

How to Decipher an Audiogram

By Lisa Maggs and Katrina Fernandez, ECHO Lab



HEARING MATTERS AUSTRALIA
Support from real life experience

If you've ever had a hearing test, you've probably sat in a chair in the audiologist's clinic room, holding the little button and listening intently to the faintest beeps through the headphones, and thought, "is it meant to be this hard?" At the start, they'll explain what to do — "Press the button when you hear a sound, even if it's very soft," and then the room goes quiet and the test begins. It sounds simple; it can feel difficult, but the result is a very important map of your hearing levels – your audiogram.

If you've ever felt like the chart you've been shown afterwards is a bit of a mystery, you are not alone. For many people, a hearing loss can feel overwhelming, and the explanation that follows can get lost along the way. It doesn't help that the results chart can look like a page of incoherent symbols and numbers. To an audiologist, those results help them understand what kind of difficulty you're having, what might be the potential cause, and what steps should be taken next.

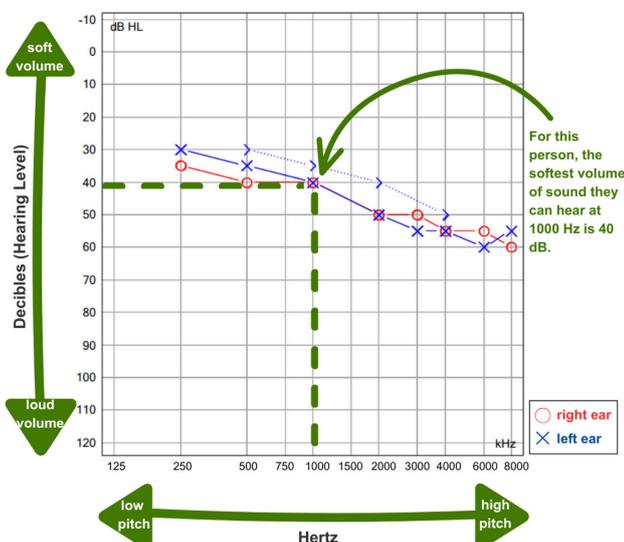
To help you get a better understanding, let's pull back the curtain on hearing levels – what they mean, how we measure them, and how to make sense of the audiogram.

Everything begins with the hearing test results, the audiogram. First, let's orient you to the graph. Along the horizontal line, you have frequency (pitch), measured in Hertz (Hz). It's laid out similarly to the keys of a piano: the low, bass sounds are on the left, and the high-pitched, treble sounds are on the right. The frequency range that the audiologist tests is usually between 250 Hz and 8000 Hz, within which is the range that contains the most critical cues for understanding speech (500 Hz – 4000 Hz). Down the side, you have intensity (loudness), measured in decibels (dB). Quieter sounds are closer to the top of the graph, and louder sounds are closer to the bottom of the graph.

You'll see a pattern consisting of two different shapes on the graph – these are your hearing thresholds. A hearing threshold is the softest volume of sound that a person can hear at a given frequency; any quieter, and the person does not hear the sound. The audiologist makes a mark at each frequency tested – a blue cross for your left ear, a red circle for your right ear – indicating the softest sound volume you responded to.

As a side note, this is why the button-press test can feel so hard. It is intentionally finding the threshold between hearing and not hearing a sound, and so a good portion of the testing time is spent playing sounds you can just barely hear – which is the point!

Once you string all the hearing thresholds together, the sum total is a map of an individual's hearing sensitivity. Hearing sensitivity gives us a good idea about how much a person can or cannot hear, which is the 'degree' of hearing loss. Hearing sensitivity is not the whole picture of how a person can functionally use their hearing out in the real world, but it is crucial in understanding what difficulties they may be having and how to help them.



Most of the time, an individual will have different levels of hearing across the pitch range. It is common (especially with age-related hearing loss) to have greater levels of hearing loss in the high frequencies. This is also why audiologists hesitate to answer the question, “So what percentage of hearing loss do I have?” Percentage cannot represent the complexity of the audiogram, where there may be different levels of hearing loss in different frequency regions. In the example above, this person has a mild hearing loss of 30 – 35 dB in the low pitch region at 250 Hz, and a moderate hearing loss of 55 – 60 dB in the high pitch region at 8000 Hz.

The audiogram can also tell the audiologist if there are medical problems that might need investigation, and they do this by testing bone conduction. The procedure of finding the hearing threshold is the same; however, the way the sound reaches the inner ear is different. Think of the ear as a 3-part system, encased within the skull: the outer ear, the middle ear, and the inner ear. Each section is important for making sure we hear well, but the inner ear is what processes the sound to

send to the brain. While wearing headphones or insert earphones, sound must travel through your outer ear and middle ear to reach your inner ear – this pathway is known as air conduction. With bone conduction, instead of headphones, a special type of device attached to a headband is placed behind your ear and sends minuscule vibrations through the bones of the skull, bypassing the outer and middle ear. The

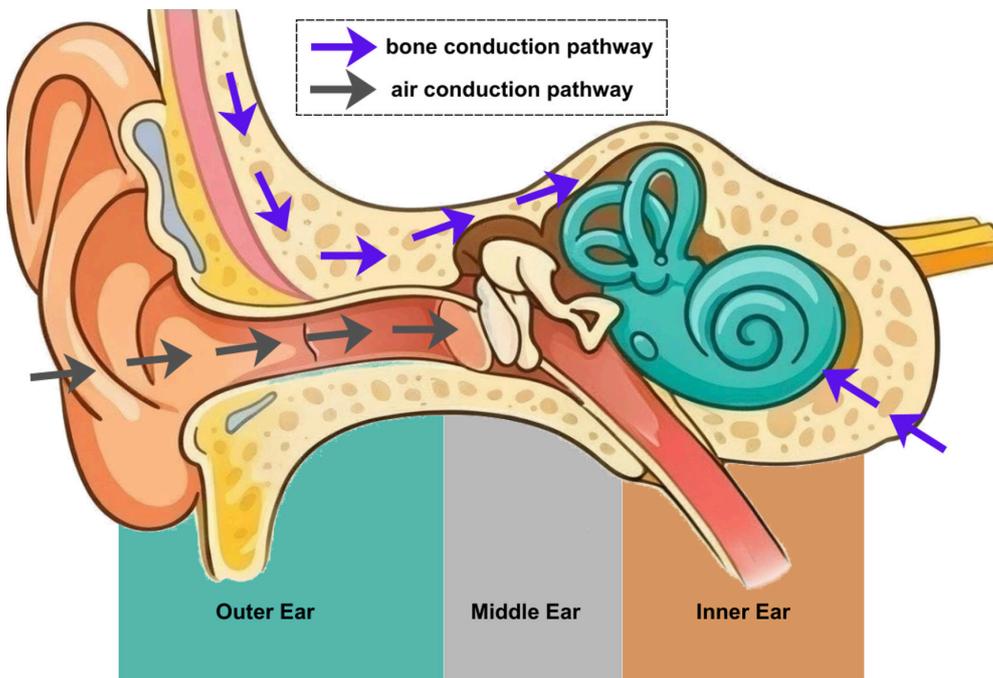


Image: Supplied.

inner ear receives these vibrations and processes them as sound – after all, sound waves are also just vibrational waves. By using bone conduction, an audiologist can find out more about the outer and middle ear systems. In a healthy outer and middle ear system, air and bone conduction thresholds will be very similar, since there is no problem with the sound travelling through either pathway. This is shown in the audiogram example above (Page 15), with the bone conduction thresholds, indicated by the blue arrows between dotted lines, being relatively similar to the air conduction thresholds (the red circles and blue crosses). If there is a problem in the middle ear, like an ear infection for example, then air conduction thresholds will become poorer, but bone conduction thresholds will remain unchanged. In this way, the audiogram also serves as a screening tool for medical abnormalities in the hearing system.

Of course, there are plenty of details about interpreting an audiogram that are outside the scope of this article, which audiologists spend years studying. Never hesitate to ask your audiologist if you need help understanding your individual hearing levels – it's the job of an audiologist to understand the finer details and to help you understand the key information you need to know about your hearing. If it's been a while since your last hearing test, it's recommended to have your hearing checked at least once a year.