Can You Hear Me Now?

Examining Hearing Sensitivity

by Valeri Tompkins



In the early 2000s, VERIZON WIRELESS had a series of COMMERCIALS that featured a man testing cellular connections, repeatedly asking "Can you hear me now?" The ad campaign was MEMORABLE and PERSUASIVE, demonstrating the RELIABILITY of Verizon's NETWORK service compared to its COMPETITORS. To this day, the question is still used when people are on the phone or as a joke if someone is not listening or paying attention. However, for many people, the question can be answered by saying "Yes, I hear you alright. I hear you too well!" Some sounds can be IRRITATING or downright PAINFUL for people with sensitive hearing. Before we dive in, let's have a brief lesson on how hearing works.

Spell: COMMERCIAL Spell: MEMORABLE Spell: PERSUASIVE What company had the tag line can you hear me now? VERIZON WIRELESS The commercial was demonstrating the reliability of Verizon's what? NETWORK Verizon is comparing its service to its what? COMPETITORS We said some sounds can be what for people with sensitive hearing? PAINFUL, IRRITATING Name one of Verizon's competitors. SPRINT, AT&T, T MOBILE, CRICKET Hearing and perceiving sounds is an incredibly COMPLEX process. When someone is speaking, a dog is barking, or music is playing, SOUND WAVES are being produced. These waves first enter the outer ear, known as the PINNA. From there, they travel through the AUDITORY CANAL to the EARDRUM, which starts VIBRATING. The vibrations then pass through three small bones – nicknamed the HAMMER, the ANVIL, and the STIRRUP – collectively called the OSSICLES and into the INNER EAR. Once there, the COCHLEA, which is shaped like a SNAIL, turns the vibrations into nerve SIGNALS that are transported to the brain. The signals first enter the brain via the THALAMUS.



Spell: COMPLEX Spell: VIBRATION Spell: SIGNAL Talking, barking, and music produce what? SOUND WAVES What's another word for the outer ear? PINNA Sounds waves travel through the auditory canal to reach what? EARDRUM What are the three small bones in the inner ear collectively called? OSSICLES What part of the ear is shaped like a snail? COCHLEA What part of the brain first receives the signals? THALAMUS Name one of the small bones that comprise the ossicles. HAMMER, ANVIL, STIRRUP

Besides the ear, name another organ in the body. BRAIN, LIVER, KIDNEY, STOMACH, HEART

If we have thirty people, how many ossicle bones will we have? $30 \times 3 = 90$

VAKT: With your finger, trace a sound from the outer ear (pinna), through the ear canal to the middle ear, and on to the inner ear.



VAKT: Watch a video showing the hearing process in action. https://www.youtube.com/watch?v=o2ltcKBMqGc

The thalamus is located in the middle of your brain above your BRAINSTEM. It is shaped like an EGG and behaves as the air traffic CONTROLLER of your brain. The thalamus is essentially a RELAY station for all MOTOR (movement) and SENSORY information coming into the brain and being sent to the body. It processes four of the five senses – hearing, sight, taste, and touch – but is not responsible for your sense of SMELL. For example, let's say you are listening to a LECTURE in school and a noisy bus drives by. Your thalamus might instruct your ears to FILTER the sound of the bus out as background noise so you can continue to listen to your professor.



Spell: CONTROLLER Spell: LECTURE Spell: FILTER The thalamus is located above your what? BRAINSTEM In what shape is the thalamus? EGG We said the thalamus is like what kind of station? RELAY For which sense is the thalamus not responsible? SMELL Name one of the senses for which the thalamus is responsible. HEARING, SIGHT, TASTE, TOUCH Name one of the two types of information coming into the brain for the thalamus to process. MOTOR, SENSORY What's a synonym for relay? TRANSER, TRANSMIT, PASS ON In your own words, explain what an air traffic controller does.

In the case of hearing, your thalamus is projecting sound to your PRIMARY AUDITORY CORTEX. If something goes AWRY (wrong, amiss) in the process, it can affect the way a person PERCEIVES sounds. People who are extremely SENSITIVE to some sounds can experience auditory OVERLOAD when their brains become OVERWHELMED by the number of

sounds they need to process. A common form of hearing sensitivity is MISOPHONIA, in which individuals have an AVERSION (dislike) to a very specific sound, such as chewing, eating, or even breathing. People with misophonia report that these sounds IRRITATE or even ANGER them.

Spell: PERCEIVES Spell: OVERLOAD Spell: SENSITIVE Your thalamus projects sound to your what? PRIMARY AUDITORY CORTEX What's another word for awry? WRONG, AMISS In a hearing-sensitive person, their brain becomes what by the number of sounds to process? OVERWHELMED What did we say is a common form of hearing sensitivity? MISOPHONIA What's another word for aversion? DISLIKE Name one of the sounds we said misophonia is triggered by? CHEWING, EATING, BREATHING What's one way people with misophonia say they feel when they hear a particular sound? IRRITATED, ANGRY The "phon" is misphonia is from the Greek language and means what? SOUND

While misophonia causes EMOTIONAL distress, another type of hearing sensitivity, HYPERACUSIS causes PHYSICAL pain for those who suffer from it. People with hyperacusis have a lower TOLERANCE than others to loud sounds, such as a vacuum, hand dryer, barking, or crying. Some patients with hyperacusis say they also have difficulty filtering out BACKGROUND noises so that they can focus on the noises they should be PRIORITIZING. People with AUTISM or ASPERGERS SYNDROME report high levels of hyperacusis. Most people with hyperacusis do not have damaged or ABNORMAL hearing, so it appears to be more of a SENSORY PROCESSING disorder than a MEDICAL condition.

Spell: EMOTIONAL Spell: PHYSICAL Spell: ABNORMAL

What hearing sensitivity causes a physical response? HYPERACUSIS People with hyperacusis have a low what to loud sounds? TOLERANCE What kind of noises do patients with hyperacusis have trouble filtering out? BACKGROUND Hyperacusis appears to be what kind of disorder? SENSORY PROCESSING Hyperacusis does not appear to be what kind of disorder? MEDICAL What is one condition people have that leads to more reports of hyperacusis? AUTISM, ASPERGERS SYNDROME What's one noise we said hyperacusis patients might be sensitive to? VACUUM, HAND DRYER, BARKING, CRYING What does it mean to prioritize something? Is there a particular sound that is painful for you to hear?

A study CONDUCTED in FRANCE may have proven a connection between autism and hyperacusis. Scientists studied two groups of children, one group on the SPECTRUM and one group of NEUROTYPICALS (people who have a standard or typical way of learning and processing). The children listened to various sounds at various DECIBELS (a unit for measuring the RELATIVE (comparative) loudness of sounds) and then rated the sounds on a scale of "low" to "too loud." For PERSPECTIVE, a WHISPER is 20 decibels, a normal tone of voice is 60 decibels, and a SIREN is 130 decibels. The children on the spectrum rated the sounds significantly higher than the other children. According to the study results, "This suggested that that children with autism may have a reduced range of comfortable volume, meaning that children on the autism spectrum actually perceive noise to be louder than their PEERS."

Spell: CONDUCTED Spell: SPECTRUM Spell: PERSPECTIVE Where was this study conducted? FRANCE The study compared children on the spectrum to whom? NEUROTYPICALS What did we say is another word for comparative? RELATIVE

What is a unit for measuring the relative loudness of sounds? DECIBEL The study showed that children on the spectrum perceive noise to be louder than their what? PEERS

Name another country in Europe.

How many decibels would a normal conversation be? 60 How many decibels higher is a siren than a whisper? 130 - 20 = 110Given the information on decibels, what is the maximum number of decibels that you think you would find comfortable?

VAKT: Listen to the first two minutes of this video to hear the different decibels of various sounds. WARNING: After two minutes, the sounds get loud!

https://www.youtube.com/watch?v=1XUovxiTpVA

So what can we do to treat hyperacusis? The first step OBVIOUSLY is to IDENTIFY all of the offending sounds so that we can adopt STRATEGIES to avoid them when we can. For example, we can choose restrooms with paper towel DISPENSERS instead of electric hand dryers or only vacuum the carpets with the sensitive person is not home. When we can't AVOID (stay away from) these sounds, we can use NOISE-CANCELING headphones or earplugs to reduce the assault on our senses. We can also use DISTRACTIONS such as an iPad, iPhone, or a hand-held game to keep a person focused on something other than the distressing noise. Last but not least, BEHAVIORAL therapy can teach a patient better COPING skills when they experience the pain of a loud sound.

Spell: OBVIOUSLY Spell: DISPENSERS Spell: COPING The first step in treating hyperacusis to do to what for all of the offending sounds: IDENTIFY After that we can adopt what to avoid these sounds? STRATEGIES What did we say to avoid means? STAY AWAY FROM What kind of headphones can we use to block out sounds? NOISE CANCELING

What kind of therapy can we use to help a patient cope with sound? BEHAVORIAL

What was one kind of distraction we can use to keep a person focused on something other than noise? IPAD, IPHONE, HAND-HELD GAME Do you think you experience any of the hearing disorders we have discussed and, if so, which one(s)?

Creative writing: Imagine you are conducting a study comparing people on the autism spectrum to their neurotypical counterparts. What's one thing you would like to measure between the two groups? Outline how you will organize and conduct your study, including sample sizes and how you will measure the characteristic you are studying. Assume that any nonspeakers can use their letterboards or keyboards to participate.

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