

AUDITORY **NEUROPATHY**

Why You Struggle to Hear in Noise



From Harvard Medical and M.I.T. Trained Neuroscientist
Dr. Keith Darrow, Ph.D., CCC-A, CDP



■ INTRODUCTORY LETTER FROM DR. DARROW

As a Neuroscientist and Clinical Audiologist for over 20 years, the single most common complaint I have heard from my patients is ***"I can hear ok, but I struggle to understand what others are saying."***

In fact, I believe the #1 reason why so many adults wait too long, more than 10 years, to seek medical treatment for their hearing loss and tinnitus is because they believe they hear fine. And that very well may be true in some cases and in some circumstances. Which is why it is so important to understand that hearing and listening are ***NOT*** the same thing, and that having difficulty listening, struggling to follow a conversation at a restaurant or dinner table, and difficulty with memory and decision making, are all signs of Auditory Processing Disorder.

LISTENING IS MORE THAN JUST HEARING; IT'S AN INTRICATE PROCESS THAT REQUIRES THE BRAIN TO INTERPRET SOUNDS. FOR INDIVIDUALS WITH AUDITORY PROCESSING DISORDERS, THE CHALLENGE LIES NOT IN THEIR ABILITY TO HEAR, BUT IN THEIR BRAIN'S ABILITY TO MAKE SENSE OF WHAT THEY HEAR.

– Dr. Keith N. Darrow

Auditory processing issues in adults, also known as central auditory processing disorders (CAPD), stem from the brain's inability to interpret, organize, and analyze sounds. These issues are often linked to neural degeneration within the auditory nervous system, which can significantly impact cognitive processing. Age-related hearing loss, which impacts 73 million adults in the US and nearly 1.5 billion people worldwide, is the leading cause of auditory processing issues in adults, making it essential to understand the anatomy, symptoms, and treatment options for these disorders to develop effective interventions.

If you or someone you love is have difficulty with everyday tasks, or they struggle to stay part of the conversation, go to www.ExcellenceInAudiology.org to find your local healthcare provider and learn how you can take your next steps towards treating auditory processing disorders.

Yours In Better Listening,
Dr. Keith Darrow, PhD



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HEARING VS. LISTENING

While most people think we hear with our ears, this isn't entirely accurate. The ear (i.e., the outer ear, middle ear, and inner ear) works to break down and analyze incoming sounds, including helping us to understand the location of where sound comes from. The sensory cells within the inner ear, such as the cochlear hair cells, then help filter sound based on its frequency (or pitch) and its volume (or loudness). At this point in the auditory system, we are not even aware that a sound has occurred (i.e., hearing), let alone actually perceive it (i.e., listening).

Hearing and listening, though often used interchangeably, represent distinct processes. Hearing is a passive, physiological process where sound waves are detected by the auditory system and converted into neural signals that the brain interprets as sound. It occurs automatically and does not require conscious effort. On the other hand, listening is an active, cognitive process that involves paying attention, interpreting, and responding to the sounds and messages received. Listening requires concentration and mental engagement, as it involves understanding the context, meaning, and nuances of the spoken words. While hearing is merely the perception of sound, listening is the thoughtful processing and comprehension of that sound, which is crucial for effective communication and meaningful interactions.

For many adults with auditory processing disorders, they hear just fine. But, when it comes to listening, especially in complex listening environments (i.e., noisy restaurants or busy offices), they struggle to follow a conversation, understand what is being said to them, and have difficulty connecting with others.





WHY DO AUDITORY PROCESSING DISORDERS OCCUR?

While the exact etiology of auditory processing disorders is not fully understood, neural degeneration is undoubtedly a culprit. Neural degeneration results in the breakdown of efficient neural processing within the nervous system. This is common in many neurologic disorders, including diabetic neuropathy, multiple sclerosis, and dementia.

Neural degeneration in the auditory nervous system can occur due to various factors such as aging, exposure to loud noises, genetic predisposition, or neurological conditions. Age-related hearing loss is the leading cause in adults, where the deterioration of auditory structures and neural pathways impairs the ability to transmit and process sound signals efficiently.

The auditory nerve lets us hear by connecting the inner ear to the brain.

A condition in the brain, causing difficulties comprehending or processing information.

AUDITORY

DISORDER



PROCESSING

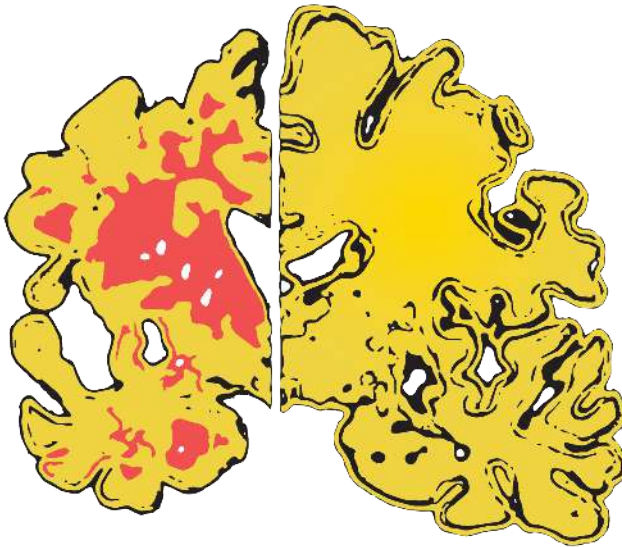
Input from the sensory organs, transforms physical stimuli into electrochemical signals.



SYMPTOMS OF AUDITORY PROCESSING ISSUES

Adults with auditory processing issues often struggle to filter out background noise, making it challenging to focus on and understand speech in noisy settings like crowded rooms, workplace settings, busy streets, or social gatherings. Their brains have trouble distinguishing the primary sound signal from surrounding noises, which leads to a reduced ability to comprehend conversations and other auditory inputs in such environments.

Due to the brain's inefficient processing of auditory information, individuals with auditory processing disorders frequently ask others to repeat themselves or clarify what was said. This repetition is necessary for them to piece together and make sense of the incomplete or distorted auditory information they receive, ensuring they fully understand the message.



Brain With Hearing Loss

Brain With Normal Hearing

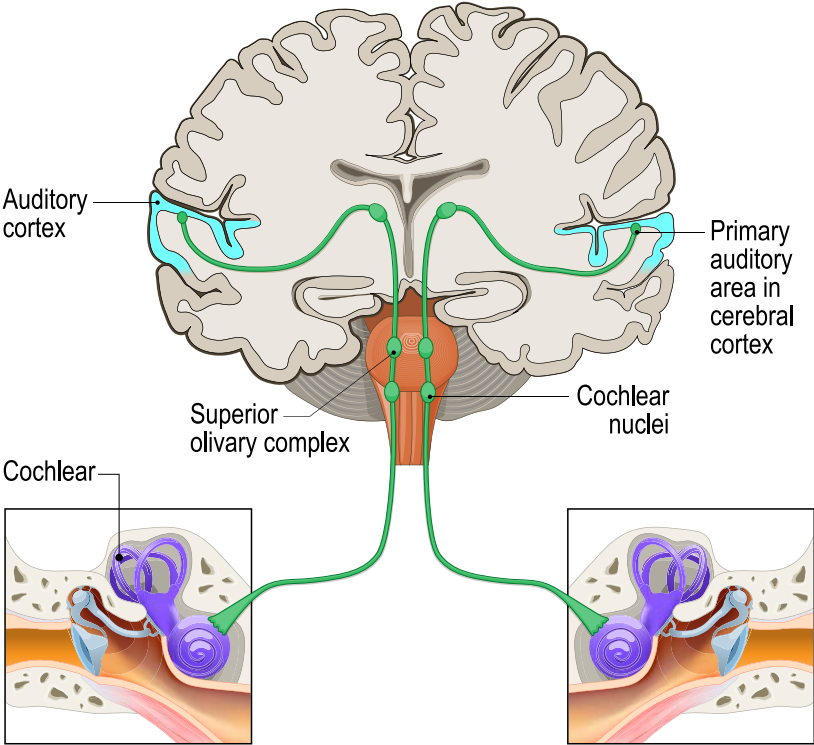
Schematic representing the potential cerebral atrophy in an individual with age-related hearing loss.

Auditory processing issues can also lead to poor listening skills and attention deficits. Individuals may find it hard to maintain focus during conversations or auditory activities, often appearing distracted or inattentive. This challenge stems from the increased cognitive load required to process auditory information, leaving fewer resources available for sustained attention and active listening. Reduced cognitive load is thought to be a leading factor in developing dementia.

People with auditory processing disorders may have difficulty following verbal instructions, especially if they are complex or given in rapid succession. Their brains struggle to accurately interpret and retain the sequence of sounds and words, leading to confusion and errors in executing the instructions.

Additionally, auditory processing issues can cause difficulty distinguishing between similar sounds, such as "bat" and "pat" or "ten" and "pen." This phonemic discrimination problem arises from the brain's impaired ability to differentiate subtle differences in sound frequencies and patterns, which is crucial for understanding speech and language.

AUDITORY PATHWAYS





IMPACT ON COGNITIVE PROCESSING

Auditory processing issues can severely impact memory, particularly auditory memory, which involves remembering and recalling auditory information. Individuals with these issues often struggle to retain and retrieve auditory information because their brains do not process sounds accurately and efficiently. This challenge can manifest in everyday situations, such as forgetting verbal instructions, struggling to remember names or details from conversations, and having difficulty following spoken directions. These memory problems can affect workplace productivity and personal relationships. The frustration of constantly forgetting or misremembering auditory information can lead to decreased confidence and increased stress, further exacerbating the cognitive load. In professional settings, this can result in missed deadlines, errors in tasks, and strained relationships with colleagues. In personal relationships, frequent misunderstandings and the need for repeated explanations can cause frustration and communication breakdowns.



Attention is another cognitive domain significantly affected by auditory processing issues. Individuals may find it hard to concentrate on auditory tasks, especially in environments with competing sounds or distractions. Their brains work harder to decipher and make sense of auditory input, leaving fewer cognitive resources available for sustained attention. Consequently, they may appear easily distracted, have trouble following conversations, and exhibit signs of inattention during listening activities. This attention deficit can impact learning, social interactions, and overall cognitive functioning. In educational settings, students may find it challenging to keep up with lectures, follow instructions, or engage in group discussions. In social interactions, the inability to focus can lead to awkward conversations and a sense of isolation. Additionally, the constant mental effort required to process sounds can lead to fatigue, making it even harder to maintain attention and cognitive performance throughout the day.



TREATMENT OPTIONS

While there is no definitive cure for neural degeneration and the resulting auditory processing disorders, several treatment options can help manage symptoms and improve auditory processing. The hearing healthcare experts across the www.ExcellenceInAudiology.com network specialize in treatment of auditory processing issues, hearing loss and tinnitus.

Prescription Hearing Technology

Many individuals with auditory processing issues will benefit significantly from increased access to sound and reduced background noise. Prescription hearing aids can enhance the auditory system's ability to detect and process sounds. Advanced features, such as directional microphones and noise reduction technology, can further improve sound clarity. In some cases, cochlear implants may be recommended to bypass damaged parts of the auditory system and directly stimulate the auditory nerve. Enhanced auditory access can improve auditory perception and contribute to better auditory processing, especially when combined with other therapeutic interventions.



Auditory Training: Exercises & Activities to Improve the Brain's Ability to Process Sound

Auditory training involves structured exercises and activities aimed at enhancing the brain's ability to interpret and process sounds. These exercises may include tasks focused on improving auditory discrimination, auditory memory, and auditory sequencing. Techniques such as dichotic listening, where different sounds are presented to each ear simultaneously, can help improve the brain's ability to integrate auditory information. Computer-based programs and apps designed for auditory training offer interactive and engaging ways to practice these skills. Consistent auditory training can lead to significant improvements in how individuals perceive and understand sounds.



Environmental Modifications to Reduce Background Noise and Enhance Sound Clarity

Modifying the listening environment can greatly assist individuals with auditory processing disorders. Strategies include reducing background noise using sound-absorbing materials, positioning oneself closer to the sound source, and minimizing distractions. Assistive listening devices, such as FM systems and personal amplifiers, can amplify the speaker's voice while reducing background noise, making it easier for individuals to focus on and understand spoken messages. Implementing these environmental modifications can create a more conducive listening environment, improving auditory comprehension.



Cognitive Behavioral Therapy (CBT) to Address the Emotional and Psychological Impact

Cognitive Behavioral Therapy (CBT) can be beneficial for addressing the emotional and psychological impacts associated with auditory processing disorders. Individuals with these disorders may experience frustration, anxiety, and low self-esteem due to their difficulties in understanding and processing sounds. For those who require treatment beyond prescription hearing technology, CBT can help individuals to develop coping strategies, manage their emotions, reframe negative thoughts, and build confidence in their abilities. Addressing the psychological aspects of auditory processing disorders can improve overall well-being and enhance the effectiveness of other, more direct, treatment approaches.

COGNITIVE BEHAVIORAL THERAPY (CBT)



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CONCLUSION

Auditory processing disorders in adults present significant challenges that extend beyond mere hearing issues, impacting cognitive functions such as memory, attention, and language comprehension. As highlighted in this report, the distinction between hearing and listening is crucial, as many adults with these disorders can hear sounds but struggle to interpret and understand them, especially in complex auditory environments. Age-related hearing loss is a major contributor to these difficulties, leading to neural degeneration that impairs the brain's ability to process auditory information efficiently.

The symptoms of auditory processing disorders, including difficulty understanding speech in noisy environments, frequent requests for repetition, poor listening skills, and trouble following verbal instructions, can severely impact daily life, professional productivity, and personal relationships. Moreover, the cognitive load associated with these disorders can lead to increased stress, decreased confidence, social isolation and increased risk for cognitive decline.

Effective management of auditory processing disorders involves a combination of strategies. Prescription hearing technology, including consideration of cochlear implants, can enhance auditory perception. Auditory training exercises can improve the brain's ability to process sounds, while environmental modifications can reduce background noise and enhance sound clarity. Additionally, Cognitive Behavioral Therapy (CBT) can address the emotional and psychological impacts, helping individuals develop coping strategies and build confidence.

Understanding and addressing auditory processing disorders in adults is essential for improving their quality of life. For those experiencing these challenges, take your next step and search the most trusted hearing healthcare network at www.ExcellenceInAudiology.org.

**Portland's Highest Rated
Hearing Health Care Office**

AUDITORY PROCESSING DISORDERS IN ADULTS

FROM THE NEUROSCIENTIST:



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