

# Central Auditory Processing Disorder

## What is auditory processing?

The easiest, quickest way to communicate is simply to say something and then deal with the other person's reply, right? Except that if your listener has a CAPD (Central Auditory Processing Disorder) your remark might come through with certain words drowned out by other noises, or with some words sounding like different words or as meaningless strings of verbiage.

Auditory processing is the term used to describe what happens when your brain recognizes and interprets the sounds around you. Humans hear when energy that we recognize as sound travels through the ear and is changed into electrical information that can be interpreted by the brain. The "disorder" part of auditory processing disorder (APD) means that something is adversely affecting the processing or interpretation of information.

APD goes by many other names. Sometimes it is referred to as central auditory processing disorder (CAPD). Other common names are auditory perception problem, auditory comprehension deficit, central auditory dysfunction, central deafness, and so-called "word deafness."

A CAPD is a physical hearing impairment, but one which does not show up as a hearing loss on routine screenings or an audiogram. Instead, it affects the hearing system beyond the ear, whose job it is to separate a meaningful message from non-essential background sound and deliver that information with good clarity to the intellectual centers of the brain (the central nervous system). When we receive distorted or incomplete auditory messages we lose one of our most vital links with the world and other people.

Children with APD often do not recognize subtle differences between sounds in words, even though the sounds themselves are loud and clear. For example, the request "Tell me how a chair and a couch are alike" may sound to a child with APD like "Tell me how a couch and a chair are alike." It can even be understood by the child as "Tell me how a cow and a hair are alike." These kinds of problems are more likely to occur when a person with APD is in a noisy environment or when he or she is listening to complex information.

## What causes auditory processing difficulty?

We are not sure. Human communication relies on taking in complicated perceptual information from the outside world through the senses, such as hearing, and interpreting that information in a meaningful way. Human communication also requires certain mental abilities, such as attention and memory. Scientists still do not understand exactly how all of these processes work and interact or how they malfunction in cases of communication disorders. Even though your child seems to "hear normally," he or she may have difficulty using those sounds for speech and language.

The cause of APD is often unknown. In children, auditory processing difficulty may be associated with conditions such as dyslexia, attention deficit disorder, autism, autism spectrum disorder, specific language impairment, pervasive development disorder, or developmental delay. Sometimes this term has been misapplied to children who have no hearing or language disorder but have challenges learning.

## What are the symptoms?

Children with auditory processing difficulty typically have normal hearing and intelligence. However, they have also been observed to:

- Have trouble paying attention to and remembering information presented orally
- Have problems carrying out multistep directions
- Have poor listening skills
- Need more time to process information

- Have low academic performance
- Have behavior problems
- Have language difficulty (e.g., they confuse syllable sequences and have problems developing vocabulary and understanding language)
- Have difficulty with reading, comprehension, spelling, and vocabulary
- Talks or likes T. V. louder than normal.
- Interprets words too literally
- Often needs remarks repeated
- Difficulty sounding out words
- "Ignores" people, especially if engrossed
- Unusually sensitive to sounds
- Asks many extra informational questions
- Confuses similar-sounding words
- Difficulty following directions in a series
- Speech developed late or unclearly
- Poor "communicator" (terse, telegraphic)
- Memorizes poorly
- Hears better when watching the speaker
- Problems with rapid speech.
- Says "huh" or "what" frequently
- Inconsistent responses to auditory stimuli
- Often misunderstands what is said
- Requests that information be repeated
- Poor auditory attention
- Exhibits extreme distractibility
- Difficulty following oral instructions
- Difficulty listening in the presence of background noise
- Poor auditory memory span
- Poor sequencing skills
- Poor receptive and expressive language skills

### **How is it diagnosed?**

It takes specialized testing to identify a CAPD. Some of the tests used by educational therapists, neuropsychologists, and educational psychologists give at least an indication that a CAPD might be present. These include tests of auditory memory (for sentences, nonsense syllables, or numbers backward), sequencing, tonal pattern recognition or sound blending, and store of general information (which is most often acquired through listening). The most accurate way to sort out CAPDs from other problems that mimic them, however, is through clinical audiologic tests of central nervous system function. These are better at locating the site of the problem and reducing the effects of language sophistication on the test results.

You, a teacher, or a day care provider may be the first person to notice symptoms of auditory processing difficulty in your child. So talking to your child's teacher about school or preschool performance is a good idea. Many health professionals can also diagnose APD in your child. There may need to be ongoing observation with the professionals involved.

Much of what will be done by these professionals will be to rule out other problems. A **pediatrician** or **family doctor** can help rule out possible diseases that can cause some of these same symptoms. He or she will also measure growth and development. If there is a disease or disorder related to hearing, you may be referred to an **otolaryngologist**, a physician who specializes in diseases and disorders of the head and neck.

To determine whether your child has a hearing function problem, an audiologic evaluation is necessary. An **audiologist** will give tests that can determine the softest sounds and words a person can hear and other tests to see how well people can recognize sounds in words and sentences. For example, for one task, the audiologist might have your child listen to different numbers or words in the right and the left ear at the same time. Another common audiologic task involves giving the child two sentences, one louder than the other, at the same time. The audiologist is trying to identify processing problems.

A **speech-language pathologist** can find out how well a person understands and uses language. A **mental health professional** can give you information about cognitive and behavioral challenges that may contribute to problems in some cases, or he or she may have suggestions that will be helpful. Because the audiologist can help with the functional problems of hearing and processing and the speech-language pathologist is focused on language, they may work as a team with your child. All of these professionals seek to provide the best outcome for each child.

### **What treatments are available**

Several strategies are available to help children with auditory processing difficulty.

**Auditory trainers** are electronic devices that allow a person to focus attention on a speaker and reduce the interference of background noise. They are often used in classrooms, where the teacher wears a microphone to transmit sound and the child wears a headset to receive the sound. Children who wear hearing aids can use them in addition to the auditory trainer.

**Environmental modifications** such as classroom acoustics, placement, and seating may help. An audiologist may suggest ways to improve the listening environment, and he or she will be able to monitor any changes in hearing status.

**Language-building** exercises can increase the ability to learn new words and increase a child's language base.

**Auditory memory enhancement**, a procedure that reduces detailed information to a more basic representation, may help. Also, informal auditory training techniques can be used by teachers and therapists to address specific difficulties.

**Auditory integration training** is sometimes promoted by practitioners as a way to retrain the auditory system and decrease hearing distortion.

It is important to know that much research is still needed to understand auditory processing problems, related disorders, and the best interventions for each child or adult. All the strategies undertaken will need to be suited to the needs of the individual child, and their effectiveness will need to be continually evaluated.

### **Have trouble hearing clearly when it's noisy?**

This can be a failure of one or more of the automatic noise-suppression systems of the brain. It is reasonable to ask for a desk away from the computers or for a sound-absorbant partition. It is both polite and efficient to say, "I'm interested in what you're saying. Let's move away from this noise." A mild-gain amplifier can help you hear accurately on the phone over the noise of a busy office.

### **Sometimes make "silly" mistakes or "careless" errors?**

Intrusions of random sounds which normal-hearing people can ignore may break your concentration so that you lose your place and skip a task (like carrying a number or writing a small word in the sentence). Take the work to a quieter place if necessary. Earplugs (sometimes in only one ear which suppresses noise less well) are a possible emergency solution. Make a deal with someone else to proofread your work.

### **Miss important sounds or signals that others hear easily?**

Poor noise suppression and sound localization skills can cause important voices or signals to "disappear" in the general background. It will save others time if they know to tap you on the shoulder before they launch into their conversation. Telephone bells and alarms can be adjusted for volume or pitch, or a visual or tactile signal can be added.

### **Get important messages wrong?**

Sound distortion, sequencing, auditory-visual transfer, and/or short term memory problems may be contributors. You can ask for the information in writing, double-check later with someone else who was present, or let the speaker know that she's going too fast. Even normal listeners often say, "Let me read that back --," or "That's '3489'?"

### **Forget instructions?**

Inefficient short term auditory and rote memory (or habituation) may figure in this. Get in the habit of taking notes; set up a logbook for longer-term assignments; ask that the information be put in a memo. You might even carry a small tape recorder or dictaphone in some situations. If you often forget to go back to it later, put the memo or recorder where you must see it, as by your purse or underneath something you use every day.

### **Only get parts of more complex directions or lengthy explanations?**

Here you may begin to suspect a problem with the subtleties of language - difficulty forming rapid "word pictures" to help with concept formation and memory, or failure to consider alternative word definitions so that meaning is mis-perceived. You can "freeze" it for later analysis by writing or taping. You can say "I learn better if I do it myself while you watch." Have someone else help you fill in details later.

### **Have difficulty knowing "what to say when" and are puzzled by others' reactions to you?**

One possibility is an inefficiency in the part of the brain which registers tonality (expression in the voice) and gives us "quick fix" on the situation (sometimes referred to with rough accuracy as a "right hemisphere disorder"). A professional can help you learn other cues by which to "read" how people are feeling about what you said and how to change what you say accordingly, much as anyone would have to learn about a foreign culture. In the meantime you might explain the problem to people you trust so their feelings aren't hurt

### **Recommendations for children with CAPD at school**

- 1) Seat the child near the source of instruction to allow the speaker to talk directly to the child. This helps reduce the interference of background noise.
- 2) Get the student's full attention prior to giving instructions using a tactile prompt such as a pat on the hand, calling the child's name, or establishing eye contact.
- 3) Reduce both auditory and visual distractions which compete for the child's attention. Other conversation and movement are the worst of these distractions.
- 4) Speak distinctly, using as few words as possible, as too much talking can act as a distraction to the child.
- 5) Simplify instruction using one-step directions. Write down key words or assignments for students who can read.
- 6) Have the student re-verbalize instruction, directions or conversations. This helps the student recall what was heard, and allows the teacher to monitor comprehension.
- 7) Structure the environment as much as possible, using a consistent routine.

- 8) A buddy system can be helpful, especially with older students, to check notes and assignments.
- 9) Visual aids provide good reinforcement for students with weak auditory skills.
- 10) Breaks during the day may be necessary for the child to relax. Tension and fatigue can occur when children are constantly straining to attend and comprehend what is going on around them.
- 11) Amplification systems, both personal and free field, allow students to hear the teacher more clearly with less interference from background sounds.
- 12) It is most important to allow the student to experience as much success as possible to promote a good self concept. When children are frustrated with themselves as well as having academic difficulties, it is hard to stimulate interest to build skills that will help restore confidence.