

Are You Listening?

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Most of the time when we talk about how to address hearing loss, we talk about technology. I will certainly touch upon aspects of technology– but for the most part in this talk, I want to focus on other pieces of the equation. I hope you will come away with insights to:

- **Engage more deeply with your acoustic environment.**
The more you tune in to sound, the more you will be able to decipher what you’re hearing...
- **Develop a listening practice.**
- **Identify how to help your audiologist help you.**



Evelyn Glennie, the performer in this clip, went completely deaf at the age of 12. This video (https://www.ted.com/talks/evelyn_glennie_shows_how_to_listen), from 2003, was part of a Ted Talk she titled, “How to truly listen.”

How does she do it? She feels vibrations through the floor and through the sticks and mallets she holds. She considers her entire body a resonating chamber.

Evelyn Glennie is a prodigy. Still, the notion that she can engage with sound makes me wonder what’s possible. **Can we augment our abilities to compensate for our own hearing loss?**

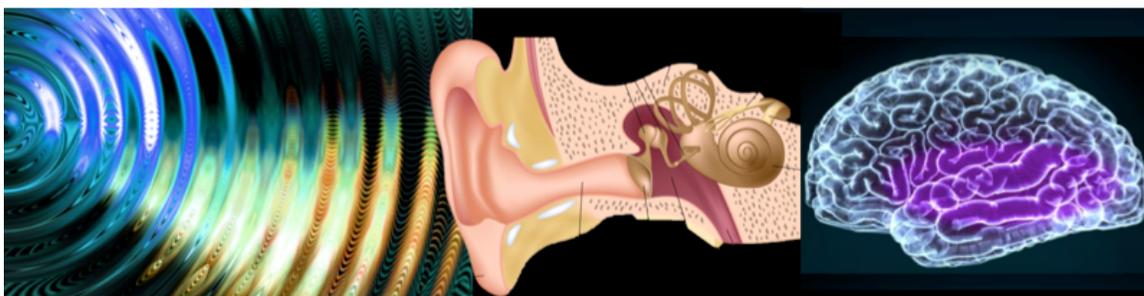


Whether we hear them or not, we are immersed in multiple vibrations. In this short video clip you *see* matter *experiencing* vibrations of sound, whether it is a metal plate with salt on it, a plate of liquid, or a stream of water...

{<https://www.youtube.com/watch?v=Q3oltPva9fs>}

How do we humans experience vibrations?

Multiple vibrations → hearing mechanism → the brain



Whatever their source, vibrations are not necessarily “sound” until they are **transmitted** and encoded via some hearing mechanism, and registered in the brain. It is the **brain** that recognizes coded patterns of vibrations as **Sound**. Essentially, it is the brain, that “hears.”

The National Institute of Health (NIH) has a video that offers a good overview of the Journey of Sound from the external world to the brain.

<https://www.youtube.com/watch?v=eQEaiZ2j9oc>

Today, I am mostly going to focus on the nature of sound, and what goes on in the brain.

In my first career, I was a recording engineer. The job of an engineer is to understand the **parameters** of sound. The task at hand is essentially to capture sound waves and reproduce or manipulate them, using all kinds of technology: microphones, signal processors, such as compressors, equalizers, and effects, such as reverb and delay. It is phenomenal how **significantly** sound can be altered! The job requires getting a handle on the technology, sure, but fundamentally, I **listened** for a living.

What's the difference between hearing & listening ?

The two terms are **casually** used interchangeably:

“Hear ye! Hear ye!”

“Listen up!”

“I know you can hear me, but you're not listening!”

“I know you were listening, but did you HEAR me?!”

For purposes of this talk, I want to differentiate between what we mean by “*hearing*” and what we mean by *listening*.

According to *Merriam Webster*:

Hearing (noun) is the special sense by which stimuli are received as noises and tones.

To **hear** (verb) is to perceive by ear.

To **listen** (verb) is to pay attention to sound.

Both hearing and listening have to do with registering sound, but whereas *hearing* is the apparatus that provides the conduit and perception of sound, *listening* requires attention. Listening is all about the *attention* the brain applies to the signals it receives. It is the *brain* that makes sense of things... (Interesting phrase, “make sense of things”!!)

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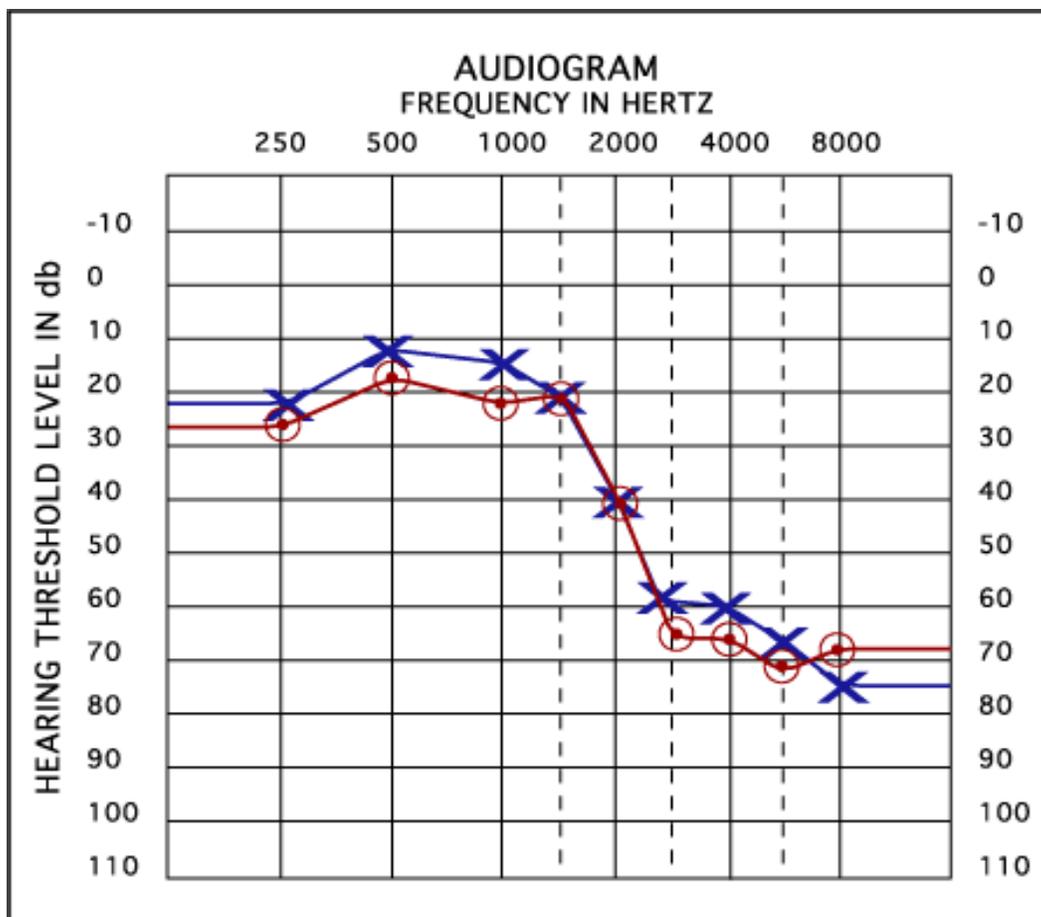
To **listen** (verb) is to pay **attention** to sound.

At some point, things weren't sounding right to me, and I went for a hearing test. This was about 16 years ago.

My first encounter with an audiologist was miserable. The outcome: my first set of hearing aids were *UN*comfortable, and the world sounded *awful*. Music was *unbearable*. I assumed that was my fate. My assumption was, what's gone is gone.... The hearing aids did help me in terms of handling conversation, but overall, the experience was disorienting and wholly unsatisfying.

It wasn't until a few years later when I *lost* one of my hearing aids that I went to a different audiologist. I got new hearing aids that, for starters, were more comfortable, and actually had *volume control* (!) and *different settings* (!) to use in different situations. Exciting in concept, and things *were* better, but not really better enough.

Still mourning the loss of my hearing, I stopped listening... I did my best to tune in to conversation, but otherwise, I tuned out as much sound as I could, because nothing sounded good to me.



You've probably seen one of these before...

This one is typical of age-induced hearing loss.

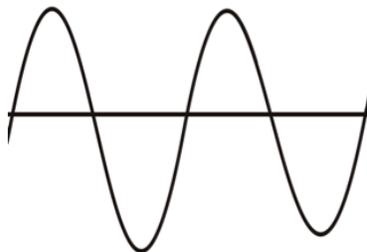
Loudness, measured in decibels charts from top to bottom.

Frequency, measured in Hertz, refers to *pitch* and charts from left to right.

I want to talk a little about these fundamental measurements – having some sense of these parameters of sound may help you listen a little differently, and possibly it may demystify the terminology and give you more confidence when you have your ears tested.

Loudness refers to the amount, or amplitude, of vibration.

LOUD



Big loud FLAP!

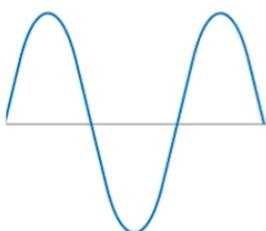
SOFT



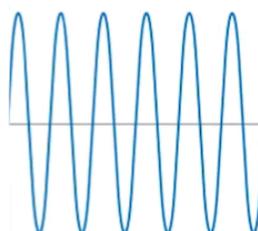
Soft little flutter.

The speed of vibration translates to pitch (frequency)

LOW

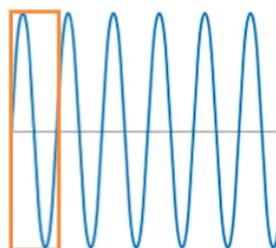
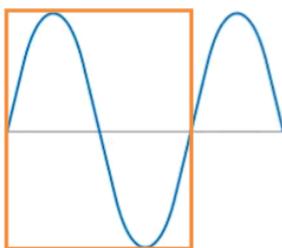


HIGH



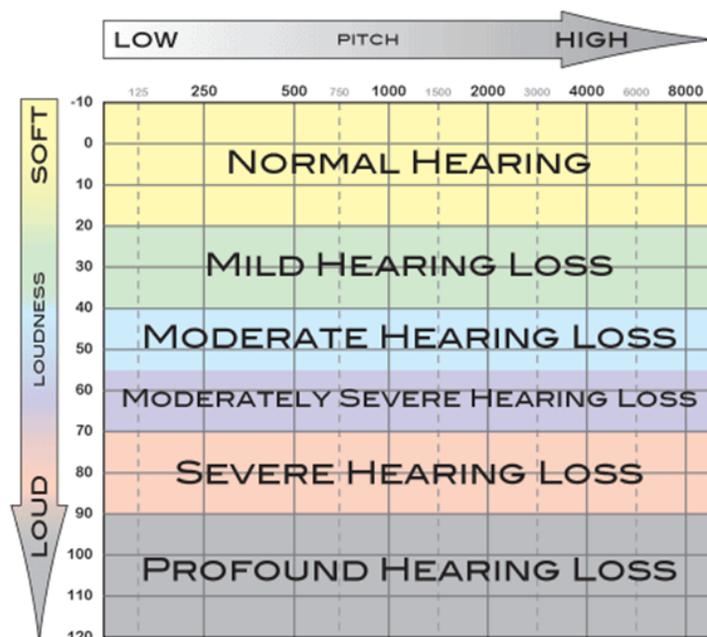
A single complete wave = 1 cycle.

Pitch is measured in cycles-per-second (Hertz) (Hz).



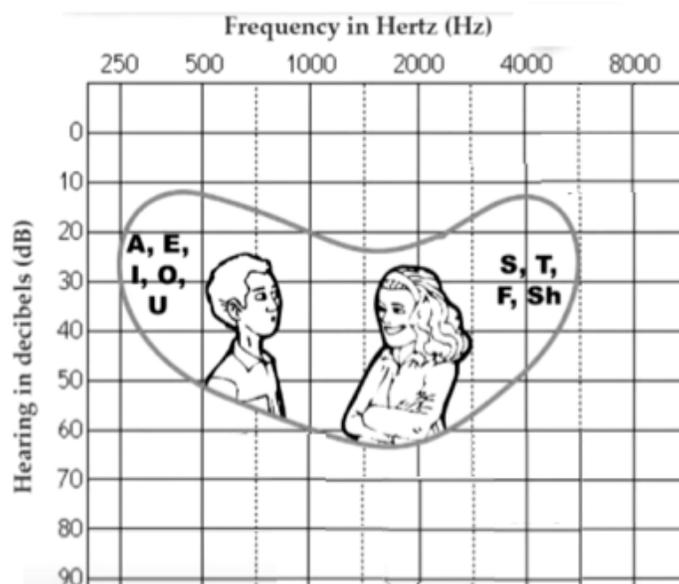
A single complete wave of vibration is considered 1 cycle.

The **number** of cycles-per-second is referred to as “Hertz” named after the person who proved the existence of electromagnetic waves, Heinrich Hertz.

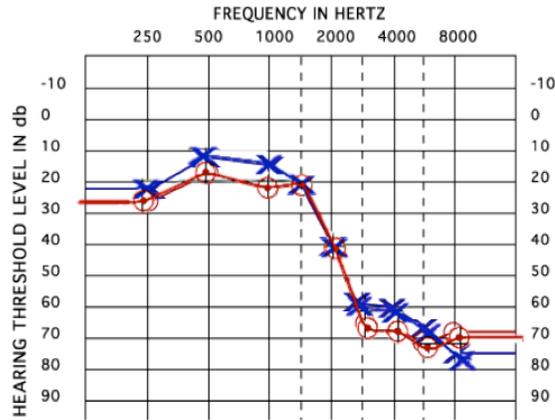


Getting back to the audiogram – ostensibly it charts your ability to hear, right? Pitches ranging from *low tones* to *high*, at levels ranging from *soft* to *loud*. The audiologist plays a pure tone at various volumes, and charts the level you indicate you can hear. How does this translate in terms of the sounds we want to hear?

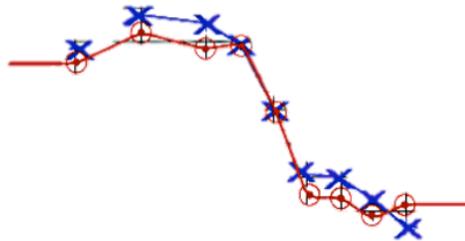
This crude overlay illustrates **some** of the frequencies associated with speech: Vowels in the lower frequencies, consonants in the mid and upper frequencies:



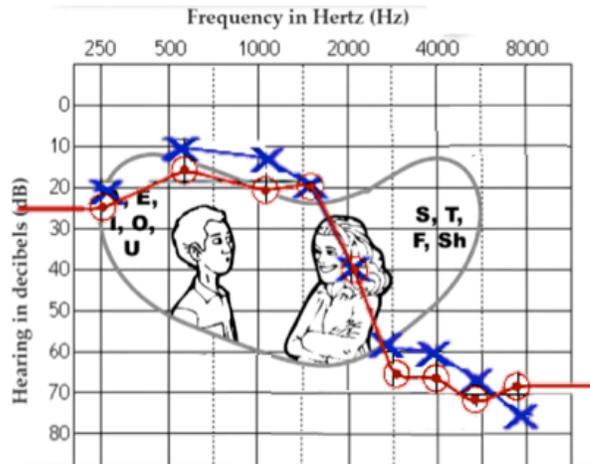
Going back to the audiogram I just showed you:



If we take this test result:

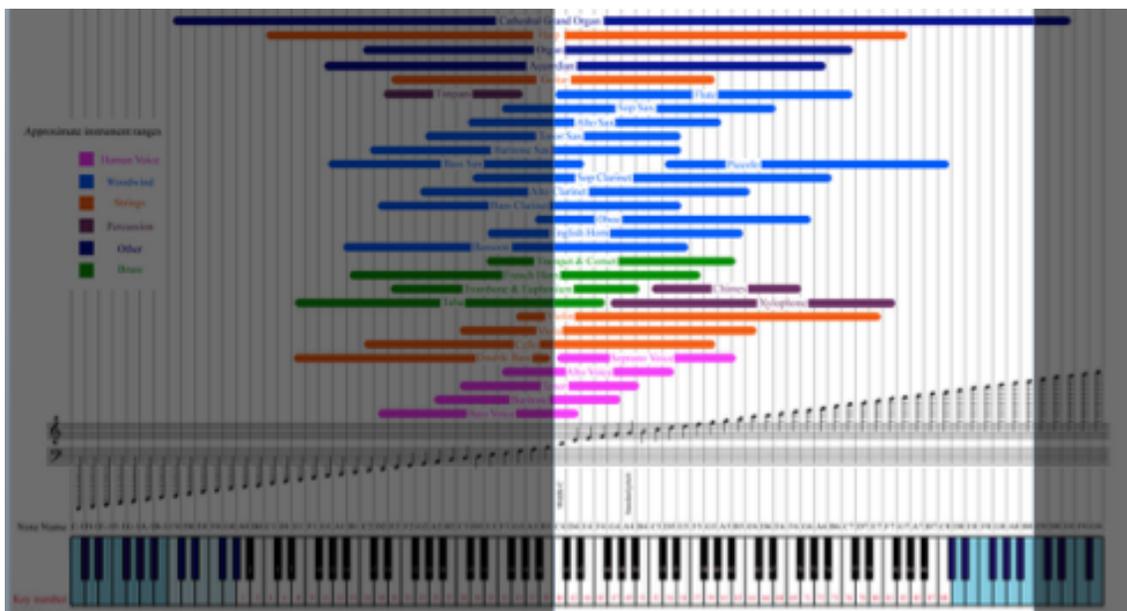


...and lay it on top of the previous chart:



... we see that the frequencies that most directly help us differentiate one word from another are the ones most compromised. Given the importance of communication, it is understandable that audiology is so focused on speech, but what about the rest of the spectrum?

This is the range covered by an audiogram:



What about the rest of the frequencies? It's not just about musical instruments—what is music anyway, but organized sound?

Pure tone testing and the grid for the audiogram haven't really changed much since the 1990s. – Though sound technology and what we we understand about the workings of the ear have certainly evolved since then. (There are some efforts to extend the testing range somewhat, but these changes have not been universally adopted.)

All of this is to say, while audiometric testing can give you a baseline indication of your ability to hear, it's NOT the whole picture!

Sound is complex.

The ear is complex.

Measuring the ability to hear is rudimentary!

Of course, audiograms are not everything that audiologists do.

Adult Aural Rehabilitation

In the seminal article, *“Adult Aural Rehabilitation: What Is It and Does It Work?”* audiologist Arthur Boothroyd, PhD, asserted in 2007 that, “The goal of rehabilitation is to **restore quality of life** by eliminating, reducing, or circumventing deficits and limitations caused by hearing loss.”

(Certainly a worthy goal!)

He considered four aspects of aural rehabilitation:

- **Sensory management** to optimize auditory function through use of technology
- **Instruction** in the use of technology and control of the listening environment
- **Counseling**, to deal both emotionally and practically with limitations.
- **Perceptual training**, which does not target function itself, but the better use of that function through enhancement of perceptual skill (i.e. **listening**)

He asserted that a holistic approach in audiology includes all four, though he acknowledged “it is not known or measured how effective perceptual training is.”

A decade later, four researchers put together a study to revisit those assertions, *“Evidence-Based Interventions for Adult Aural Rehabilitation: That Was Then, This Is Now.”* They acknowledged the same four tent poles of audiologic practice.

They showed evidence of **advances** and **improvement** in three of the four areas:

- **Sensory management**: citing self-management for hearing aids and other listening devices
- **Instruction**: demonstrated knowledge in the use of technology and skills for managing the listening environment
- **Counseling**: acknowledged motivational engagement

But they found **Perceptual training** – *auditory & cognitive training* – harder to quantify.

This makes sense to me. Auditory and cognitive training are essentially about listening and fine-tuning attention. And how do you measure that?

A good audiologist will conduct Word Recognition tests and Speech-in-Noise assessments, and they can offer some insight into how well you can function, But the tests themselves do little to improve your ability to listen.

I have no way to assess programs for cochlear Implants. From what I understand auditory training is a strong component for people adjusting to cochlear implants, and for individuals who need speech therapy, but for most of us with mild-moderate-severe hearing loss perceptual training/the practice of *listening* is underplayed, if not ignored altogether.

I have tried some self-directed auditory and cognitive training programs that are available online. *Hearing Tracker* published this short list in Dec 2017, and all but “ReadMyQuips” are currently listed on the HLAA website:

LACE® Listening & Communication Enhancement

ReadMyQuips

Angel Sound

cLEAR – Exercises for Aural Rehabilitation

Postit Science: Brain Fitness Program

These programs purport to help the user improve ability to decipher speech.

LACE had been highly recommended to me by a few other sources as well—even referred to as “the industry standard” —so I plunked down the \$79 fee and plunged in, only to be pretty seriously disappointed. I wrote up an analysis of my experience, (a link to it is included in the end notes.) In preparing for this talk I came across a study from July of 2016: “Findings from this randomized controlled trial show that LACE training does **not** result in improved outcomes over standard-of-care hearing aid intervention alone.”

I tried to test **ReadMyQuips**, but could not get it to work. Even after I installed and reinstalled Flash, I got no further than the message, “Flash is not installed.”

Angel Sound bills itself as “interactive listening rehabilitation program” It is free, but requires a download, and only works on PC. The program felt really dated; it was slow to load, and slow to respond and I gave up on it pretty quickly.

cLEAR has a well organized site... centered around the premise that you “Play computer games and improve your listening skills.” They provide substantial research to back their claim. It cost \$24.99/month, but you can cancel at any time. One cool thing about this program is that you can use the pre-recorded voices that they provide, OR you can have your partner - or someone you communicate with a lot - record all the vocabulary words that are used in the program. So you are testing —or playing a game—using a voice that you may be having trouble understanding in your day-to-day life. Maybe that helps you! Of course that’s a HUGE time commitment for your communication partner. I didn’t test this feature, but I think it’s a very cool option. I like that they’re trying to personalize the program. Alas, I was disappointed in the design of the games themselves. I found the interface cumbersome, and the interaction with elements on the screen a little clunky... But maybe that’s just me.

Brain Fitness Program is well designed. It’s not exclusively about auditory cognition, but it is intriguing and fun. It provides exercises that work on “attention, brain speed, memory, people skills, navigation, and intelligence.” \$14/mo if you subscribe, or you can try it out and come back every day and do one free test. So far I am doing a free test almost daily – I don’t really know if it is making my brain more fit—it’s too early to say!

In all though, I am a little skeptical about these online experiences as means to improve **listening** skill. My theory about why these don't necessarily work for me: They engage multiple parts of the brain – click on this, read that. It *is* exercising the brain (and sometimes your patience), but how much of that exercise improves your listening?

Games that reward you with points, or speed up as you progress tend to get me hyped up, competitive, and a little anxious.... In my opinion that is not a good mindset for listening!

But I am on the look-out... If you know of any other programs to check out, please let me know!

I've been digging into these programs and articles because I truly believe that listening is *key* to improving our hearing experience.

LISTEN.

I play and sing in a band and hearing loss can be more than a little unnerving. I had to figure out how to make it feasible for me to hear better on stage, or quit the band. I started to make up my own listening exercises, spending time each day, just focused on listening.

Sometimes music, sometimes news analysis on the radio. Walking down the street I try to be *conscious* of everything I'm hearing. (Although since I live in the city, I often put my hearing aids on *mute* because there is SO MUCH NOISE!) I love when I can get outside of the city... but nature is noisy too!

What works for me may not work for you and vice versa. But just LISTEN!
Listen to the refrigerator, the shower. Go for a walk...

Instead of going sight-seeing go sound-listening.

Find a playground...

A river...

Have fun with it, But give the world of sound your *attention*....

Try listening to different things.

Make the 'unconscious' conscious.

Try to notice what circumstances are challenging.

Try to imagine how *you* might better cope.

“Listening is a mysterious process that is not the same for everyone.”

— Pauline Oliveros

Composer and author Pauline Oliveros developed a practice she called **Deep Listening**, something akin to meditation. From years of practice and teaching, she observed, “Listening is a mysterious process that is not the same for everyone.” How we **listen**, how we make **sense** of what we hear... is completely individual! Listening is mysterious, hearing is unique!

And how do we evaluate our experience? How do we describe what we hear, or want to hear? And how do we translate that to an audiologist?

I consulted the network of audiologists on LinkedIn and in the American Speech-Language-Hearing Association (commonly known as ASHA), posing the question: “If you are an audiologist, what can a patient tell you that will help you help them?” Few of the responses talk about sound specifically. Most of them refer to the experience of hearing, or the experience of struggling to hear. I have compiled all of the responses at the end of this handout. Most of the audiologists’ responses imply ways you can practice listening. Here is a sample:

- What specific listening difficulties are you having?
- What coping strategies do you currently use?
- What situations do you find most difficult?

Overall, a key issue audiologists want their patients to understand:

*Hearing technology and auditory training can **improve** understanding, but cannot completely **fix** hearing.*

One audiologist responded:

Understand that hearing aids are a product but everything else is service based. The guidance to choose the right device, and the ability to “tune” the devices to the individual’s hearing and listening needs (what features to activate, how to connect them to the smartphone, etc.) is actually the important part in getting a great outcome!

He went on to say:

People should feel free to shop around until they feel a “chemistry” with the audiologist and clinic. They should feel looked after and in safe hands, it will be a long-term relationship not a one-off purchase.

What do you want your audiologist to be aware of?

Looking back, it is amazing to me that I was not more assertive with that first audiologist. But you know. Hearing is an elusive thing, and we do not always value or believe our perceptions, especially when we feel vulnerable. What do *you* want *your* audiologist to be aware of?

What are your preferences for hearing technology?



My first hearing aids weren't this cumbersome, but they almost might as well have been!

As I mentioned, my second pair of hearing aids were better, but I didn't know that they had a T-coil and also the option for a "MUTE" button. It was through HLAA that I found this out.

My audiologist never mentioned it until I asked her about them. (This was my second audiologist.) She was happy to activate them for me, but it took me ASKING for them. She said, "a lot of people don't *want* lots of controls that they have to mess with. They just want to put 'em in and forget about' em."

That may be – but that isn't me.

And what I want may not be what you want.

You may not know what you want. We are lucky to have each other and the HLAA community at large to fill us in on what's available.

Hearing assistive technologies (beyond hearing aids) may be what will help you the most.



You may be looking for something subtler than a nice big collar to block out the sound behind you, to help you focus on the sound in front of you, but some sort of accessory may really help you.

Seriously, we are lucky to live in an age of technology. Technology *can* help. And it can help the most if we can try to be clear about what we want and what we need. ASK what options might be available. Try them.

One of the frustrations I have is that I KNOW that sound technology is incredibly powerful, and I have felt that my hearing aids *must* be capable of more radical sound processing than they were delivering. I will give you an example:

How many of you wear hearing aids?

How many of you have the option for different programs on your hearing aids?

For hearing aids that can be programmed to accommodate different situations, typically there will be a “general, all-around, daily-use” setting.

Programs on your hearing aid

There might be another setting for “lectures.”

Programs on your hearing aid

Another for “music.”

Programs on your hearing aid

And so on.

Programs on your hearing aid

Did you notice the difference in shading on these? This is my visual analogy for how different programs in hearing aids tend to be set up. Out of the all the possibilities that might be chosen from the robust palette of vibrant colors, in my opinion, the shades of difference in the programs that the software provides out of the box are WAY too subtle. I think these settings should be much more radically programmed to accommodate extreme differences in our environments. That’s *my* preference. Through trial and error, by being specific (and a little pushy) I have been able to get my hearing aids programmed so that they better serve my needs and my temperament.

“Vibration detection is one of the most basic, universal sensory systems that any earthly organism can have.”

—Seth Horowitz, PhD

The Universal Sense, How Hearing Shapes the Mind

Hearing loss is no easy matter. Hearing is the first sense that evolved in organisms. Losing it is losing something very fundamental. No question.

There are common issues that accompany hearing loss, but the more YOU can identify what you want, the more your audiologist will be able to help you.

What do you want your audiologist to know?

Are there issues you want your audiologist or the hearing industry at large to be aware of? What's your wish list?

Email me your thoughts; I will share them with ASHA and LinkedIn networks of audiologists. And anyone else who will listen!

I believe that by **listening, articulating** what we want, and **asserting** what we need, We can improve technology and the way audiology is practiced. And enjoy an improved quality of life.

In conclusion...

Listen up!



I would like to acknowledge HLAA, multiple audiologists who shared perspective and expertise, my incredibly patient husband, and Andrea Kaneb of Gathering Sound, for supporting this effort.

Thank you!

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Just for Fun

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Things to Consider Before You See Your Audiologist

Recommendations from ASHA SIG 7 and LinkedIn networks of audiologists
Collated March-May 2019

By thinking through these questions, you'll be prepared to help your audiologist help you.

- Can you describe your experience with hearing loss?
- What specific listening difficulties are you having?
- What situations do you find most difficult?
- What motivated you to take action to improve your hearing/communication?
- What coping strategies do you currently use?
- Does your hearing loss impact your lifestyle? If so, how?
- How easily do you communicate with your Partner? Family? Friends? Co-workers?
- Do you experience emotions in response to hearing difficulties (e.g., stress, withdrawal, frustration, anger)?
- Are you confident about managing new devices?
- If you have concerns about managing new devices, what are your concerns?
- Are you inclined to undertake training?
- Do you have other health conditions that might affect your ability to use hearing aids or assistive devices?
- Are there financial considerations to factor into your choice of devices and training?
- Have you ever used an assistive listening device?
- Are you aware of the potential benefit of an induction loop?
- What are your questions?

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What do you want your audiologist to know about you?  
What do you want hearing aid and other hearing technology manufacturers to know?  
Please email me your thoughts at [ux4hearing@gmail.com](mailto:ux4hearing@gmail.com), and I will do my best to deliver the word!  
I also welcome any thoughts or questions you might have about this presentation.  
And I would LOVE to hear about your sound-listening ventures!  
(If you think I am off the mark, let me know that too.)  
Thanks again, and here's to listening! Best,



Darleen