

# AN ACOUSTICIAN'S JOURNEY INTO HEARING AIDS

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## 1 Introduction

Scientific papers are not generally written in the first person. But, as the title suggests, this is a story about a personal journey so the author will beg the readers' forgiveness if the writing lapses into I's, my's and me's. Apologies in advance for a less technical, storytelling type of paper. I hope it might help someone.

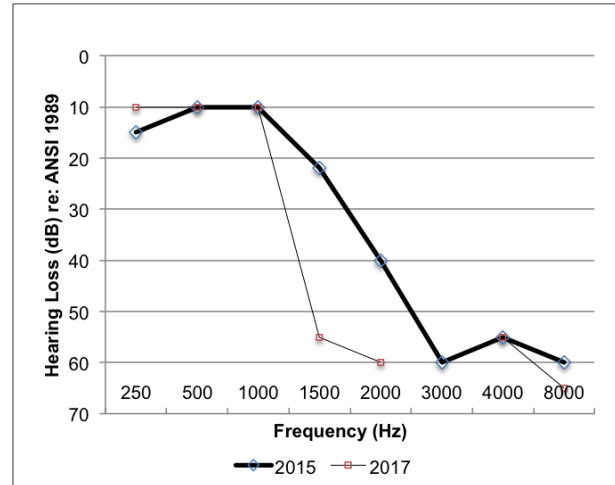
There is a perception that an acoustician must have "golden ears". That is, they are uniquely set with such superior auditory processing that the application of science is rendered superfluous. This perception persists in spite of the fact that it is at least two generations out of date. Creativity married to science is the answer these days. Still, it is an absolute anathema for an acoustician to wear hearing aids. It doesn't look good. It's alright for an artist or an architect to wear glasses. An acoustician should never don a pair of hearing aids. But that's exactly what I've done. I was fitted with hearing aids two years ago. I'm not supposed to be talking about this but I will. And I'm glad I have my hearing aids. I hope this story will encourage other acousticians to consider hearing aids, whether they know they need them or not.

## 2 The beginning of the journey

It's difficult for someone seen as an expert in acoustics to admit that he or she has a hearing loss. I wouldn't admit it for years.

But I am fortunate enough to have an audiologist as my wife. We met at ISVR in Southampton when we were doing our respective Masters' degrees. Over the dinner table a few years ago she told me, judging by my increasing difficulties understanding conversation and the kind of mistakes I was making, that I probably had a hearing loss of 35 dB at 2000 Hz. When she finally measured my hearing it turns out she was spot on. 35 dB down at 2000 Hz. 35 dB is about the same Transmission Loss you would get from of a heavy and very well sealed door. 2000 Hz is the range of consonant frequencies that are critical for good speech discrimination. Phonemes like p, t and k are all clustered around this frequency. And so many words in English are defined by one differing phoneme – such as tin, pin and kin, for example. Three words easily confused if you can't hear the phonemes. These high frequencies are the sounds that give words in Western languages their clarity. Stage actors, opera singers and, for that matter, the great Louis Armstrong all over-emphasise their consonants so they can be understood at the back of the room. Problem was, I couldn't hear those consonants anymore. I was behind a heavy, well-sealed

door.



**Figure 1:** The author's right ear audiograms showing the original 35 dB loss at 2000 Hz in 2015 and how it has progressed down to 1500 Hz in 2017.

## 3 The awakening

I was fitted with my hearing aids two years ago. The first few months were bliss. I could hear the world come alive again. I was warned that hearing aids would give me too much noise and that it would take a while to get used to it. It's true; I could hear my middle age bones crackle too much. The floorboards in our hundred year old house made more noise than they used to. The sound of the wind in the trees that surround our house enthralled me. But none of this was noise. Here's the thing, I design the sound in buildings, theatres and concert halls because I love sound. And if I can hear sound better in the most important building in my life – our home – that's a good thing!

I could hear the consonants, at least for a while, but my speech discrimination was only slowly improving. My brain hadn't had to figure those sounds out for a while. It's something called neuro-plasticity. The brain is a bit like a muscle. If there are parts of it you're not exercising, they fade away. But with new found exercise (i.e. my hearing aids) those parts of my brain will start to figure things out again. Initially my feeble brain couldn't figure out all those k's and t's that I hadn't really heard for so long. It was supposed to take about 6 months for neuro-plasticity to kick in. But it hasn't really happened as planned.

## 4 The continuing journey

Copies of the author's audiograms are shown in Figure 1. The first is from 2015 when I was first diagnosed and the

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second is from 2017. Only the right ear audiograms are shown for the sake of clarity. (The left ear is essentially the same as the right.) As mentioned, I have a 35 dB loss at 2000 Hz, that's shown in the 2015 audiogram. By 2017, that 35 dB loss had moved down in frequency to 1500 Hz. That's why I was continuing to have trouble with speech discrimination. My hearing aids have been adjusted accordingly so hopefully my neuro-plastic learning can start up again.

## 5 Comments and reflections

I'm a middle-aged man in a profession where I really shouldn't be seen wearing hearing aids – or writing about it for that matter. I don't really care.

There's something much more important than that. There is a stigma that still persists about wearing hearing aids and it extends to children. This is an area of study that I have become very much interested in because of my experience with hearing loss. Pittman has shown that a hard of hearing child needs to hear a word three times more frequently than a normally hearing child in order to understand that word and to incorporate it into his or her lexicon [1]. One study, in the early 1980s found that classroom noise alone accounted for 50% to 75% of the variance of reading delays of 1 year or more in elementary school students [2] – and that was for a normal hearing population. Too much reverberation in a classroom will impede speech. For the Hard of Hearing, this problem is exacerbated. ANSI recommends a maximum Reverberation Time of 0.6 to 0.7 seconds in classrooms. For the Hard of Hearing, Crandell has found that it should be shorter, in the range of 0.4 to 0.5 seconds [3]. Hearing aids and the early detection of their need can help address this.

Some parents with a hard of hearing child don't want to admit it. That's a mistake. And the child will pay for it. During elementary school they're effectively behind that heavy wooden door, standing outside in the corridor. It's pretty hard to hear the teacher that way. And in the early years – the most plastic of neuro-plasticity – they are still learning language. If they can't do that during the critical early learning period, they're going to have trouble with learning throughout their education, which, indeed, they may shorten to their own detriment.

What's interesting is there seems to be a bit of a generation gap when it comes to hearing aids for children. Recently, my wife prescribed hearing aids for a little boy. His mother wanted skin toned hearing aids, perhaps so no one would notice. He wanted the purple dinosaur hearing aids because they were cool. As, indeed, they are. At least for a little boy. I decided against the purple dinosaur hearing aids!

## 6 The future

My immediate future includes annual hearing tests to make sure my hearing loss hasn't progressed further down the frequency scale. I like to think that my decision to wear hearing aids may inspire others. After at least 25 years of denial, my sister has finally been fitted with hearing aids.

And I know more than one acoustician who could benefit from hearing aids. Hearing aids create a better life. Not just for adults but, much more importantly, for children who are just starting school.

I'll finish with a positive story.

A few years ago I was teaching a course on acoustics at the University of Toronto. A young woman came up to me at the beginning of the lectures and asked if I would wear a transmitter for her. This is something that you wear around your neck and it transmits your voice directly into her hearing aids. Her hearing loss was much more profound than mine. My guess is that she's had it all her life. You could tell by the way she talked. I might also guess that, when she was a little girl, her parents were smart enough and open minded enough to get her the proper treatment. I was proud to wear that transmitter for her. Imagine. A young woman who overcame all of the educational challenges imposed on her by a profound hearing loss throughout her entire life and was about to complete a Master's of Architecture degree. Good for you girl! Hearing aids can and do make a difference.

## Acknowledgements

I should like to thank my audiologist Jacqueline Hayden. Her talent and dexterity with the nuances of her profession are very impressive indeed. Plus, she put up with me through all those years when I was in denial! I should also like to thank my friends Peter Alberti and Jerry Hyde. Peter is an otolaryngologist and Jerry is an acoustician. Both wear hearing aids. It was nice to chat with people in the same boat as me.

## References

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