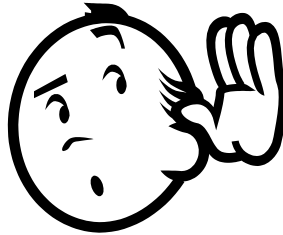


(Central) Auditory Processing Disorder



**Compiled by Dr. Michael Cheng,
Child and Family Psychiatrist, Ottawa**

Where to Get This Handout

This handout can be downloaded from <http://www.drcheng.ca> in the Mental Health Information section. Your comments are encouraged as they will help ensure this handout is helpful!

Purpose of This Handout

This handout provides basic information about central auditory processing disorder and is written for parents and caregivers.



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Table of Contents

| | |
|---|----|
| What is (Central) Auditory Processing Disorder ((C)APD)? | 2 |
| Where does it come from? | 2 |
| What does (C)APD look like? | 3 |
| Signs and Symptoms of (C)APD | 3 |
| Usual symptoms..... | 3 |
| Emotional / behavioral symptoms | 3 |
| In order to cope with these difficulties, people with auditory processing difficulties may: | 4 |
| Diagnosing (C)APD | 4 |
| (C)APD and other conditions | 4 |
| Specific problems that might be seen with (C)APD..... | 5 |
| Five General Profiles in (C)APD..... | 6 |
| Classroom Accommodations for (C)APD | 9 |
| Sound Amplification Systems | 10 |
| Local Ottawa Resources | 11 |
| References and Weblinks..... | 11 |

What is (Central) Auditory Processing Disorder ((C)APD)?

(C)APD is a condition where someone has normal hearing, but the brain is unable to properly process the information it has heard, and thus the person ends up having trouble understanding what is heard.

Because so much of our lives depends on sound information (such as spoken language), this can cause significant problems at school, work, home and relationships.

According to the American Speech-Language-Hearing Association (ASHA) Auditory Processing Ad Hoc Committee (1990):

- Auditory processing disorders (or Central auditory processing disorders) are deficits in the information processing of audible signals not attributed to impaired hearing sensitivity or intellectual impairment. Specifically, (C)APD refers to limitations in the ongoing transmission, analysis, organization, transformation, elaboration, storage, retrieval, and use of information contained in audible signals. This processing involves perceptual, cognitive, and linguistic functions that, with appropriate interaction, result in effective receptive communication of passive (e.g. conscious and unconscious, mediated and unmediated) ability to:
 - attend, discriminate, and identify acoustic signals;
 - transform and continuously transmit information through both the peripheral and central nervous systems;
 - filter, sort, and combine information at appropriate perceptual and conceptual levels;
 - store and retrieve information efficiently;
 - restore, using phonological, semantic, syntactic, and pragmatic knowledge; and
 - attach meaning to a stream of acoustic signals through utilization of linguistic and nonlinguistic contexts.

Where does it come from?

(C)APD is believed to be a problem occurring in the brain. It can be inherited, or acquired (e.g. by problems at birth, or ear infections when young).

Normal development

Central auditory processing (CAP) is the ability to interpret and store what we have heard. CAP skills typically develop in the first five years of life along with receptive and expressive language.

What does (C)APD look like?

It is the 7-yr girl who is able to pay attention when working one-on-one with an adult. But when there are other children around, she can't seem to focus and appears distractible, and can't appear to get long with them. During group discussions, she just stares out the window. People wonder if she has attention deficit disorder.

It is the 13-yr girl who prefers to eat alone during lunchtime. She seems okay one on one with classmates, but when she has gone to the cafeteria to eat with classmates, she seems to get confused and can't seem to follow conversations with other people around. People have wondered if she might have social anxiety disorder. Others have wondered about sensory processing disorder, because she also happens to be very sensitive to noise.

It is the 14-yr boy who is always forgetful and can't seem to remember things that his parents have told him. Just the other day, he came home late even though his mother had just reminded him that morning to come home early for his doctor's appointment. Parents wonder if he's just being difficult, or if it's something else.

Signs and Symptoms of (C)APD

Symptoms of (C)APD can range from mild to severe, and can look different depending on the child:

Usual symptoms

- Difficulty following verbal directions.
- Echolalia (repeating back words and phrases without comprehension).
- Re-auditorization (repeating back what was heard, and then showing comprehension).
- A child who says "huh" or "what" and requires more repetitions of verbal input messages.
- **Speech sound discrimination difficulties, i.e. troubles understanding what is heard when there is background noise, more than one person speaking, or other sound distractions**
- Highly distractible/active
- Might have unintelligible speech, but with adequate vocal inflection and gestures.
- Difficulty with memorizing names and places.
- Difficulty repeating words or numbers in sequence.
- Troubles learning, especially in large noisy classrooms and homes
- May act like they understand, in reality get easily confused
- May have speech or language "delays", or poor receptive and expressive language skills
- Needs instructions to be repeated back

Emotional / behavioral symptoms

- Troubles understanding what is said, or auditory overload, may lead them to feel overwhelmed, which can lead to them feeling insecure/anxious, or angry and aggressive.
- Become defensive or argumentative for no apparent reason
- Due to stresses of coping with school and social situations, at high risk for losing confidence and feeling insecure

In order to cope with these difficulties, people with auditory processing difficulties may:

- Tune out
- React through two extremes, either becoming underreactive (i.e. become lethargic or quiet) or overreactive
- Jump from one topic to another when talking
- Resemble attention deficit behavior
- Cannot carry on a normal conversation
- Come across as being controlling – their need to control their environment is their way to keep their nervous system from being overwhelmed

Diagnosing (C)APD

If you suspect (C)APD, you should first take your child to see a pediatrician, to make sure that there aren't other medical problems contributing such as hearing problems, e.g. due to ear infections.

The actual audiology testing for (C)APD is done by an audiologist. Using special equipment, the audiologist will give various sounds (specialized word, number and pitch recognition tests) to the child to measure the child's auditory performance (ability to hear and understand). These tests simulate the stress on the child's auditory system during daily listening activities. This helps discover what areas your child is having problems in. Children under the age of seven cannot be evaluated using these tests however, because their brains (including language and auditory processing) are still developing.

(C)APD and other conditions

(C)APD can be seen on its own, but often it can be seen along with other conditions, such as:

- **Non-verbal disability:** research shows that it can be more frequent in children who have a diagnosis of non-verbal learning disability (Keller et al., 2006).
- **Attention deficit hyperactivity disorder:** although there was confusion in the past, it is now widely accepted that ADHD and APDs are separate conditions, each of which may occur on their own, as well as together. Figuring out what is ADHD and what is APD can be challenging due to the similarities in symptoms between them. Nonetheless, there are some predominant behaviors that may help distinguish between the two (Chermak et al., 1999).

Behaviors seen with Attention Deficit Hyperactivity Disorder vs. Auditory Processing Disorders in Frequency of Occurrence

| ADHD | APDs |
|------------------------|---|
| 1. Inattentive | 1. Difficulty hearing in background noise |
| 2. Distracted | 2. Difficulty following oral instructions |
| 3. Hyperactive | 3. Poor listening skills |
| 4. Fidgety/restless | 4. Academic difficulties |
| 5. Hasty/impulsive | 5. Poor auditory association skills |
| 6. Interrupts/intrudes | 6. Distracted |
| 7. Inattentive | |

*From Auditory Processing Disorders, from the Minnesota Department of Education, 2003.

Specific problems that might be seen with (C)APD

- Difficulty learning things that are spoken or heard
- Difficulty with phonics and speech sound discrimination
- Slow or delayed response to verbal requests and instructions
- Troubles following instructions - from simple to complex
- Being slow to process or understand instructions
- Auditory Figure-Ground Problems
 - Troubles paying attention especially in environments with lots of other sounds and distractions
 - This may make the child frustrated when there is too much noise in the classroom
- Auditory memory problems:
 - Troubles remembering what s/he is told.
 - So after being told a set of instructions, the individual may have troubles remembering things right after they are said, or may have troubles remembering it later.
 - May not consistently remember addresses, phone numbers, etc. from day to day.
 - May not remember how to pronounce letters and words.
- Auditory Discrimination Problems
 - Difficulties hearing the difference between sounds or words that are similar
 - E.g. pat/pad; rice/rise; coat/boat; sounds such as “ch” or “sh”
- Auditory-Visual Association Deficit
 - This skill requires functioning of lower level skills plus relating a visual symbol with a sound for that symbol. This skill is the essence of word recognition. Subjects with this deficit will have trouble recognizing and naming letters, words, numbers, etc. May be able to write what is read, speak what is heard, but will have trouble speaking what is read, or writing what is heard. This can result in troubles with note-taking.
- Auditory Association Deficit
 - Troubles learning sounds of letters and letter names, individual words with categories, etc. May not be able to follow verbal directions, conceptualize the concepts of words, numbers, etc. May have difficulty classifying objects and ideas presented verbally.
- Sound localization and lateralization:
 - Knowing where a sound is in space.
 - E.g. hearing someone call your name, and figuring out where the person is.
- Auditory pattern recognition
 - Similarities and differences in the patterns of sounds.
 - E.g. apple/appeal; apple/chapel.
- Auditory performance with degraded acoustic signals
 - Understanding the spoken word if part of the word is missing.
- Auditory Attention Problems:
 - Problems in listening long enough to complete a task or requirement (such as listening to a lecture in school). Although health, motivation, and attitude may also affect attention, among other factors, a child with (C)APD is simply unable to maintain attention, and is not simply being lazy or defiant.
- Auditory Cohesion Problems:
 - Problems with ‘putting the pieces together’ in higher-level listening tasks. Auditory cohesion skills - drawing inferences from conversations, understanding riddles, or comprehending verbal math problems - require heightened auditory processing and language levels. They develop best when all the other skills (levels one through four above) are intact.

Five General Profiles in (C)APD

Reproduced from Auditory Processing Disorders, by the Minnesota Department of Education.

Teri James Belles (1999) and Jeanane Ferre (1996) described five general profiles seen in (C)APD:

1. Auditory decoding weakness

Example

- John has difficulty with phonics. He is very distracted when his teacher gives instructions in a noisy classroom. He enjoys math, but does not like reading or spelling.

Symptoms

- Cognitive testing often reveals discrepancy between verbal and nonverbal test scores because basic reading skills are not required (matching sounds to their letter symbol).
- Commonly has difficulty with decoding letters.
- Has difficulty hearing in noise, or may ask for repetition.
- Appears to “mishear” and substitute similar-sounding words for the actual auditory target, similar to a student with high frequency hearing loss.
- Has difficulty with sound blending or spelling.
- Tends to perform better in subjects such as math computation.

Strategies

- Make environmental modifications and accommodations in the classroom to improve student’s ability to hear the teacher in noise:
 - preferential seating to maximize both auditory and visual information (placement of student to see the speaker’s face).
 - consideration of a peer note taker.
- Provide speech sound training; focus on stop consonants (b, p, t, d, k) and other “hard-to-hear” contrasts (s, sh, ch, j).
- Provide activities to enhance ability to “fill in the gaps” (complete rhymes, or anticipate answers); use of contextual clues is often helpful.
- Counsel toward self-advocacy for listening, including recognition of adverse listening conditions and methods of dealing with them.
- Teach visualization and verbalization approach to spelling and reading decoding skills that reinforce sound-symbol association may be effective.
- Provide repetition or rephrasing as an appropriate modification.
- Use assistive listening device (ALD)/ technology if poor learning in noise documented.

An assistive listening device (ALD) is a piece of equipment used to augment hearing ... in difficult listening situations, through the use of a remote microphone, assistive listening devices provide a superior signal-to-noise ratio which enhances the clarity (intelligibility) of the speech signal (Flexer, 1994). Use of an assistive listening device requires an educational audiologist and input from the educational team.

2. Prosody Weakness

Example

- Susie reads without any intonation in her voice. She has difficulty understanding age appropriate jokes.

Symptoms

- Has good word attack skills but difficulty with sight words.
- Frequently demonstrates weak social communication skills (pragmatics) and often may respond inappropriately.
- Has flat or monotonic speech and oral reading, difficulty with rhythm or stress.
- Cognitive testing reveals discrepancy between verbal and nonverbal test scores, with higher verbal scores.

Strategies

- Place with an animated teacher.
- Provide key word extraction--activities focusing on searching for and extracting key words from oral or written narratives of increasing linguistic complexity.
- Direct teaching of social language skills.
- Provide drill/practice/games with sight words.
- Monitor social communication in all settings and teach appropriate responses directly.
- Model and teach oral reading with intonation.
- Tape record student reading and then listen for rhythm and stress.
- **Note: In this profile, use of assistive listening device is seldom indicated (unless poor learning in noise has been documented.)**

3. Integration Weakness

Example

- Peter cannot do more than one task at a time. He has great difficulty taking notes, listening to his teacher and watching the overhead projector simultaneously.

Symptoms

- Has difficulty linking prosodic (rhythm and pattern) elements with linguistic content of a spoken message, resulting in:
 - compromised linguistic content, missing components
 - difficulty processing ongoing discourse
 - difficulty following verbally presented directions
- Has poor speech-in-noise skills.
- Has phonological deficits, such as patterns of sound omission, or verb endings.
- Exhibits reading and spelling difficulties.

Strategies

- Limit or discontinue use of multimodality cues (more than one sensory mode used together, i.e.; auditory and visual, auditory, visual, and handson).
- Preteach new information and new vocabulary.
- Reduce classroom distractions.
- Consider using a peer note taker.
- **Note: In this profile, use of assistive listening device is seldom indicated (unless poor learning in noise has been documented.)**

4. Organization Weakness

Example

- Rebecca has one of the messiest desks in the classroom. She is uncertain regarding her schedule and assignments. Her difficulties become more apparent as she gets older.

Symptoms

- Demonstrates poor organizational skills, such as poor note taking and assignment completion skills (may be considered "messy child").

- Has poor sequencing in general; of pictures, events or functional tasks.
- May have poor speech-in-noise skills.

Strategies

- Provide highly structured directions and information one step at a time
- Train in use of organizational aids (e.g.; outlines, making lists, using planning books and calendars).
- Structure routines into classroom to develop consistency.
- Provide therapy focusing on expressive language and word retrieval strategies
- Sequence activities, such as picture sentences.
- Use an assistive listening device (ALD) if poor learning in noise has been documented.

5. Auditory Associative Weakness (Auditory Language)

Example

- Michael struggles with the whole language curriculum in his classroom. He has difficulty performing any independent academic tasks. Instruction must be simplified.

Symptoms

- Has receptive language deficits, including semantics and syntax.
- Has difficulty with whole language concepts.
- Demonstrates expressive semantic difficulties, such as poor use and understanding of antonyms, categorizations, synonyms, or homonyms.
- Shows difficulty comprehending information of increasing linguistic complexity.
- Has difficulty understanding words that have multiple meanings.
- May have writing difficulties (grammar).
- Has difficulty with reading comprehension and story problems in math.

Strategies

- Rephrase information using smaller linguistic units. (The focus is on linguistic clarity, not acoustic clarity.)
- Use a learning approach that includes a systematic, multisensory, rule-based method to language and learning.
- Teach methods to enhance auditory comprehension and memory:
 - Chunking
 - Verbal chaining
 - Mnemonics
 - Rehearsal
 - Paraphrasing
 - Summarizing
- Check comprehension by asking for demonstration or a paraphrasing rather than repetition of information.
- Analyze grammatical errors in writing and teach to “fix” errors.
- Directly teach antonyms, synonyms, homonyms, and increase complexity over time.

Classroom Accommodations for (C)APD

To summarize all these strategies

- **Reduce background noise**
- **Ideally, provide a one-to-one, in a quiet environment.**
- Structure the environment as much as possible, using a consistent routine. Changes in routine may be stressful, because those are times when there may be unexpected noises.
- Classroom placement.
 - Self-contained classrooms are preferred
 - Open classrooms are typically less structured and worse for the CAPD student
- Sit the child away from noise (e.g. doors, windows, pencil sharpeners)
 - If the audiologist has determined that the child has a “weak” ear, seat the child so that the better ear is used more
- Seat the student closer to the teacher, which also makes the teacher’s voice relative to other distractions
- Reduce unnecessary sound (such as unnecessary conversation) and visual distractions (such as movement)
- Speak distinctly, using as few words as possible, as too much talking can act as a distraction to the child.
- Quiet areas for study, or for doing seatwork. At home or school, provide an individual study area relatively free from distractions and the mainstream of family life or from small group activities in the classroom. Quiet areas can also serve as a respite place for the child to go to when s/he is getting overwhelmed by noise or frustration.
- Look and listen. Preferential seating is a major consideration in managing the CAP-disordered child. Encourage him to watch the teacher’s face.
- Gain attention. Get the child’s attention **before** giving oral instructions. Calling him by name or touching his shoulder may alert the child. Rather than saying, “What is the capital of Ontario, Billy?”, it is better to first get the child’s attention by saying, “Billy, what is the capital of Ontario?”
- Get the student’s full attention prior to giving instructions using touch (e.g. such as a firm pat on the hand, however be aware if the student is touch hypersensitive), calling the child’s name, or establishing eye contact.
- Check comprehension. Have the child repeat directions and instructions to make sure they are understood. This helps the student recall what was heard, and allows the teacher to monitor comprehension.
- Rephrase and restate. Encourage children with auditory deficits to indicate when they do not understand what has been said. Rephrase the statement using simplified grammar or by substituting words, so that the intended meaning is conveyed. Keep instructions relatively short.

- Pre-tutor. Have the child read ahead on a subject to be discussed in class so that he is familiar with new vocabulary and concepts. Parents can often help the child in this respect.
- Visual aids. Some children with auditory deficits may have better visual learning skills. Use visual aids to provide auditory/visual association.
- Write instructions. Since CAPD-disordered children may not follow oral directions well, write them on the blackboard and encourage the use of an assignment book.
- Monitor efforts. Children with auditory deficits may become more fatigued than other children. This may affect attention and concentration. Therefore, provide short, intensive periods of instruction with breaks.

Inform parents. Provide parents with consistent input so that they understand the goals of therapy, educational management, and progress being made.

S-P-E-E-C-H. the mnemonic device entitled "SPEECH" has been found to be helpful by teachers and parents. An analysis of "S-P-E-E-C-H highlights basic strategies for dealing with attention, memory, and receptive language deficits, while capitalizing upon strengths in visual processing.

S - state the topic to be discussed

P - pace your conversation at a moderate speed with occasional pauses for comprehension

E - enunciate clearly, without exaggerated lip movement

E - enthusiastically communicate using body language and natural gestures

CH - check comprehension before changing topics

- Simplify instruction using one-step directions. Write down key words or assignments for students who can read.
- A buddy system can be helpful, especially with older students, to check notes and assignments.
- Always pairing 'listening with looking' - i.e. give visual aids (written or picture explanations) to a learning task as well as the spoken instruction. If you want the child to do some chores or responsibilities, write them down!
- 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.
- **Amplification (FM) systems, both personal and free field, allow students to hear the teacher more clearly with less interference from background sounds.**
- 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.

Sound Amplification Systems

Newer research suggests that sound amplification systems (so-called FM systems) in classrooms may benefit **all** children, not only those with central auditory processing disorder. In fact, the Canadian Association of Speech-Language Pathologists and Audiologists recommended in Oct 2007 that

- All Canadian teachers from kindergarten to Grade 3 should wear microphones,
- Classrooms should be equipped with surround-sound systems to give every pupil a "front-row seat" when it comes to hearing

Alternatively, classroom speakers can be placed on his desk.

Research shows that young children cannot hear one of every six words the teacher says, due to distractions such as other children talking (due in part to interactive learning approaches that require more participation and group work), computers, the hum of lights, as well as out-of-class distractions.

Local Ottawa Resources

Audiology Centres where testing can be done include:

- Ottawa Hospital, Civic Campus, 1053 Carling Avenue, Ottawa, Ontario, K1Y 4E9, 613-761-4075, and an assessment costs ~ \$250-300.
- Advanced Hearing Aid Clinic, 1663 Carling Ave, Ottawa, Ontario K2A 1C4, (613) 728-4327, and an assessment costs ~ \$300-350.

Both of these sites see children, generally 7 years and up.

Speech-language pathologist (SLP)

- Consider seeing an SLP with experience with auditory processing difficulties in order to help with strategies, as well as with helping with self-advocacy

References and Weblinks

- The Minnesota Department of Education has an excellent downloadable handout at <http://education.state.mn.us/mdeprod/groups/SpecialEd/documents/Instruction/001567.pdf>
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