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## Early Development of Children with Hearing Loss: Interview with Susan Nittrouer, PhD

Douglas L. Beck, AuD, speaks with Dr. Nittrouer about language development, sign language, adoption, cochlear implants, and her new book, *Early Development of Children with Hearing Loss* (published by Plural Publishing).

**Academy:** Hi, Susan. Thanks for chatting with me this morning.

**Nittrouer:** Hi, Doug. It's my pleasure. Thanks for the invitation.

**Academy:** You're welcome. You wrote one of those books that made me feel like I already knew you, as you wove a bit of your personal story into an incredible research project.

**Nittrouer:** Thanks. That's kind of you.

**Academy:** Let's start sort of at the beginning. When and where did you get your PhD?

**Nittrouer:** I earned my doctorate from the City University of New York back in 1985.

**Academy:** Oh yes, that was such a great program. Irv Hochberg was the chair and Harry Levitt and Arthur Boothroyd were both there—that must've been very exciting.

**Nittrouer:** Exactly. We had a wealth of talent all around us and it was an amazing experience.

**Academy:** Susan, your personal story is fascinating, and some of it's revealed in the book...so if you don't mind, I'd like to ask you to review your personal journey a little, and then we'll get into the study.

**Nittrouer:** Okay, well, I began as a teacher of the deaf. In particular, it was my task to teach speech and language to deaf children in the 1970s. Back then, I actually thought we were doing a pretty good job based on what we knew and the tools we had.

**Academy:** And just to clarify, that was some 10 years before cochlear implants were FDA approved for children in the mid 1980s.

**Nittrouer:** Exactly. So we struggled with gain, feedback, repairs, and failures in those early amplification devices and those frustrations were part of the day-to-day issues. It was tough, but we believed in the mission and tried to do our best. However, in retrospect, we were inconsistent partly because the tools were not as good as they are today and we had gaps in our knowledge and understanding. So that inspired me to go back and get my PhD. I thought if there was a better way to teach spoken language to children with hearing loss—I needed to know what that was. If there wasn't, I wanted to help find one.

**Academy:** But to get from there to here, you have to first study normal language processes, right?

**Nittrouer:** Yes. That's what got me a little side-tracked. You see, I was very interested in the normal process of language development from the very beginning of my career. That was an area of enormous interest for me.

**Academy:** And with regard to normal language development, I know you have some thoughts related to how cochlear implants helped enlighten you with regard to normal language development?

**Nittrouer:** Yes. Thanks for asking. You see there has been a broad perspective and understanding as to how people understand and interpret speech. Basically, investigators have traditionally thought we harvest acoustic cues and put them together to derive strings of phonetic segments. However, if that's the whole game plan, that is, if all we do is gather acoustic cues and assemble phonetic segments, then cochlear implants would not work! Cochlear implants do not provide those traditional acoustic cues! And so some of us went back and re-examined our first assumptions and beliefs as to how language develops. Nonetheless, as I've detailed in the book, the children who develop language using modern cochlear implants do very well—but they still don't achieve all they might have, had they not had hearing loss.

**Academy:** Susan, please tell me your primary research questions as well as what you did and what you found?

**Nittrouer:** Well, the book details and represents a five-year study that examined outcomes for 205 young children, most of them with hearing loss. They were tested between 12 and 48 months of age on their six-month birthdays. The study began with three independent questions and variables:

1. Age of identification
2. Whether or not using signs with spoken language had a facilitative effect on the learning of spoken language, and

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### 3. How are children with cochlear implants doing these days

We were able to enlist children from many areas of the country. The essential outcome was children with hearing loss have been moved into the ballpark of children with typical language development—but we're not actually hitting many homeruns just yet!

Nonetheless, early identification is going very well, modern technology is doing its job very well, and so the primary area for improvement rests with how we provide intervention, how much we provide, and how consistently we provide it everywhere. We need to self-examine and question what we do and how we do it. That is, rather than just updating, sometimes we need to shake it up or start over to incorporate new information into our habilitative and rehabilitative protocols.

**Academy:** I agree. That makes perfect sense. Let's talk about a few key points from the book. First, please tell me a little from your findings related to the age of identification of hearing loss as it relates to sign and spoken language?

**Nittrouer:** One major finding from the study was when sign language was used to supplement spoken language, there was no effect on the spoken language of children identified with hearing loss below one year of age. However, for children identified at one year of age or older, there is a negative effect—that is, when you combine spoken language and sign language in children over one year of age, their spoken language suffers.

**Academy:** That's amazing. I really am quite surprised by that. So it seems to reinforce that there is a critical period related to language development?

**Nittrouer:** Yes. There seems to be something akin to a critical period for language development. Here it seems to have been revealed mainly by the fact that there is an age beyond which children—at least those with hearing loss—have difficulty acquiring two language systems. Again, for children who weren't being signed to, there was no effect on their spoken language related to their age of identification. But that finding shouldn't be interpreted as showing that age of identification isn't important to long-term outcomes.

I think the reason we didn't find a stronger effect of age of identification for the children who were not being signed to, was that language development was generally constrained for the children with hearing loss. An implication of all this is that early identification and early management are particularly important, indeed critical, for excellent long-term outcomes. And as we mentioned earlier, many of these children end up flying just under the radar. They are developing language, but they are not developing language concomitant with their full potential—had they not had hearing loss. They develop enough to get by, but they aren't developing the same rich foundation as they might have otherwise—and that likely becomes increasingly important as they age and get into the later elementary school grades.

When language and social demands increase, these children often don't have the language capacity to handle it and multiple social, behavioral, and academic problems can emerge. For example, when children are learning new vocabulary and they need to rapidly hear and process what is being said in the classroom, it's easy for the child with a poorer language foundation to just tune out because he or she cannot handle it as well as a normal hearing child. This starts a cycle of frustration and falling behind, and it appears as inattention or an attention deficit—but it may well be rooted in hearing loss and associated linguistic problems and issues.

As you can imagine, it might even be the case that some aspects of some intervention methods, no matter how well intentioned, might actually contribute to these kinds of deficits. In particular, this might occur when children are diagnosed with disorders largely based only on behavioral rating scales.

**Academy:** Excellent point. Okay, changing subject dramatically...please tell me about your adopted daughters!

**Nittrouer:** I adopted my first child from Wuxi, China, which is about 25 kilometers west of Shang Hai. The adoption came about because one day I turned around and noticed I was in my 40s, and I said to myself "Oh my gosh—I forgot to get married and have children!"

**Academy:** Yes, that can happen!

**Nittrouer:** I decided it would be great to adopt children, and so I started with one and then two years later adopted a second child.

**Academy:** And how old are they now?

**Nittrouer:** Emily is 13 and Allison is 11 years old. Fortunately, Emily was only 9 months old when I adopted her and Allison was only 4 months old.

**Academy:** And so as far as their language development, they were each very early in the process, which some people describe as the "pruning process." Specifically, during the pruning process, theoretically, all languages are still reasonable options and they haven't quite listened enough to their own language to "prune" sounds out of their language repertoire?

**Nittrouer:** Right, and as we discovered, my older child has hearing loss essentially in the high frequencies and she also had horrible chronic ear disease, so we had to work through all of that. Consequently her diagnosis came about late, when she was just about three years old and she only had 10 words. Fortunately, she went to the Omaha Hearing School in the preschool years, which was an extraordinary experience for her and for me. She made fabulous progress, but then in late elementary school, she did start having language problems. And as we discussed, many children in this situation have "good enough" language skills that they fly just under the radar and so they're not likely to get the services they need.

**Academy:** Susan, thanks so much for your time today and for speaking with me about your book. I've enjoyed discussing these issues and I certainly learned a great deal reading the book. Best of luck to you in your research and clinical work, and all the best to you and your daughters!

**Nittrouer:** Thanks, Doug. It's really been fun chatting with you, too.

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