

# Pediatric Audiology and Hearing in Children: Interview with Jerry Northern PhD

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Douglas L. Beck, AuD, spoke with Dr. Northern about hearing aids, including intelligent and advanced features, noise reduction, frequency lowering, remote microphones, and more.



**Academy:** Good morning, Jerry. It is always great to chat with you.

**Northern:** Hi, Doug. Good to catch up with you, too.

**Academy:** I absolutely knew the day would come, that I would be reading the news from the world of audiology and I'd see that the sixth edition of *Hearing in Children* had been published! Congratulations on yet another edition of this excellent text. Please tell me what inspired you?

**Northern:** Well, let me start by saying this is indeed the sixth and *final* edition! As you know, this new edition of *Hearing in Children* is dedicated to my very dear friend and colleague Dr. Marion P. Downs, as she spent 60 years of her career focused on pediatric audiology. But with specific regard to your question, it's been more than a dozen years since the fifth edition was published in 2002 and so much has changed in pediatric audiology!

Some of my colleagues had mentioned (in a kind way!) that the fifth edition was actually outdated, and over the past few years, they have been enthusiastically encouraging me to write a new and updated text for use in their pediatric audiology classes. So, in view of my slow transition into retirement, I somehow thought I had yet one more edition in me...and so I started typing. Just to

confirm that “things have changed” in pediatric audiology during the past 12 years, this newly revised sixth edition is some new 300 pages longer than the fifth edition!

**Academy:** And, I see that this text is an all new, total rewrite. In fact, I would be remiss if I didn't note the entire book was written by you—with the exception of what Marion Downs refers to contributions as her “few meager paragraphs,” since the first edition in 1974. And that's an important point...because this text is written entirely by you, rather than a group of authors, it speaks from one voice and in that respect demonstrates internal consistency.

Of course, for our undergrads and doctoral students, it makes it easier to grasp the ideas and concepts. And, let me share one story about the prominence of the previous editions of *Hearing in Children* used around the world: You and I were speaking together in England doing a series of lectures on pediatric audiology, and the entire series was directed at audiology students. The presentations went very well. Finally, when we reached the end of the first day, I'll never forget the line of students who brought their previous editions of *Hearing in Children* with them for you to autograph! In their eyes you were a real rock star!

**Northern:** Thanks, Doug. Yes, that was a lot of fun and it's always a great feeling to have something like that happen.

**Academy:** Okay then, let's talk about the sixth edition of *Hearing in Children*. How long did it actually take to write?

**Northern:** Well, it took me almost three years. I had a few false starts and distractions, but three years later, it was complete...and let me add that Dr. Deborah Hayes, a noted pediatric audiologist in her own right, was very instrumental in pushing this whole project forward, and I am very grateful for her inspiration, encouragement and support. Dr. Hayes helped me understand that the book needed to be updated to the AuD level for our doctoral-level audiology students. Of course, one thing that separates this book from the others is that it's written as a comprehensive overview of the many aspects of pediatric audiology. There are currently available several excellent texts that address, in detail and depth, various clinical aspects important to pediatric audiologists such as selection and fitting of hearing aids, and other books on pediatric cochlear implants, and others on family counseling, on others on behavioral and/or physiological testing and more.

In the early years, we did not have the availability of so many specific topic textbooks. My idea for this sixth edition was to write a comprehensive summary of the current status (2014) of pediatric audiology. Students seeking more information about specific topics are referred to current journal articles and other textbooks rather than for me to try and present a detailed representation of all pediatric topics complements. The material in my book will lead students to outside readings to develop their research topics in more depth.

**Academy:** I agree, and, again, I have to say, it's a rare text in audiology written from one voice with consistent thoughts and ideas throughout the entire book. So as you think through the hundreds of topics within the book, what are the biggest changes in content, and perhaps in the profession, between the timing and the text of the fifth and the sixth editions?

**Northern:** There really are hundreds, maybe thousands? After deleting the dated content of the book, I realized it would require an entirely new re-write. My goal was to maintain our important and valuable medical connection with pediatric audiology. I enhanced and expanded the genetics and

embryology sections of the book, focused on family-centered management approaches, added a great deal of material on auditory processing and auditory neuropathy spectrum disorder, and thoroughly updated and added to the ever-useful Appendix of Hearing Disorders and Syndromes.

The last decade has been all about technology developments that apply to pediatric audiology. Certainly, one striking change is the ever-growing successful impact of cochlear implants on children with significant hearing loss. Of course, 12 years ago the potential of pediatric cochlear implants was taking shape, and perhaps some of us thought that CIs couldn't get even more prominent and useful, but now they're even more prominent and more useful and the results for hearing impaired children cannot be denied; the results with pediatric CIs for children are stellar. Of course, the improvements in digital hearing aids have been also been very dramatic, too, over the last twelve years.

**Academy:** For example?

**Northern:** Can you imagine our routine pediatric fitting in the 1970s was a body aid, worn by little tykes in a heavy leather pocket harness, with binaural stimulation provided by a Y-cord? Perhaps the improvement most appreciated by the children, parents and pediatric audiologists has been the advent of feedback suppression circuitry—in those early years we needed to use power hearing aids but had to couple them to extremely tight earmolds to prevent acoustic feedback. Nowadays, feedback suppression helps make these fittings easier and reduces the need for constant earmold replacement.

**Academy:** So let me ask your thoughts on a few specifics with regard to fitting hearing aid amplification on children.

**Northern:** Sure, go ahead.

**Academy:** Do you think we should use advanced, top-shelf, intelligent automatic hearing aid features such as digital noise reduction, adaptive directionality and extended bandwidths for all children (with appropriate hearing loss, such as mild-moderate-severe sensorineural hearing loss) most or all the time?

**Northern:** Indeed I do...why not? The few studies in the contemporary literature indicate these smart technologies can be used by children, just like adults, and they are likely beneficial. Frankly, I cannot imagine denying children access to these important amplification features. We cannot do extensive research with these advanced features in young children as we really don't have sufficiently sensitive tests to document differences in functional performance. However, when these features are well-fitted with best practice protocols, and are verified and validated, they may increase speech recognition in adults. Most importantly, use of these features does not negatively impact speech perception in adults. So yes, it seems to me, they should be used for children unless there is a clear contraindication.

**Academy:** Jerry, let me ask you to address the importance of wireless FM and remote microphones for children. Harvey Dillon recently noted that wireless microphone systems should be used any time the child is more than a meter from the teacher, or the person speaking. Do you agree?

**Northern:** Yes, I do. FM technology is the most under-used technology in our armamentarium. Children with significant hearing loss should be using FM technology 24/7—not just in the school classroom. I suppose it is always about the additional cost – although no one seems to blink at the

cost of cochlear implants? If we go back a decade or two, we were all speaking about classroom lighting, visualization of the teacher and preferential seating in the classroom—all of which are important, but now we have excellent technologies which preserve the SNR at the teacher's mouth and the listener's ear. This is an undeniable benefit and a vast improvement for the child's learning environment.

**Academy:** I agree. And I believe you've previously addressed this as one of the most important issues in pediatric audiology?

**Northern:** Yes, exactly. To me, the one of the most significant failures in pediatric audiology has been our inability to provide remote microphone access to children in the schools, in their home, and during their extracurricular activities, too. These relatively inexpensive, high-quality remote microphones can maintain a SNR of 10, 15, or maybe 20 dB. They are highly beneficial I agree, but they need to be used throughout the day, every child, all the time. Perhaps the new apps that couple smart phones to hearing aids can be used as a wireless microphone system for our aided children and will help us achieve this needed 24/7 FM advantage?

**Academy:** Okay, let's move into the topic of frequency lowering. Your thoughts, please?

**Northern:** Well, I think you and I agree that the issue is clear. We need outcomes-based data (i.e., evidence-based science!) to prove frequency lowering is efficacious with regard to long term speech perception and auditory processing of speech in children (and speech-in-noise in particular). I have seen some small sample reports of children here and there who have done well with frequency lowering, but it may be that as many children have not done well which, of course, does not show up in the literature. Frequency-lowering should not be the automatic fitting standard for every child with hearing loss. So, we try to guide ourselves by the child's degree and slope of hearing loss to determine which frequency lowering paradigms to apply. And yes, we still have many questions regarding frequency lowering...such as which of the four frequencies lowering technologies available to us is the best for which child? What are the specific selection criteria for the children? What are the aural rehabilitation strategies that will maximize hearing and listening for that child with that particular technology? What are the long term outcomes for the child...what happen if the child needs a new hearing aid in 3 to 5 or 7 years and what if that particular frequency lowering technology is no longer available? If this strategy is so powerful why isn't it used with adults? And most importantly, where are the data? So to be clear, Doug, like you, I am not opposed to frequency lowering, but we need better and stronger data that supports it before we just accept it as the pediatric hearing aid fitting default program.

**Academy:** Lots to think about, all good points! Jerry, it's been wonderful catching up with you. Thanks for sharing your thoughts on these issues and congratulations again for the wonderful new sixth edition of *Hearing in Children*. I know the book will be remarkably successful and I'll look forward to the next time our paths cross!

**Northern:** Thanks Doug. Always a pleasure working with you and I appreciate your interest in my new edition and your continued interest in pediatric audiology.

*Jerry Northern, PhD, is professor emeritus at the University of Colorado School of Medicine. He is also an Academy founding member, third president of the American Academy of Audiology, and author of the sixth edition of Hearing in Children.*

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