



**Central  
Auditory  
Processing  
Disorders:**

**When  
noise  
makes  
speech  
vanish!**

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# What is Central Auditory Processing Disorder?

Central Auditory Processing Disorder (CAPD), also known as simply Auditory Processing Disorder (APD), is one of those hidden problems that cause many children to fail in school. Children with CAPD do not have the ability to hear speech when competing environmental sounds are present. This causes the following problems:

- ✚ Cannot locate sound in space (figure out which person is speaking)
- ✚ Lack auditory discrimination (not able to tell one sound from another)
- ✚ Cannot recognize auditory patterns (problems sequencing sounds to words)
- ✚ Shortens auditory memory (cannot remember sequence of words)
- ✚ **Causes speech to fade or totally drop out when sound is present** (i.e. paper's rustling, fan or radiator, people whispering, coughing, etc.)
- ✚ May cause problems with balance
- ✚ May cause auditory sensitivity (cannot tolerate vacuum, fire alarm, etc.)



CAPD is a somewhat heartbreaking condition because so many children go undiagnosed, or worse, misdiagnosed. It is not unusual for children with CAPD to be labeled as ADHD (due to inattentiveness) or as a behavior problem (due to not following directions). In other words, the lack of knowledge about CAPD is truly hurting children.

To REALLY make matters worse, CAPD is not typically detected through the normal hearing exam. So, even if teachers suspect a hearing problem and request a typical hearing test (pure tone), the results will usually come back normal. Needless to say, many children are not being diagnosed because of this, so having information on this disorder is critical!

# General Signs of Possible Problems

The signs of CAPD can range from serious to very subtle, so you have to really look at these children. Here are some things you might see:

- + Poor attention skills
- + Problems with phonics
- + Slight articulation errors
- + Complaints about “not hearing”
- + Incorrect pronunciation of words
- + Lack of balance and awkward or tentative movement
- + Frequent ear infections
- + Limited social skills and/or few friends
- + Frequent “behavior” issues, usually for not “following directions”
- + Inconsistent auditory discrimination (i.e. may be able to recognize the sound at the beginning of a word but miss the same sounds in the middle or end of the word)



- ✚ Asking frequent questions or appearing confused
- ✚ Complaints about spinning sensations when lying down and/or when eyes are closed
- ✚ Delayed responses (due to the student trying to figure out what was said)
- ✚ Unusual fear and/or pain to certain sounds (i.e. fire alarm, book dropping)
- ✚ Missing words/speech when music is played in the background (i.e. gym or a movie)
- ✚ Problems functioning in “loud” areas (i.e. hall, gym, recess, bus)
- ✚ Looking down or appearing “disengaged” when listening (has to concentrate on hearing so may not write words or take notes during that time)
- ✚ Turning one ear or another towards the speaker



It is again important to note that these children may not only perform at a typical level on a regular, pure tone hearing test, they may even score above average. These children actually hear environmental noise better than speech so a tone test that has NO speech will not detect the issue.

It is so sad to see well-meaning teachers and parents who suspect a student is having hearing problems switch to considering behavior problems or ADD when a typical hearing test comes back “normal”. How I wish that CAPD would be considered first... If there is one thing I change before I retire, it will be this, I hope!

# Diagnosis



As mentioned earlier, CAPD is not diagnosed easily. There is a great deal of variation in hearing development when children are young, so that already causes issues. In addition, to diagnose CAPD, the student must be able to tell the examiner what they are hearing in the *left ear* versus the *right ear*; a difficult task. Because of this demand, students must usually be about 7 ½ years old to obtain a valid result. That doesn't mean you can't suspect CAPD and assist children younger than age seven, but to get a definitive diagnosis, the student usually has to be in second grade or older.

Which tests are used to diagnose CAPD? Well, you DO begin with a normal hearing test. You have to rule out regular hearing disabilities before you can explore CAPD, so that test is typically completed first. Here are some of the other assessments you may see:

- Complete Audiological Battery
- (C)APD Battery
- Listening Inventory
- Electrophysiological Measures (Auditory Brain Stem Responses---see response to sound in the brain)
- Additional measures that may be needed include speech-language exams, psychology and behavior measures (ADHD----it is possible to have both CAPD and ADHD)

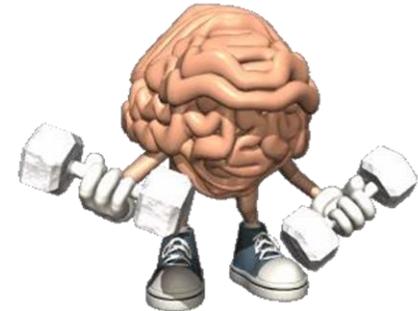
As you can see, it is a bit of a process but definitely worth the effort!

**PLEASE NOTE:** *The intention of this unit is to give you enough information to note possible problems and assist families in obtaining the proper medical diagnosis through a qualified professional. It is not meant to be used by educators to diagnose the student within the classroom. I KNOW you know this, but it is best to mention it directly 😊*

# Overview of Treatment Options

Most teachers know how to assist children with general hearing problems in the classroom, so I will focus the majority of this document on the more unusual or unknown. In general, there are three ways you can assist a child with CAPD. You can use:

1. **Environmental Modification**: Room arrangement to improve hearing
2. **Compensation Strategies**: Technology to improve hearing ability
3. **Deficit Specific Training**: Programs to “rewire the brain/auditory cortex”



To begin this process, you have to have a sense of what is happening when the child hears speech in a location where there is noise. Some children hear the speech, but it is too *mumbled* or *low-toned* to determine what is being said. Other children claim they just hear *static*. Still others say they “*hear nothing at all*”. In addition, the amount of sound (signal to noise ratio) that causes the problem may differ greatly from child to child. Some children have to be in a pretty loud environment before there are problems, and others can be affected by something as small as the fan on the projector. Definitely question the child, especially if they are young and a good diagnosis is still not possible.

Since hearing is so automatic for us, it is easy to misunderstand what it is like to lack this ability. There are many websites that have simulations for general hearing disorders. Look for one---they are quite interesting to experience and can help inform your practice.

So, let’s begin to look at the three strategies listed above...

# Classroom Strategies

Of course you already know the basics of how to help children hear well. We know to reduce sound by closing doors, putting tennis balls on table, and chair legs, seating the child close, putting up curtains if possible, reducing echo with “soft” fabric, etc. etc. but one of the most important and less recognized changes is directly teaching the child to “make visual contact”, so that is what we will focus on here.

Many of you may have experienced the McGurk Effect back in a psychology class, but it is so fun, it is worth the one-minute to try it again.

The "McGurk Effect" was first described by Harry McGurk & John MacDonald in "*Hearing lips and seeing voices*" (1976-----Nature 264, pgs. 746-748). At that time they found that initial sounds totally changed depending on whether they are heard with your eyes open, heard with them closed, or just seen. Let that sink in a moment.... This means that if a child is looking down at a paper when they hear you say a word, they are hearing something slightly different than if they are directly looking at you! Try it yourself at this website and see ☺ <http://www.youtube.com/watch?v=PX9FYxadPoQ>



The graphic features a black background with a white title box at the top containing the text "McGurk Effect" in a serif font. Below the title is a small portrait of a man with long hair and glasses. To the right of the portrait, there are three lines of text: "Look & Listen: Da - Da - Da - Da" in green, "Sound Off: Ga - Ga - Ga - Ga" in red, and "Eyes Closed: Ba - Ba - Ba -Ba" in yellow.

So, what does this mean for a child with CAPD? Well, most typically developing children eventually figure out the different sounds despite the McGurk effect, but a child with CAPD, already at a hearing disadvantage, may not. These children should be taught to look directly at the person who is speaking. Yes, this may slow their work, and in older students, may require some assistance with note-taking, but it is the best way to improve the hearing the students possess without the addition of amplification.

# Amplification

Even with environmental strategies, many children with CAPD will need amplification of some sort. It is important to understand that a simple hearing aid will not help these students. A hearing aid amplifies ALL sound, and that would not work in this case. What these children need is amplification of speech only, and that requires a microphone-based system.

Often amplifying the total room with a typical FM unit will do the trick, but some children may need more. In those cases, the amplification can be brought directly to the student. Here are two vendors I have dealt with in the past, and others can be found on the web. Research has clearly shown that room amplification can help all students, especially in the younger grades; so many schools have this technology already in place. For many students with CAPD, having this type of equipment available will be essential to their academic progress and classroom interaction!

The logo for Lightspeed, featuring a stylized eye icon to the left of the word "lightspeed" in a lowercase, sans-serif font.

**Example of a classroom system**

The logo for Phonak, featuring the word "PHONAK" in a bold, uppercase, sans-serif font with a green dot over the 'O', and the tagline "life is on" in a smaller, lowercase, sans-serif font below it.

**Example of an individual system**

# Amplification

Many software programs have come onto the market that are designed to assist students in developing hearing skills, and in some cases, regain hearing ability through retraining of the auditory cortex. I have seen many, many students do quite well with these, and even come off amplification completely. But, in other sad cases, *there was no change at all*. So, please know that there is no guarantee that these will work for your students, but they are worth knowing, and in many cases, worth a try. Here are the two I have used and are most common in the field. Look for others---I find this field is growing rapidly!



Earobics did not require a license or special training to use and teacher guides were provided. Software touches on all aspects of hearing and reading- related phonetic work. Many hospitals used this as part of their therapy programs for speech and hearing and schools use it for reading, hearing and English Language Learners. I have personally used this software both professionally and for my own daughter with CAPD and found it both easy to use and effective. Please see the website for more information. It is being phased out in many locations, however. As this process continues, you may only be able to find it through vendors or as a used product. Just FYI. It's too bad....it was a nice product!



This product requires a license to use. It can be obtained by going through their training modules and passing a competency test. The program interacts with the student to provide individually tailored sound speed and tone on the edge of what the student can hear. As the student improves, the program automatically adjusts levels....this is done for both ears individually, so it is tailored for that child. I have also used this professionally and personally with good results. Many learning centers and schools also use this system for intensive reading

intervention. You can find more information at <http://www.scilearn.com>

# Secondary Issues

## Auditory Memory

Children who have CAPD do not receive auditory information consistently. It is almost like listening on a faulty cell phone connection. Because the sound drops in and out, the length of sentences a child hears are shortened. Throw in the faulty brain-hearing connection, and you have auditory memory problems.

There are many ways to lengthen auditory memory that you are well familiar with including simple, old-fashioned games like “I am going on a picnic” (A child names what they are bringing, and the next person repeats that item, and then adds another. Keep going until they no longer can remember the list as well. Other auditory items, especially old fashioned items (like books on tape) are also useful. You should also know that most software programs that target hearing will also target this skill and many reading programs are beginning to do so as well.

## Vestibular Balance

I have found that many students with CAPD have very poor vestibular processing as well. Whether you categorize this as a sensory integration disorder or leave it lumped in with CAPD, either way it must be dealt with. Any exercise that helps the child to work on balance (especially balance with their eyes closed) is useful.

In addition, you should question the child about sleeping/napping comfort. It is not unusual for a child with CAPD to feel like they are falling or spinning when they lay down. Needless to say, it is hard to sleep in that situation. Many resort to lying on the floor to gain some comfort. You can use traditional sensory integration tricks like weighted blankets or bed-tents (little tent enclosures over the bed) to help the child feel secure and safe. See the manual titled, *Sensory Processing*, for additional techniques to provide proprioceptive and vestibular supports.



## Secondary Issues

There are many resources for more information on CAPD. Here are a few to note:

[www.NCAPD.org](http://www.NCAPD.org)

The National Coalition on Auditory Processing Disorders, Inc. N(C)APD. It is a non-profit organization dedicated to assisting families and individuals affected by auditory processing disorders.

<http://www.exploratorium.edu/exhibits/ladle/index.html>

While not originally designed to simulate CAPD, many use it because it so closely replicates what some of them hear (the muffled, incorrect phonetic cases). Worth a listen...

<http://www.ncl.org/types-learning-disabilities/adhd-related-issues/auditory-processing-disorders/auditory-processing-disorders>

A wonderful resource for all types of processing disorders.

<https://www.asha.org/Practice-Portal/Clinical-Topics/Central-Auditory-Processing-Disorder/>

Formal page with resources and other information

<http://www.ldonline.org/article/5919/>

Provides resources on this condition plus other conditions that causing learning disabilities

There are many, MANY other resources. Just a simple search will provide you many more!