectively, we have vision. And if we don't, something's going to be really kind of out of whack. And I see that we have one member here who's validating the idea of using Skeffington so thank you. So spelling this out, these four circles, the four of them, really, not one more important than the other, they all need to be balanced. We have this antigravity system, we might call it the movement system, vestibular system. You cannot think about vision without thinking about the vestibular system. And so, this is that internal balance

that we need and it's really so important for postural control, and postural control is really essential to attention. But when we think about this vestibular system piece, there is a huge relationship to eye movements.

And so if you think about the vestibular ocular reflex and you think about these processes, it starts to make sense. And also make sense in terms of your balance reactions, how your body moves to right itself, it becomes important in this process too. Centering, the idea of that is attention and orientation as well as directing your body, head and eyes towards something in space so you can receive information. Centering becomes really important when you think about it, it's from like more of a biomechanical standpoint in terms of, can I move? Do I have the mobility? And do I have the control to orient to something and attend to it and dissociate as I need? But I have to have some kind of underlying proprioceptive function as well as strength be able to do something. The strength either needs to be my own strength and or do I have some kind of supports to help me. Identification, and this I think, was maybe one of the pieces I was kind of missing when I was doing a lot of the visual work I used to do. Identification is really gathering meaning from whatever you are attending to in space and starting to appreciate the relationships between the details. This becomes really important in processing information, the visual perceptual skills, particularly when we're discriminating and differentiating between things.

So when we're starting to think about the different visual perceptual skills, this becomes extremely important. Because now we're not just talking about being able to label something, but label it in a way where you can tell the differences and the little nuances between things that lead to higher level thinking and awareness. And then of course, speech and auditory is I have to analyze and communicate what I'm seeing. So when we're thinking about speech, it's coming from more of like a cognitive language piece. The identification, this cannot happen with really functional proprioceptive awareness and body schema awareness. So, you're starting to think about parietal

lobe function with something like spatial relations or position in space. I really can't do that functionally if I don't know, first of all, that I have two sides of my body, that I have a right and the left. And that that right and left can do two different things at the same time or can do something together. Can I cross the midline? All those kinds of things that we look at all the time inform my position in space and spatial relations. If I don't understand right versus left on myself and I don't understand right versus left with you, and you're sitting across from me, and you're trying to give me directions, oh, we have a problem. Or I'm trying to give you directions, I have a problem. So I can't really discriminate and differentiate how to get there from my own perspective, much less yours. And so then it starts to make sense as to why that piece becomes extremely important with your visual processing. I hit the wrong button. Is that working Caitlin? Okay, there we go, sorry about that I hit the wrong button.

Okay, so when we think about the Skeffington model, really what it's telling us is that we see with our whole body. We don't see with our eyes, our eyes are simply the tool that we use to see or have vision or to really have that visual ability, and visual ability is saying I have functional vision and visual function working together. So I have all those things I listed earlier working together. That little middle of the Skeffington's, that happens from our whole entire body, not just our eyes. And so an example of that that's kind of fun is when you think about optical illusions. So some of you might be seeing one animal and some of you might be seeing another animal so I'll give you a second to see what you see. And so some of you might be seeing an animal that is furry and some of you might be seeing one that has feathers. And if people wanna go ahead and type answers in there to what I'm seeing or they're seeing. But some of you might see both rather quickly, some of you might struggle to see both, there's no wrong or right to any of that and nothing of it means that there's anything wrong with anybody, but it just is also talking to the fact that identification really will kind of inform our visual perceptual skills to be somewhat subjective.

So there's a bunny and a duck which is kind of cool. So going back to our friend Patrick who's in second grade, what is expected of a second grader? We might know what's expected of them in school or at home especially culturally with the family as well as what might be appropriate for an eight year old in second grader, was he seven or eight? But here's what's going on. These are kind of the universal standards for second grade in school. They should be able to read complex words which means two syllable words, understand the structure of a story and self correct mistakes and reread when necessary. So those are pretty high level reading skills. Math, they should be able to add and subtract one through 20 using mental math, and I think I might know some adults that struggle with that, they can break down three digit number into groups, so they know like if it's 10s, ones or hundreds. They also know various polygons, which would then indicate that they have some awareness of visual discrimination and form constancy starting to develop. They tell time with an analog clock, now, you could put an asterisk next to that just from societal changes with technology, but they should be able to in theory, they should be able to also solve word problems with money, so they can start to manipulate money and coins and basic sort of adding some coins together and things like that. And they also from like a science perspective should be able to work in groups to conduct simple experiments. They should also be able to record their observations through writing and speaking to make conclusions about what they've observed in the experiment, and ask scientific questions and record observations throughout the process, not just at the end.

So, I think what's kind of interesting here about the science piece, it's kind of universal beyond the subject of science, this could be something with with respect to social studies or other topics as well. And I think most of you are familiar with other developmental things, but sometimes I think was school, some of us that are in the clinic might not be as aware of what's expected in second grade. So from a visual development standpoint, this is really important, I can't emphasize enough how important this hierarchy is, and I'm gonna go through it rather quickly. But the basis of

it is that oculomotor control. Then we're starting to talk about the idea of attention, and that's visual attention. And visual attention really requires sustained attention as well as a vigilance or a persistence toward it. If I'm really looking at something to figure something out, I have to have some persistence. Scanning, can I scan my environment? Then we start moving into more of the pattern recognition, then we start to have a memory bank, the visual memory starts to kick in because I'm now recognizing patterns and I start to fill that bank. Then what we have is really functional visual reception. I have these kind of, like... I'm sorry, that should actually say perception. That's a typo so everyone click that or change that. That should say visual perception, I apologize. Now I'm getting into perceptual skills. I'm getting into higher level like visual closure, which is a discrimination, I might be getting into spatial relations, position in space, topographical orientation. So I'm starting to get into all these higher level, figure ground, all those fun visual perceptual skills that we all test all the time with the TV, PS and whatnot. So that comes way later. I first have to get through all these pieces then I can start to adapt to vision.

So I always use this analogy and I don't know how applicable it is outside of Florida but some of you might appreciate it if you live somewhere with tornadoes. But in Florida we have hurricanes, and so one of the big things down here is to get hurricane windows. And hurricane windows are great because they can withstand the impact of debris flying around during a hurricane. So if you have a house and you have a foundation on the house, you can have a strong foundation, you can build the house, and then all of a sudden you add hurricane windows, you're kind of safe from the storm or even a tornado. However, if you have a mobile home, or let's say a tiny house, you know, the tiny houses are all the rage, that doesn't have a foundation, and then you add hurricane windows, that's all good if you know you're just trying to protect the windows, but the whole house will blow away during the storm. And I think about that with our kids. So what I will see sometimes and I'm sure I was guilty of this back in the day too is I would see that they had some visual perceptual issues and a lot of our

tools are related to visual perception. So I would sort of start with let's work on visual perception, we're gonna do some mazes, and we're gonna do all these things. Or people will start with handwriting, handwriting is visual motor integration and that is up here, adoption through vision. Without going back and appreciating that the child's missing a foundational element that's going to keep them from blowing away in the hurricane, the hurricane is school, that is where our kids will blow away, okay? And so, we wanna make sure that they have those foundational pieces. So that's kind of my example to kind of remember that I need to go make sure that I have the foundation cause the hierarchy of visual development is everything, it really is.

This is just the case assessment results and I just want to let you know what I used for the case assessment. For Patrick, I use the M-FUN, the DTVP-3, the Beery VMI, and oculomotor screening. And also I did the SFA, which is a school function assessment. And so I did that because I wanted to kind of see, you know, get some information about vestibular functioning, I wanted to get some information about, I think it is sensory profile too, some motor skills, I wanted to look at the DTVP because there was some motor or visual skills as well as non motor or visual skills. And then oculomotor is really important and you can do that just your basic oculomotor. I often just do the tracking kinds of things. I love the King-Devick saccade tests, but a lot of times they'll just do sort of like your basic things. There's also the developmental eye movement test, the DEM, which is also very helpful.

So, and I don't know what people have access to, but you can do oculomotor just through your basic screenings that you do. From his school reports, I saw that he was below the age range in reading, which we kind of suspected anyway, but he was above age range in math, so he had good math skills. He had some handwriting difficulties according to the teacher, she had a hard time, she felt that he was slow, it took him a long time and she thought that it took him a lot of effort. She had him sitting in the front because he has such a hard time following directions, but she said also it's because

he's slow, like he's always kind of behind. She didn't feel that he had behavior concerns but he's slow with his work and he doesn't complete assignments, and she thinks sometimes he was just kind of tired. And then she said that he doesn't really like PE class, he doesn't get excited for even though he loves football, but he does enjoy music and art class and he likes science. And she did say he liked math too but sometimes he had a hard time copying the math problems from the board and getting his math finish. So, even though he was good at mental math, the copying of the problems was very difficult for him.

This screen here is the assessment results. So the M-FUN showed, I mean nothing really exciting here, surprising, not exciting but not surprising here is that we knew he had some motor issues. So gross motor, visual motor and fine motor came back as delayed, not a surprise. However, his fine motor had higher scores which means that wasn't quite as involved as maybe the gross motor and the visual motor. On the VMI, he scored one to two standard deviations below the mean on all three sub tests. However, the motor coordination had the lowest scores and that's the one where you connect the dots. So that makes sense because that one requires some control. And so it kind of started to get a hypothesis here that if he's lacking the control and that score is lower than the drawing one, the green one with the VMI, I'm wondering what's going on oculomotor wise. From the SFA, it said that he had increased need for assistance on task behavior, compliance with adult directives, again, that's similar to the teachers report, memory and understanding, clothing management. So he had a hard time with activity performance on that as well. And then limitations using materials. From the DTVP-3, which measures figure ground visual closure, eye hand coordination, form constancy and all those visual perceptual things, he had reduced scores on that so he's below the norm, one to two standard deviations. And then there's three composites on the DTVP, motor reduced VP, visual motor integration and general visual perception.

On all three of those, he had two standard deviations below the norm. So, what you see there is it doesn't really make a difference between if there's motor involved and the motor is drawing or using a pencil in some way to go around a track or something, as opposed to just using his eyes. So when you see that, that's kind of a red flag that there's something going on at those lower hierarchical levels of development with respect to ocular motor functioning, as well as attention. And then the sensory profile two said that proprioception and visual were much less than others so he was like showing low registration for those. So registration and bystander were much more than others, but he also had sensitivity more than others. And then the vestibular piece and auditory movement and auditory were much more than others. So we're starting to see a picture here of vestibular challenges, proprioceptive challenges, visual challenges, and attention and learning on the school factor was also involved on the school companion.

So I'm seeing now picture of my hypothesis, if I go back to the slide here, where he's missing probably some of these lower level skills. And when I did the screening to see, can you track and can you follow and scan and do you have functional saccades, I don't think it's a surprise if you're having vestibular issues that saccades are going to be really difficult for him, and that goes along with reading. So the saccades were really the area of dysfunction as well as cognitive loading with smooth pursuit. So, cognitive loading was smooth pursuits, basically what you do is you take your, let me get a color that might show up better here, you take your object and you have them follow it in nice smooth patterns, about 10 inches from their face, and then you see how it looks. And then you start asking them very basic questions that are long term memory kinds of things like, what did you have for breakfast? Or who's your favorite TV character? What's your dog's name? And can they follow it? If you see a huge discrepancy between their smooth pursuits and the cognitive loading, you will then know that there's really some significant oculomotor control issues and it's gonna affect school. So, let me go back. And so this stuff all kind of aligns with not only that, but some of

the things that we heard from school as well as concerns mom had said as well. So, I wanted to give you just a little bit of information from the research on assessments two that kind of informs your clinical reasoning of the choices. Some of this is older but it's quite interesting to think about the VMI as it's very commonly used, it's cheap and easy, right? And quick. In this study, it was related to teachers ratings of reading, writing and spelling. And so it just kind of shows you, I think a lot of people use the VMI for handwriting, and it actually is not an effective tool to identify handwriting issues, it's more effective at showing us writing, reading and spelling challenges for that age group of seven to nine, hence why I chose it for Patrick.

This one is the same author, Kulp, who does a lot of these studies is that all three sub tests of the VMI are really important instead of just doing one, and that's because you might get it within normal limits on one of them but not on the other one. So you can't just go by like, I gave the blue one which is or sorry, the green one, which is the drawing the designs, copying the designs and base that as okay. More importantly, I feel that the blue one, which is the visual perception one, it's really only testing visual discrimination, can they match a picture? So it doesn't really give you a lot of information so Kulp really recommends doing all three sub tests. And then this is very interesting about the DTVP-2, the version before, it actually differed between students classified as skilled and unskilled hand writers. So if you're wanting to look for handwriting challenges and figuring out where it's coming from, the DTVP is a good choice cause the DTVP-3, the new version, is based off the same purpose, it just has better psychometrics. So still we'll relate to those skilled and unskilled students. They just kind of teased up some of the validity and tightened up the validity in the reliability scores.

And then this one, I think is really important. So poor visual memory predicts reading comprehension. And so, you will see kids who have poor visual memory also will have below average reading, decoding math and academic achievement scores for second

to fourth graders. And so, making sure that you use something where you can see where their visual memory is becomes very important for this age group if they're struggling in school. So that's why I use the DTVP, I like that one. The TVPS is okay too but it doesn't capture the composite of motor versus non motor. And so again using that Skeffington's model approach, if we look at vestibular function of Patrick, now what we kind of start to realize is that if you have an under responsive vestibular system, it can affect reading acuity. Vestibular promotes gaze stabilization and balanced training is related to your vestibular function for vision. And so he actually seemed to have a hyper functioning vestibular system according to the sensory processing or sensory profile two, however he had some over responsiveness but when you actually did his post-rotary nystagmus, it looked a little under responsive.

So there was some hypo function elements as well. Then when you look at the exercise and strength piece, I wanna call that the centering part of Skeffington's, when you looked at the research, it says, exercise programs can improve hand eye coordination. So just a basic exercise program for kids actually will show that there's some ways to improve that eye hand coordination that we're desperately looking for. And some of the reasoning behind what they found, and there's multiple studies, is often that the kids start to get a better, they get better posture, they get better strength, they get better endurance and they start kind of showing also that they are more aware of their body. So the body scheme or kinesthetic awareness can also improve. They also found that visual attention therapy improves reading skills and that vision attention therapy could result from exercise and strength programs. So I find that to be very interesting, we know that if someone can sustain sitting upright for a while and has postural control, that they also will have better cognitive attention, but we know visual attention really relies more on if I just stay up right and I can sustain on something for a while and hold my head, whatever needs to be held, then I'm gonna have improved visual attention. So it makes sense that if I have more postural strength and dissociation, I can do that. And then this is kind of the, I combined language and

identification together as the cognitive components of vision, but what's cool about this one is that proprioceptive awareness becomes very important per the research. The more proprioceptive aware you are, the higher level of visual perceptual skills, they seem to correlate.

Visual imagery became extremely important within this, that you have to have some visual imagery and that involves the retina. And so this also then involves vestibular functioning and proprioception because the vestibular system interacts with your visual system as well as the proprioceptive system or input to really provide stability within your environment. And as we negotiate, through our activities, what happens is it allows for an image to be obtained by the retina and it happens as you are also moving your head to access things and then your body integrates it. So it starts to get really complicated very quickly but it's like, okay, if I put all these things together, I start to become someone who has this dynamic ability to hone in on something, look at it, get that retinal involvement and then start that whole processing procedure or process. So it's pretty interesting and there's all these studies are kind of fascinating when you start to think about it really is the whole body that we need to have in order to see. So, they also showed that perceptual activities become extremely important. And if you improve visual memory, the VM and working memory, WM, as well as automaticity in motor learning, you will see improved reading and learning. So that one I think really speaks to us as OTs and we might not necessarily think that that correlates to reading and learning skills, but it really does fit in this language and identification piece, that cognitive piece because if you think about it, visual memory, I have now a bank of things that I can pull from, and then I can start moving up the hierarchal ladder.

Working memory is being able to utilize your functional memory in the moment, and that does require visual memory as well as auditory memory, okay? And then automaticity is really saying that my motor learning ability has moved beyond the skill level, I'm not in the cognitive learning level of motor learning, I'm really moved into the

third level of motor learning which is that autonomous level where I can do something without really making a lot of errors and having to think about it. So if we can get people automatic with something, as many of you might type, many of you might be able to drive and do something else, it's because you're automatic at it. So we have to think about motor learning from getting people more autonomous at the automatic level, we will see that reading and learning flourish. And that's really, really focusing on handwriting for the most part, because that's often the tool that we use, that written communication in our school occupations. If I'm focusing on writing, it's really gonna be hard for me to do anything else.

And those of you who know, when we're stuck in the motor learning cognitive phase, it's frustrating, it's exhausting, it's hard. So if we can kind of really get them beyond that level to where they are more automatic, it's much more functional for learning. You cannot learn if you're in divided attention. So super important. And I hope this kind of brings it together with the Skeffington's idea. And so I'm going to this slide and I don't know if this is probably something that's not new to anybody, but it's just reinforcing what we've talked about. So the bottom level here and I think I lost my little arrow, so the bottom part of this triangle is the very basic sensory system, and that's the basis for learning, okay? The next one is sensory motor development. So you can see here, this includes body sense, postural security, bilateral awareness and motor planning. So that's been informed by the sensory system, once this is pretty good, you start to develop more perceptual motor development which is auditory language skills, visual spatial skills, eye hand coordination, oculomotor control, postural adjustment. So you start to see this developmental pattern starts to make sense with vision and cognitive vision. And then we get to the top, which is academic learning, daily living activities, the occupations that we focus on, it's like, oh, they need a lot of these underlying skills to be able to do it. And you can kind of see where it's Skeffington's and that whole body vision from the get go. But that sensory piece is the bottom part hence why the vestibular and proprioceptive pieces of our sensory system become so important to

vision. However, if you really look at all of these sensory pieces, they all inform our subjective processing of visual information, okay? Okay, so let's do some remediation for our friend Patrick. So this is when I kind of said, okay with this whole Skeffington model, if I'm looking at centering and I'm looking at antigravity, what those really are in my head, antigravity is vestibular and postural control and that centering is really strength, kind of biomechanical perspective.

And so now what I'm thinking is if I'm gonna treat saccades, if I'm gonna treat oculomotor skills and try to build visual attention, what I want to do is focus on getting these kids postural strength, endurance, postural control and head eye association. And now all of a sudden, they become little visual receptors, they kind of receive information, they suddenly go from, instead of being an iPhone that stuck and can't move around, they can move around and access information. So what does that look like in therapy? Well, those can be all sorts of cool activities that really work on improving that strength. And so I'm talking about things like yoga, activities that you guys are already doing where you're crawling around doing things to get stronger. Because the idea here is if I get sustained stationary posture, sustained seated postural control and prone extension for tracking and supine flexion for vertical tracking, I'm really good to go here cause now I'm thinking if they can't sit still, they won't have adequate vision for learning.

So I wanna kind of explain to you a little bit about the prone extension and supine flexion. So, I want you to take your fingers and I want you to put them on the back of your neck. So if the middle of your neck, you've got the middle of your neck, and then you've got the sides, go between that and then just lightly palpate and then I want you to take your eyes and track laterally or horizontally, whatever it is that you want to refer to that, and I want you to see if you can feel what's happening in the back of your neck, you should feel a contraction. And what that's telling you is there's a direct relationship between your lateral or horizontal tracking and your posterior or extensor

neck muscles. It's the same thing if you go into the front of your neck right here. Now this one's a little trickier, you have a pulse. Don't use your thumb because you have a pulse in there and just be very light and make sure that your head is straight, and just go up and down with your vertical tracking, and you should also feel a very slight contraction. So those positions can actually facilitate improved tracking if you can strengthen them, and so that's really important.

So I have a question, how are these skills being affected as children are not writing in school, most of the time, they're using tablets and typing? So I mean, the short of it is I'm seeing a lot more kids with with challenges, I don't think that's probably news to anybody here. So it just sort of reinforces that we need to do more things to really help kids have this full body vision. And I'm gonna talk a little bit about the challenges with reading on a tablet as well. So that was kind of the motor centering this is the vestibular antigavity, so what we wanna think about here is does the kid have a history of ear infections, ear tubes, car sicknesses? Can they somersault? Can they log roll? These are really important to tell us how that vestibular system's working. And these are kind of the things that we wanna work on with these kids to really get that antigavity circle of Skeffington's model working. And so, this is my favorite thing to work on. So I really wanna make sure the balance reactions are working. A lot of times I use the like onion swing for this kind of thing. But also what I really love to do is rolling with gaze stabilization, one of my favorite activities when they're ready, cause some of the kids that can be really noxious or too intense, but when they're ready is having them do either a log rolling activities or somersaulting forward or backward activities where they have to then stop and visually a 10 with gaze stabilization to something. And so, now that you've seen your corporate rating, vestibular rolling, stop, focus my gaze, okay? Then whatever I do, and then I have to like, roll again, stop, focus my gaze and there's a million ways to do it that can be fun, but that's a really surefire way to get that vestibular system working with the gaze stabilization using the research results that I provided earlier. So that now all of a sudden, you're gonna see a huge change

saccades and the function of those saccades. And so, let's apply it to our friend Patrick.

So we wanna perform a top down occupational analysis and find the discrepancy and we wanna identify and incorporate occupation-based practice to address those discrepancies. So we're not just sort of functioning without occupation. And so the final occupation-based activity should mimic the real activity in context. And then we wanna incorporate adaptations as needed, including can we educate the parents and the teachers and do consulting and whatnot. And so, what you wanna then do is embed the vestibular stuff, the antigravity, the motor stuff, the centering and the cognitive perceptual stuff, which is the identification, the language stuff, based upon the visual hierarchy and discrepancies. And this is where it can get a little tricky. And I actually wanna go back to a few slides back because this is the one that's so important, but what I want you to appreciate here, if you see the deficit here, pattern recognition, you treat the one level below. You don't start at the level of dysfunction in the hierarchal development, you always start one below. I hope that makes sense to folks.

So if I find that Patrick's issue is here, there really isn't anything lower to go so that's what we're gonna start and I wanna make sure too to, I would send them to optometry anyway to make sure visual acuity is okay. But if I got Patrick and I saw, I mean, that attention was the issue, I would go back and start here. If I had a kid whose issue was visual memory and that was the deficit that really stuck out to me on whatever assessments I did, I would start with pattern recognition. So just make sure that you're aware that you always go one level below, very important. Okay, so let me go back to where we were cause we're gonna start to think about let's treat Patrick. So this is this top down approach that I was just talking about. And I love this cause I really do adhere to the idea of occupation based practice. So, if the occupation that we wanna work on, the goal that we're working on is copying from the board, we want Patrick to

be able to copy from the board. And particularly in his class, what he had to do was, they had like a journal topic that they had to copy from the board and they also had to like copy math problems and spelling words. So, I could get a little more focused, I kept it general. And so the next stage of the occupation based process as you say, what's the context? Where does it happen?

So you can see here I put at school, math, language, arts, science, and also his agenda there, teaching agenda stuff very early. The next thing you do is you do that activity analysis. And I always say as OTs, this is our special sauce, this is what makes us really unique. And I realized that now more as I do more presentations to other disciplines that we really know how to do an activity or occupational analysis. So, I did a very basic one here but he has to sit in his seat, hold the utensil, look at the board, recall the information, transcribe it on the paper, and then repeat that as he's moving head and eyes until he gets everything copied. So the next level of the process of top down as you say, what's Patrick skill set? And so those are the black words in the activity analysis. So he could hold the utensil, he could look at the board and he could transcribe it, okay? But then what you say is, okay, well what's the discrepancy between the activity analysis and Patrick's skills? And that is the red text. So sitting in the seat was hard for him, recalling the information was hard for him and then repeating it over and over moving his head and eyes was difficult for him.

So right away that tells me centering is difficult, vestibular is difficult, and probably something to do with the language piece, the recalling the information and or the identification, I'd have to maybe tease that out a little bit more. And I suspect because he has difficulty with proprioception, identification's hard for him too. So my discrepancy now is what I would then treat. And so the focus of my treatment then is getting towards sustain posture, working on head and eyes association with gaze stabilization and visual memory. And so the activities that I could do in our therapy sessions would be things like Mad Libs, and I hope some of you might have done

those as kids, I love Mad Libs and the kids really enjoy them. Secret decoding. So a lot of times we'll do decoding stuff where we put like a code and they have to look at the code and then they have to break the code, so much fun. Scavenger hunts, again, are really fun. And then an obstacle course. So if you're embedding the things that you know will address what he needs to work on, that's beautiful, you can get some of that vestibular gaze stabilization stuff I could embed some of the postural stuff. And then we used to do something called Patrick Olympics which was where we would just come up with different activities, you know, and I would pick some he would pick some, I would incorporate some of the vestibular and motor stuff and he would try to do them and try to get the gold medal, you know, whatever works.

So here's another one. So this would be completing homework. And again, you can see the activity analysis, where do we do it? And then of course, Patrick's skills are the ones that are in black and then the discrepancy are those in red. So then how do we go ahead and treat that? Well, our focus is gonna be completing the task which is sustained attention, postural and bilateral integration and environmental supports, which I'm gonna get into in a second. And then what we could do again, Mad Libs. We did fantasy football stuff so where he had to, we had to come up with something that would be similar to completing a homework assignment so he would have to dole out the fantasy football stuff, I made it second grade appropriate but he's really into that. Football charts and plays. So he had to, maybe the assignment might be come up with five football charts and the names and explain them in a basic way. He loved that cause he got to draw up these little football charts and he get to teach them to me, but he had to finish the assignment. And then we also did, cause he was into being a fireman, stop, drop and roll obstacle course. And that was just kind of fun where he had to put out fires and then he had to do a stop, drop and roll, which of course the vestibular piece. And we would just make up stuff that was fun and that way I'm getting into these red areas of discrepancy. And then this one here is buttoning and zipping pants. And again, you can see the activity analysis with his skill set in black and

the discrepancy in red. So with this one, I'm focusing on the posture with the neck flexed sustain, that can be very, very hard and downward gaze, and that sustained visual attention. And so the occupations there, we did mini golf, where you had to really look and kind of do the golf piece.

Egg game. The egg game is this thing where you have to carry the egg, you have like a little like a belt and it has a little pouch that you carry the egg while you're walking and you have to watch the egg and you have to go very slow cause the egg will fall out, it's silly and if it breaks, you lose. But you have to look down the whole time and walk very slowly. Crab soccer is great cause it kind of facilitates that neck flexion sustained pattern and you have to watch when you're kicking the ball. And then we also did a game called fire rescue. And that one was done basically on the scooter kind of in that supine inflection pattern and he was having to find the little fires that were hard to find and he had to keep kind of this neck flexion position and sometimes I would hide them in things and he had to look for them.

So again, embedding some of those things that really come from that Skeffington model approach and the evidence. So, from adaptive approaches, the adaptive thing that we can do. The functional learning position is really important and this is the Harmon distance. So the Harmon distances if you take your fist, you put it at your cheek and it's the distance to your elbow. And that is actually an evidence based approach for maximizing visual learning. And I'm gonna show you a picture of it in a second. And then postural supported seating. So if somebody really is struggling, we wanna support their seating. This is not news to any of you but really making sure that the desk and the table fit the kid and you guys know in the school system or even the home desk, that's not always the case. Reducing eyestrain. So 20/20/20 is a really great tool. Every 20 minutes, you stare at an object 20 feet away for 20 seconds. So every 20 minutes, I stare at an object 20 feet away for 20 seconds to recalibrate my eyes to kind of relax the tension. You also wanna make sure lighting is good, seating

position is important. Making sure that they're not somewhere where they're constantly having to strain is really important. Fluorescent lights are just bad, I don't know how else to say it.

And then computer screen, they really should take a break after every 20 minutes from the computer screen. And if you can get them on a black background with white font instead of white with black, its better. The other thing too is that when we're thinking about reading with the computer, the problem with reading a book on the computer is that there is no point of reference. So, lemme show a littler piece of paper. Here's a little post it note, right? So on this post it note or piece of paper, I have one, two, three, four corners of orientation. If I turn the back side, I have one, two, three, four more corners of orientation, and one is page one and one is page two. So there's now a sequence to when I read what was ever on here as to what was at the top, what was at the bottom and everything in between. That does not happen when you're reading a book on a Kindle or on a computer, you lose those corners of orientation. And so we, you and I, we all know how to read so we don't need those corners of orientation so much cause our skills are already intact.

Kids are still learning skills and gaining skills. They need those corners of orientation for their learning and for even the the reading comprehension, the sequencing of events, trying to find things, and it really sort of happens in a vacuum when you're in a Kindle book or an online book. And some of you might have even experienced that, just reading like, where was that and you can't find it. And so they're actually starting to find that reading online is not good for learning to read or for school development. Some other reading options. If kids use their finger to read, let them use it. It helps them, don't take it away. Graphic novels and comics are fantastic. And so it really does help give them a visual piece to supplement the reading and the text is usually not as dense. Closed captioning is probably one of the best ways to help. So having them watch videos and then have the closed captioning at the bottom, they have shown that

lights up in functional MRI is the part of the brain for reading. And that works really well for Kids with dyslexia. And then using the window method or a ruler. As I'm reading something, let me see if I can get, and I can just kind of keep that to where I can block out whatever is below and focus on what I need to do. Those all work so they're options.

So here's the Harmon distance. Oh I lost my arrow. This picture here with the person at the desk, thank you, and so here's the Harmon distance. So if I'm sitting, I wanna be 90, 90, 90. And then what I can do is put a slant board or I use like a two to three inch binder and put a book in there so it doesn't collapse. And then all I do is put like a rubber band or binder clip there because this is the Harmon distance, it will facilitate that fist to the cheek distance, and that's optimal for reading, for learning with reading. Then of course, I said the ruler, comics or graphic novels, using your fingers, good, graphics novels or comics are great and then closed captioning. So, thinking about our friend Patrick, if you think back to this one here, I think I said here the... Oh, wait, wrong one, I think it was the one before. Yeah, so here we were saying he would benefit from a 90, 90, 90 position. He tends to use a kickstand, this is a kickstand. So, this is where I don't have the control that I need so I'm holding my head up. So because he has that kickstand, we'd wanna look at can we support his posture, but also, can we get him the Harmon distance, might be helped as well.

And then if you look at this one again, we already know that Patrick is using his finger so we would wanna let him keep doing that. I want to have him use the Harmon distance. I think the closed captioning would be great. You know for him, if he likes to watch videos on YouTube or something or even the TV, I would recommend mom put movies or TV to have the closed captioning. And then I could investigate if he would like to read graphic novels or comics, which one does he prefer, would be really helpful for him? And so the closed captioning, how does the closed captioning help with dyslexia? Great question. So, what they have found with dyslexia, and it's a whole

complicated thing, but there is evidence that the functional MRI of those who have dyslexia when they read, they use the wrong part of the brain. So they don't use the reading part of the brain, they use the language side and so when you read closed captioning, it actually lights up the reading part of the brain instead of the language part, and therefore, it's building up that piece of the puzzle for them in terms of their neurology. I hope that helps a little bit. That was a quick, quick explanation for a very complicated diagnosis.

So here's some helpful resources I wanted to give to you. This is the VERA, it's a free vision screening program and they invite occupational therapists to join in. It's awesome, I highly recommend you check it out. And then I love this blog down here. There's a bunch of sections and you could really learn some really in depth stuff about vision. The developmental optometrist on there is amazing and he explains everything. And then some of these other things are just kind of good little different clinics and things that have some good information. But I highly recommend the VERA, I definitely recommend this blog. And then this is COVD which is like the, it's like a group of vision folks that kind of come together so that's a good one too, so check those out. And those are all the references. And this is my email if you want to contact me. I did go like a couple minutes over so I do apologize, but I do have some questions here. Kids who resist Harmon distance adaptation, so they don't like a slant board. So usually what I try to do is at least make sure they have the 90, 90, 90 and if they don't want to use the slant board, I just try to position them as well as I can, I'm not gonna force anybody to use anything. But I might have them try it, usually its cause they're embarrassed, so I might have them try it and see if they think it's worth the embarrassment or worth the challenge of it if they think it works. So, let's see. Let's see here, I'm getting compliments so thank you.

- [Nika] Hi Nicole, this is Nika, I just want to let you know we are out of time for this wonderful webinar today. So we'll just go ahead and tell any participants that have

further questions to please email you at your email address that's there on the screen. I just wanna thank you again for sharing all your knowledge and expertise with us, lots of great information so thank you so much and I hope everyone has a great rest of your day and join us again soon on occupationaltherapy.com. Thank you.

- Bye everybody, thank you.