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Earmold Options for Wideband Hearing Aids

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> Mead C. Killion
> Journal of Speech and Hearing Disorders, 46, 10-20. 1981.

SOMETHING ABOUT MEAD

I have long since recycled many of my old paper journals, including my *JASA*s going back years, but there are a few paper issues of journals still on my bookshelf, and this 1981 *Journal of Speech and Hearing Disorders* (ASHA) publication of Mead's is one of them. This actually came out about the time of my very first job in Audiology at the Canadian Hearing Society — for one of my first staff meetings, I was asked to review this article and give a summary for the other audiologists. Prior to this article, I only had Robyn Cox's 1979 Monograph in earmold acoustics (which is also still on my bookshelf), but this article opened up an entirely new area of clinical work. For the first time we could fit hearing aids that nominally had a frequency response going up to 3800 Hz with an earmold that could extend the output beyond 5000 or 6000 Hz. I recall reading something in the Appendix that I thought was wrong- he had an "amplification ruler" that could be used to simplify length characteristics for earmold tubing. I think it was off by 1 mm? In any event, as a young audiologist, I wrote a letter to Dr. Killion (it was 1981 and before the Internet). A week or so later, I was called out of the clinic for a phone call from Dr. Killion; I quickly excused myself and took the call. He complimented me on my knowledge but pointed out that he didn't want a resonance in the 8CR earmold described in his article to be exactly at 2700 Hz, but slightly off that (because it "sounded better"), so his ruler was correct. This began a long relationship, but this was my first — a great communicator and someone who loved our field and supported early-career audiologists in any way he could!

SUMMARY

I didn't need to go back to this article because I'd memorized it by heart. Using knowledge of "quarter wavelength resonators" and the "acoustic transformer effect" (also known as the "horn effect" Mead was able to show the improved high frequency sound transmission of a number of earmolds that any earmold manufacturer could make. Among them was the most important (and commonly used in the 1980s and beyond) was the 8CR which stood for an earmold that extended the bandwidth of the hearing aid up to 8000 Hz and also re-established the 2700 Hz ear canal resonance (or as Mead would encourage us to write "earcanal" as one word). This became the standard for virtually all of my patients. The 8CR earmold introduced us to the use of acoustic

filters where a judicious use of both 680 ohm and 1500 ohm filters resulted in a smooth frequency response. Of special importance in this article (which was a summary of the acoustics part of Mead's PhD studies) was his Appendix. The Appendix (along with Robyn Cox's 1979 monograph) could be the basis of any earmold acoustics course, and indeed did function as that.

> Annotated by: Marshall Chasin