



Episode #196

**Understanding Auditory Processing
Disorders with Dr. Donna Geffner**

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Debbie: Hello Donna, welcome to the podcast.

Dr. Geffner: I'm glad to be here.

Debbie: Well, I'm so pleased to bring you on the show is, I was mentioning before I hit record, I had heard you speak at the TECA conference last month and I was just kind of blown away by what you shared and this is a new topic for me and for this show. And so I'm really excited that you were able to come on and share with us today. So just maybe take a few minutes and tell us about the work that you do in the world and who you work with and maybe why you're on a mission to do this work.

Dr. Geffner: Thank you Debbie for giving me the opportunity. I've spent a lot of years. Of course, I was an academic, I was a university professor, I was the director of the speech and hearing center and graduate program and speech language pathology and audiology. But I had an opportunity to work with a number of professionals, psychiatrists, psychologists, over the years. And we've learned that many of the youngsters who wind up with a diagnosis of ADHD, have auditory processing disorders. And I began to study this. And you know, it's not a new disorder. This goes back to the 1950s with [Michael Bust] who studied auditory and perception, auditory agnosia. Um, and we saw it a good deal in brain damaged individuals and individuals with aphasia. But we find that children with no none brain dysfunction can have difficulty understanding what they hear. It's the inability to take in the auditory message, identify it, recognize it, discriminate it, listen under difficult listening conditions, and take it in, in a timely manner even with normal hearing. And what is, I guess very confusing to a parent is oftentimes the teacher will say, you know, I, your child is not listening or I have to repeat things. Or he asks "what" and the parent takes the child to the audiologist or to the pediatrician. They test the child's hearing. And low and behold, the child's hearing is normal. So they send them home and say, okay, well his hearing's normal. And we don't understand it, maybe it's ADHD. Well, it can be, because we have a lot of comorbidities with this, but it also can be an auditory processing disorder. And I want people to understand, professionals, teachers, parents, that this exists. This is not a language disorder or it can be associated with one, but it is an entity that stands alone as a disorder. And that is the inability to take in the auditory information and derive clarity from it and be able to listen under difficult listening conditions.

And according to the American Speech Language and Hearing Association and the Academy of Audiology, we see this occurring in youngsters and adults and they are a heterogeneous group. And often it is a very silent disability because we can't recognize it easily. Youngsters may very well sit in a classroom, be quiet and not participate. And one of the reasons is that they're just not hearing the teacher clearly. So it usually comes from children who have had longstanding otitis media with fluid or other problems in development, neuro development, immaturity of the auditory system, a myriad of reasons. And in the same token, it

can come from parental and familial genetic tendencies and often we don't always know, but we do know that there is a neuro biological reason for the interruption of the auditory system that reaches the brain and it's the brain that does the interpretation.

Dr. Geffner: The brain is what does the information and processing of the inflammation, but getting the message there requires clarity, requires speed. It requires integration of both ears and both acoustic hemispheres, auditory hemispheres. In order to do that, and for many youngsters, this is an issue and a problem and many show up when they reach upper grades, sometimes when the work is harder or the environment is more noisy and it's more information to process that we begin to see these breakdowns in their ability to attend and focus and listen. These are your listening individuals who tend to ask "what?" Who tend to say, "can you say it again?" They need repetition. And many of these youngsters also have reading problems because they can't hear the phonemes. They don't hear the differences in an "e" and an "eh" of a vowel. So they have difficulty with phonemic awareness skills in decoding. And those are the early building blocks of reading. And reading in the early years is very um, very auditory. And if the child can't make fine discrimination judgments among phonemes or hear differences among sound or put sounds together to form a word, he or she will struggle to learn to read with accuracy.

Debbie: Thank you for that. That's such a rich overview of auditory processing disorder. And what I'm hearing and what I gleaned from hearing your presentation to you is, you know, this is a very, it's a complex disorder and it can be co-morbid with other things. As you said, you just mentioned that these might be kids who say "what" a lot and are asking for things to be repeated. They might be demonstrating some reading problems. What are some other signs, you know, for listeners, a lot of my is parents and if they are listening to this thinking, Hmm, I wonder if this is something going on with my child. What are some signs that would indicate it's worth exploring further?

Dr. Geffner: Sure. Well that's a good question. For one thing, maybe these youngsters mishear. They may hear one word and they say it in another way, that that's what they heard. So we get mishearings and parents are very much aware of all tell me, yes, my child mishears uh, go to the car here, go to the can, something similar. And that translates to their own speech. They may not want to do their own speech, they may speak more loudly or softly or they mispronounce words because that's how they hear it. You know, a youngster doesn't know what he's supposed to hear, all he knows is what he does here. And so many times when I have a youngster in my office and I'm testing him or her and I ask her repeat a series of words, I can say hen and the child can say, then I can say bird and he can say, Burt, I can say not and he can hear, "na" without the final sound.

So there are incidences that we'll see where they break up the words, they don't hear it clearly. They do ask a lot of "whats," they use IQs to figure out what was being said. And if they're in an environment where it's noisy, it will only exacerbate the situation, it becomes difficult. And these are youngsters who definitely must be accommodated for, and not be placed in more noisy area.

Certainly away from doors, windows, where there's distractions and sounds. But these youngsters will quickly turn to where the outside noise is. They're distracted by other sounds on, they often will have difficulty locating where a sound may be coming from, which is localization. They might have difficulty processing something very spoken quickly. And I'll often ask the parents, do you find yourself slowing down when you speak to your child. And the answer is yes because they realize if they speak more slowly, they will be understood better. And yes, these are children, many of whom have what we call temporal processing problems. They don't hear it fast enough, they don't get the message quick enough. And so there's a delay in responding. And many of them will say, wait, what? Or what, wait. Because really they need that extra few seconds to process what they just heard.

Debbie: Is there a social component to this as well? Like a social understanding of their peers' behavior? What does that look like?

Dr. Geffner: Well, in many cases when a youngster can't keep up with his same age peers and, and we see an overflow from auditory processing problems into some language difficulties. These, your kids who don't pick up nuances, sarcasm, because they don't necessarily hear the toning of the voice that conveys that information. They don't pick up on duration characteristics that give information pertaining to a nonverbal message. They might not get non-literal language. They may have trouble with inferential language. But that all comes down to the fact that many of these youngsters just don't, or can't keep up with their same age peers in their communication and so they may not participate as much. They don't have as many friends, they feel or act more immaturity, or they also do poorly in school and they may have difficulty with listening tasks and comprehension, not understanding well, having trouble with reading. So they develop low self esteem. They're seen as "special ed kids" and therefore have a stigma associated with it. And then it becomes very demoralizing to many of these youngsters when we find kids with low self esteem feeling badly, feeling like they're broken, uh, something is wrong with them. It's not unusual that I've seen a child turn to his mother and cry and say, I know something's wrong with me. Why do you have to always show me? Or why do I have to be different? And so children can internalize these things and it impacts their ability to socialize with other children of the same age that they are. It involves their ability to participate in social activities. Some do withdraw from such and so they continue to grow, but not the good feelings about who they are and what they're capable of.

Debbie: I'd like to talk about the diagnostic process a little bit because as you're talking, it just occurs to me that there are probably many children with auditory processing disorders that are had that haven't been identified as such or they've been identified as something different. So I'm curious to know, could you tell us a little bit about what the assessment process looks like? When can parents, you know, identify these things in their kids and just take us inside that process a little bit?

Dr. Geffner: Sure, sure. Well, for one thing, you always must do a hearing test. We must rule out anything that's going on in the child's hearing. And it's not unusual that they,

for me, when I do a hearing, just to find that the child has a conductive hearing loss, that is a loss in the middle ear because of fluid or because of the allergies, or having constant colds, a large tonsils and adenoids or having sinusitis, which can cause an inflammation in the auditory system and fluid builds up. And when these children walk around with fluid in the ear or negative pressure, they don't hear clearly. You know, if you have a 20 to 40 decibel loss of hearing, you don't hear clearly. So that's number one. We have to be sure that hearing is normal and if hearing is normal, it doesn't mean they perceive speech as well.

And then they have normal hearing acuity for pure tones that we test. But when it comes to speech and the clarity of speech or the ability to listen in background noise or competing conditions, that becomes deteriorated. And that's where we start to see the perceptual difficulty. The hearing interception, which is what is a hallmark of auditory processing disorder. The inability to hear the clarity or be able to listen in competing conditions. So we do test and we provide difficult listening conditions. And one of the reasons we make it difficult is that we'll try to bring forth upper auditory pathways if we get more difficult. And therefore we're taxing upper pathways that lead to the auditory cortex. So a child will hear words that are coming in in each ear, different words in each ear at the same time. That's called dichotic listening. We can do sentences in each ear at the same time, but now the child has to listen to only one ear and not pay attention to the other ear.

And that's a binaural summation effect. It means upper auditory pathways are being stimulated and we need to now see how they integrate, how one kid suppressed the other pathway. We also give the youngster words that are muffled and we ask the youngster to figure out what the word is, that's a closure skill. And we use internal resources in order to do that. So for instance, you heard the word "caw ee ott," uh, it may come to mind that I said coffee pot, even though you didn't hear every single phoneme. Well, we all do this because we don't always hear a hundred percent of the time or get clarity. So we figure out what the word could be. And again, that's a closure technique. And so we test that ability, we test the child's discrimination in quiet and in noise for speech. And we also test the child's ability to take in words that may be staggered, words that are rapid or are time compressed sentences. They also test non-verbally... The child's ability to detect when one beep becomes two beeps because it is like by a narrow gap anywhere from one millisecond to 40 milliseconds. Most youngsters certainly can hear a gap between two tones of 20 to 40 milliseconds, that those who had trouble, may have trouble hearing the gap and certainly not recognizing a gap that's lower than 20 milliseconds. So that tells us about their timing, their ability to take advantage of small increments in time duration. You also can test pattern and pitch pattern discrimination and duration of pattern discrimination. That is, it tells us about can the individual recognize differences in pitch or differences in duration, timing long and short tones, and that's nonverbal tasks. Many people really want an audiologist use that because it's not all about testing their, their verbal processing skills as well. So we use nonverbal stimuli.

Many young individuals out there will test youngsters using electric physical measures. Well, there's one electrical visit that measure that I certainly use, I

think we all do as audiologists is the middle ear and the inner ear. We do auto-acoustic emissions, we do tympanometry, we do acoustic reflexes. So those are objective measures of how inner the inner ear is and the auditory nerve. Beyond that, there are audiologists that will do EEGs -- electroencephalograms. Or do ABRs -- auditory brainstem responses -- to see the integrity of the auditory nerve. Often if there is a problem in processing, it could be related to an eighth nerve, which is your auditory nerve, difficulty or dyssynchrony between the nerves of both ears. So we look at the function of the auditory nerve, and that's accomplished through ABR testing, auditory brainstem response testing, or what we call middle and late frequency, middle and late amplified testing to see how the youngster will respond. And this is objective measures because we do it by placing electrodes on various parts of the brain and the ear tip so that we can measure responses to clicks, which is speech, without the child's behavioral response. There have been incidences where a youngster may come in and act in a way or behaviorally to affect the results of the test and so on. There are many audiologists that will enjoy using electrophysical measures, which are more objective.

So a battery can vary and we don't have any true gold standard to any set battery, but there are a number of very fine tests out there that are standardized, that norm reference test, that give us a great deal of information. And many times we test youngsters against their same age peers. So if I have an eight year old, I know an eight year old should be doing on these tasks and I mentioned this particular child's performance against his same age peers and I drive information as to whether or not the youngster is performing the same or less than or as good as, and that tells me a good deal of information.

Debbie: And so you mentioned testing an eight year old against his or her same age peers. So is there an age that's too young to do this testing or an ideal age?

Dr. Geffner: Well, I think, and I'm very glad you asked that Debbie, because uh, we don't have any data to refute the myth that these children can't be tested before the age of eight or seven. It was at one point believed to be the case because we didn't have the instruments or the tests that would norm down to those levels. But now we do. Now we have a handful of tests from the age five and above. And I am very fortunate to have the opportunity to research this and develop a test with Pearson publications, which is a worldwide publisher, and study it for four years and obtain data on hundreds and hundreds of youngsters that we can now test kids as early as three and a half, and certainly four, four and a half, and five. And what we found is that, as in children of that young, we know what three and a half year old youngsters could be doing and they can listen in quiet and in noise. We can test speech in noise. And what has come out subsequent to this test, which is called the auditory skills assessment, is some work coming out of Brain Volts Laboratory at Northwestern, is that youngsters who have difficulty discriminating in noise, hearing speech and noise, are often those at risk for reading problems later on. Certainly by kindergarten. And the children have difficulty listening in "the din" of the kindergarten noise of those who have trouble will have trouble in learning to read. So there's a real connection and association between the skill of listening acutely and being able to read. So my

contention is, let's test children as early as we can, we see certain behaviors, signs, we have tests that can give us information and if we find it very young child who is three and a half or four who does not perform as other youngsters his age and he becomes an aggressed child and we do things to help him.

We do things to intervene. We build up those listening skills, those early reading skills. So by the time the child reaches kindergarten, he will be functioning like his same age peers and we haven't lost valuable years of neuroplasticity. And neuroplasticity is a very critical concept. The brain is plastic, it's plastic throughout life. So we know that you can teach old dogs new tricks. But it's more plastic in it's younger brain. And the earlier we get to these young ages and better than remediation, the faster, the quicker and the more efficient. So my soapbox plea is for those teachers and preschool teachers and parents who see youngsters struggling with auditory information and taking in auditory information who need a lot of repetition, or youngsters who should be at least screen to see if they have any auditory processing problems so we can do something about it.

Debbie: And so I'm wondering, you mentioned earlier about accommodations too. So it sounds like the earlier the better in terms of tapping into a child's malleable brain and making some real changes there that would, will help them be more on track with their same age peers. What kind of supports and accommodations might we suggest for in the classroom for kids with auditory processing disorder?

Dr. Geffner: Well for one thing, we want them to be seated properly, away from doors and windows and noise. One youngster I saw last week, they put them near the air conditioning unit and he couldn't function in the classroom. So we want to avoid that. Uh, we want them to be away from noisy other children. And of course the smaller size classes is better. We can't always achieve that in a public school system. But the smaller class, the closer, the one-to-one ratio of teacher to student is always preferred. And if it can't be, we do have sound enhancement systems. We do have fabulous FM systems that can accommodate these youngsters because what that individual does is wear either a set of headphones or small little behind the ear AIDS that look like hearing AIDS and their little FM units and the teacher wears the microphone and they hear the teacher's voice as if the teacher's talking to him or to her directly.

It blocks out background noise, it brings the signal in clearer. And so the youngster now can hear clear speech. There is no substitute for the need to hear clear speech. It's as if the child who has a visual problem looks at the board and can see the letters when we put glasses on his eyes and now we can see the board, he can read the letters, you read the words. So the child is wearing an FM system, either through a sound enhanced system or an individual unit through headphones or binaural FM AIDS, can now hear clearly, can even monitor his or her own speech, can help with phonological awareness skills for reading and be able to follow directions. And be less embarrassed to have to ask the teacher to repeat. And it makes it so much easier and there's less listening fatigue. There's

less teacher fatigue and the teacher doesn't have to repeat as often or raise her voice.

Dr. Geffner: It also establishes better eye contact with the youngster. So we have lots of great data about the use of FM systems. Uh, one of the important data points, is not only better attention and focus, but our eye contact, and children know who to look to. Children are able to process language better. So we do see this and we also see as a result of pet scan studies and the auditory cortex that if a child wears an FM system over time, that usually a school year, within six to eight hour school day and wears it consistently, they see more activation in the left temporal lobe area, which is your ultimate prime area for reception of sound, so that that part of the brain gets stimulated and thus results in their hearing over time. So wearing an FM system is not just a management approach to the job. You're better at the moment. It is a therapeutic approach in that it improves the auditory system. And I think once I explained that to parents or teachers, I think there's a greater emphasis on wearing it, wearing it consistently.

Debbie: You mentioned earlier that auditory processing disorder can often be co-morbid with ADHD. And I'm wondering if in your practice or in your experience, you've seen students come in who have been misdiagnosed with ADHD, when it's, when it's really APD.

Dr. Geffner: Yes, that is true. But then we can't negate the fact that it's not necessarily either/or. Years back when I was a university professor and I had the wonderful help of grad assistants, we looked at over 425 files of individuals who had auditory processing disorders in my caseload. And we found 42% of them had diagnosed ADHD and another 42% did have attention factors but not necessarily diagnosed because either they were not seen by a psychiatrist or psychologist, but their symptoms were presented as as if they had attention deficit. So, um, that's about if we wanted to add it up, we've got like 84% hit rate. Now, I will say that a published study by Shawmer and Al in the 2006 American Speech Language Hearing Association Journal of Research did indicate that when she looked at a hundred children who were diagnosed with central auditory processing disorder, only 4% in that population had no other comorbid conditions.

And the most common comorbid conditions were reading disability and ADHD. Now the way I like to differentiate it is ADHD is problem in self-regulation. We often see a lot of executive function problems. So if a youngster comes in and has difficulty and they have very shared common symptoms, that is, the child with ADHD will not necessarily pay attention to auditory stimuli, will easily be distracted by auditory stimuli, ask a lot of "whats" or say a lot of "wait, what" questions, they need repetition so they present with very similar symptoms. But the way I differentiate it is that there's an organizational characteristic to ADHD. These are kids who can't self-regulate, core organizational skills, difficulty in prioritizing difficulty, and finishing or initiating a task. And a child with an auditory processing disorder doesn't necessarily have these behavioral symptoms. They may, but it's not a primary symptom of their disorder. So there are differences. Um, sometimes I can tell when I call the parents to schedule an appointment, I hear the youngster in the background, crying or saying, I need

you, I need you, asking for attention, being disruptive, And therefore we have more of attentional or behavioral issues going on. But they can occur, they can both occur.

Debbie: Yeah. So, so interesting. I'm always trying to put myself in my, my listeners minds to see what questions they would want to ask. And I think that there are parents who have kind of like a laundry list, right, of diagnoses or identifications for their kids. And so that's really helpful. Let me ask you one last question. For parents who are suspecting or, or they know that this is going on with their child, we talked about accommodations in the classroom. Is there anything that parents should be aware of or can work on at home with their kids to support them?

Dr. Geffner: Yeah. And Debbie, I didn't mention which I should have a minute ago is that speech language therapy is wonderful for remediation. And these are youngsters, who have a phonological processing disorder that is, they can't blend sounds together, they can't tell you how many sounds they hear in a word, can't manipulate sounds, can't no witness sound is being deleted or added. Those can be taught. That's a very successful therapy program. There's some wonderful programs out there. The phonemic synthesis program, wonderful programs in CDs that have been developed to work with these skills and youngsters do get better. They get better. There's other skills that can be trained through speech and language services. And I will say that often if we find a kid with an auditory processing disorder, really like an their language skills, receptive and expressive, many youngsters have weak comprehension, inability to understand what we said to them and that tool can be trained and developed and improved upon.

For the speech language pathologists and in addition or in concert with the speech language pathologist, they often have a wonderful web-based programs today, lots of programs around the web programs like Fast Forward, which works on tempo processing and attention and sequencing, memory, decoding, youngsters are on it and it's a concentrated problem. You do it five out of seven days a week for 30 minutes a day over several weeks, several months. You can do programs like Cap Dots which work on dichotic skills and integration. Lots of good apps out there. Pocket Phonics and Pocket Phonics Sentences. So there's lots of programs that will build up the auditory skills for phonics and following directions, working on discrimination skills, working with a speech language pathologist on listening better in noise and figure ground skill. And then ultimately on language skills. Keep in mind many of these youngsters, because they don't always get the message clearly, don't always use appropriate social language. You don't always pick up on nuances or sarcasm. So that's where a speech language pathologist can play a role in helping that youngster to make those discriminations judgements and to understand when something was said sarcastically as opposed to a real answer. So helping that youngster to make those discrimination judgments is very important in a therapeutic approach.

Debbie: Fantastic. Thank you for that. So first of all, I feel like there are a ton of resources that I want to share with listeners. So listeners, I'm going to make sure to include everything that Dr. Geffner has mentioned in the show notes pages. But are there

any other resources that parents listening need to know about that you didn't cover?

Dr. Geffner: Yes. Well, for one, I think they should know about our national associations. The American Speech Language and a Hearing Association does have guidelines. You could go into their website under consumer and pull up information about auditory processing disorders. The American Academy of Audiology also has a website and one can pull up information for the consumer about auditory processing disorders. there's the IGATS group - the International Group of Auditory Processing Specialists that do communicate...I'm on their wonderful listserv and we talk to each other all over the world and we share our experiences and our knowledge and it's become a true community of those of us who do auditory processing testing. But there are others. The CDC, the Center for Disease Control has information on it as well. So, uh, there's my website, drdonnageffner.com, I do have a section about it.

Uh, and we also have another website on auditoryprocessing.com that Deborah Swain and myself have produced. So we have information out there on the web that can be helpful. I also have a textbook, uh, Auditory Processing Disorders: Assessment, Management, and Treatment, which I have to say I edited, I didn't write the entire book, but it's a wonderful compilation of chapters written by experts all over the world about auditory processing. But we have other wonderful textbooks out there, other workbooks by other authors that have studied this area, uh, and have taught us a good deal about auditory processing. Dulles has done wonderful work with that coming out of University of Massachusetts, who has been a wonderful resource for these areas as well. So there are lots of wonderful authors and writers and researchers that get this new information every single day.

Debbie: Fantastic. Thanks for sharing those. And again, I will list these on the show notes page. But for now I just want to say thank you so much for coming by and sharing with us. Again, this is a new topic for the show, which at 180 plus episodes is not something I say very often. So I really appreciate you sharing with us today and telling us more about your work.

Dr. Geffner: Oh, thank you. I'm glad I had the opportunity. And also, I don't want to neglect the fact that many of these youngsters are twice exceptional. They could be bright. They could be competent youngsters, but they also can have some perceptual difficulties which get them into that category. So thank you for giving me the opportunity to share information and to provide enlightenment to people out there who may have questions. So I am very grateful to you too Debbie.

RESOURCES MENTIONED:

- Dr. Geffner's website
- *Auditory Processing Disorder: Assessment, Management, and Treatment* by Donna Geffner and Deborah Ross-Swain
- *Auditory Skills Assessment (ASA) Pearson Assessments* by Donna Geffner PhD and Ronald Goldman, PhD
- American Speech Language Hearing Association
- The American Academy of Audiology
- International Guild of Auditory Processing Specialists
- CDC Speech and Language Disorders in Children
- Fast Forward
- CAPDOTS
- Pocket Phonics