

# GUIDELINES FOR DETERMINING A CENTRAL AUDITORY PROCESSING DISORDER

## I. DEFINITIONS

**Central Auditory Processing** – the *auditory system* mechanisms and processes responsible for the following behavioral phenomena:

- A. sound localization and lateralization
- B. auditory discrimination
- C. temporal aspects of audition, including
  - 1. temporal resolution
  - 2. temporal masking
  - 3. temporal integration
  - 4. temporal ordering
- D. auditory performance decrements with competing acoustic signals
- E. auditory performance decrements with degraded acoustic signals

These mechanisms and processes are presumed to apply to nonverbal as well as verbal signals and to affect many areas of function, including speech and language. They have neurophysiological as well as behavior correlates.

Many neurocognitive mechanisms and processes are engaged in recognition and discrimination tasks. Some are specifically dedicated to acoustic signals, whereas others (e.g. attentional processes, long-term language representations) are not. With respect to these nondedicated mechanisms and processes, the term *central auditory processes* refers particularly to their deployment in the service of acoustic signal processing.

**Central Auditory Processing Disorder (CAPD)** – an observed deficiency in one or more of the above-listed behaviors.

Central Auditory Processing Disorder is not a stand alone category for receipt of special education services, however, students with CAPD may be eligible for special education services under an existing category of disability if the CAPD manifests itself in such a way as to result in an adverse affect on educational performance.

For students with CAPD, a multidisciplinary evaluation is necessary. Although audiology may be the primary discipline involved in the diagnosis, it will be important for the speech-language pathologist, classroom teacher and psychological examiner to be involved in determining the manner in which a student's CAPD impacts educational performance. Based on this information and the required evaluations for any disability category considered, the student's evaluation committee must make a decision about eligibility and services needed, if any.

Student's with CAPD may meet the eligibility requirements for Speech or Language Impairment when the language area of perception and processing is considered. Please refer to Part I: Eligibility Criteria for Children with Disabilities, Ages 5-21, I. Speech or Language Impairment, of this document. The student may also qualify for special education services if the CAPD manifests as a specific learning disability.

For some persons, CAPD is presumed to result from the dysfunction of processes and mechanisms dedicated to audition; for others, CAPD may stem from some more general dysfunction, such as an attention deficit or neural timing deficit, that affects performance across modalities. It is also possible for CAPD to reflect co-existing dysfunctions of both sorts.

The clinician should attempt to determine the factors that contribute to the disturbance of auditory behaviors (e.g. auditory, cognitive, linguistic) as these may influence clinical decision-making (ASHA, 1995).

Individuals with CAPD exhibit language-related academic deficits with no observable explanations with regard to hearing status, intellectual functioning, articulation disorder, English as a primary language, or emotional disturbance.

CAPDs have been reported for persons manifesting a large and diverse set of clinical problems. In some cases, CAPD is observed in students who show clear evidence of central nervous system (CNS) pathology. CAPD may also be associated with conditions where CNS pathology is uncertain (e.g. developmental language disorder or learning disability). Although the links between them are complex, CAPD has a potential impact on both *language learning* and *language use* for clients with and without clear evidence of neuropathology.

## II. POSSIBLE REFERRAL CHARACTERISTICS

Central Auditory Processing Disorders may specifically fall into one of the following subprofiles. A definition and characteristics of each subprofile are presented.

**Auditory Decoding Deficits** – involves the inability to discriminate fine acoustic differences in speech with poor auditory discrimination or poor auditory closure; the inability to hear differences between speech sounds.

- A. poor auditory closure abilities
- B. poor performance on tests of monaural low-redundancy speech and speech-in-noise
  1. right ear performance is often poorer than left ear performance
  2. errors tend to be phonemically similar to the target (“bite” for “bike”)
- C. listening difficulties in situations where:
  1. external redundancy is reduced
  2. child is unfamiliar with vocabulary
  3. information is presented without sufficient contextual or visual cues
  4. noise is excessive
  5. environment is highly reverberant (i.e. large auditoriums, lunchroom, playground)
  6. child is engaged in group activities (e.g. sports) or social communication
- D. becomes fatigued much more quickly than their peers
- E. demonstrates poor listening habits
- F. reports that they “cannot or did not hear” what was said
- G. misunderstands common words
- H. frequently requests to have information repeated
- I. processes information slowly and inaccurately
- J. reaches “auditory overload” quickly
- K. may perform well in subjects where phonemic decoding is not required, such as math computation
- L. difficulty with development of vocabulary, syntax, semantics, and second language acquisition

- M. difficulty with reading, particularly when an auditory phonics approach is applied
- N. difficulty with spelling, note taking, following directions, or answering simple questions
- O. may demonstrate problems with retention, discrimination, and/or sound blending of phonemes

**Auditory Integration Deficits** – involves the inability to perform tasks that require intersensory or interhemispheric communication resulting in the inability to synthesize pieces of information into a useable whole.

- A. difficulty with tasks that require interhemispheric communication, within and/or across modality (EX: integrating auditory with visual functions OR linguistic-based auditory information with nonlinguistic auditory information, such as rhythm and pattern perception)
- B. demonstrates abnormal left ear suppression on dichotic listening tasks, combined with bilateral deficits on tests of temporal patterning which require a verbal report
- C. difficulty determining “how to” do some tasks
- D. difficulty with multimodality tasks, such as notetaking, drawing a picture from verbal or written instructions, dancing to the beat of music, singing/playing an instrument
- E. asks many task-related questions; requires task parameters
- F. difficulty putting parts into whole
- G. tends to “watch and wait”
- H. difficulty getting started on or moving quickly from task to task
- I. requires more time to complete the same task as peers
- J. easily overwhelmed and often gives up or responds “I don’t know” if given lengthy assignments or instructions
- K. processes slowly, but may eventually reach the correct answer
- L. may do poorly in some situations where noise is present
- M. difficulty with sound symbol association, reading recognition, and use of symbolic language (e.g. math application)
- N. difficulty with sight word recognition, spelling, writing skills, and other sensory integrative tasks
- O. inability to perceive and/or use the prosodic aspects of speech, including rhythm, stress, and intonation; spoken sentences may sound like strings of unrelated words, with no relative stress to emphasize key words and other cues
- P. possible problems with visual motor tasks

**Auditory Association Deficits** – involves the inability to apply the rules of language to incoming acoustic signal; inability to receive pieces of auditory information, analyze them, and attach meaning to them.

- A. demonstrates bilateral deficits on dichotic listening tasks
- B. performance on tests of temporal patterning is often good
- C. speech sound discrimination typically is quite good; however, word recognition itself may be poor
- D. exhibits receptive language deficits in vocabulary, semantics, and syntax; pragmatic and social communication skills may be poor
- E. often exhibits difficulty with sentences presented in the passive voice (e.g. *The ball was thrown by the girl.*), compound sentences, and other linguistically complex messages
- F. inability to attach linguistic meaning to phonemic units of speech

- G. often requests clarification, saying "I don't know what you mean." or "I don't understand."
- H. difficulty with vocabulary, word naming, syntax, semantics, or verbal/written expression
- I. problems with pragmatic language/social communication
- J. demonstrates errors of punctuation, grammar, verb tense, and capitalization
- K. written work may contain stilted language across sentences (e.g. "We went to the park. We went to the store. We went to the movies.")
- L. does not understand jokes, idioms, multiple meanings, etc.
- M. adequate reading recognition (decoding) with poor comprehension
- N. difficulty with word problems in math
- O. demonstrates increased academic difficulties with increased linguistic demands; difficulties become more apparent about 3<sup>rd</sup>, 4<sup>th</sup>, or 5<sup>th</sup> grade
- P. difficulty with independent work, whole language approaches, self-monitoring of learning behavior
- Q. often able to repeat verbatim instructions given, but does not necessarily comprehend
- R. possible early problems with phonology

**Output-Organization Deficits** – involves the inability to organize, sequence, plan, or recall appropriate responses resulting in difficulty on tasks where success is dependent on efficient motor pathway transmission or motor planning skills; inability to sequence, organize, and recall what is heard.

- A. poor performance on tests that require the child to report on multiple elements because of inability to formulate the appropriate response
- B. demonstrates abnormal contralateral acoustic reflexes and extremely poor speech-in-noise skills
- C. performance on monaural low-redundancy speech tasks will be unaffected
- D. demonstrates expressive language problems that involve syntax and articulation; errors often consist of perseverative responses of previously heard words; sequencing errors and sound blending difficulties are not uncommon
- E. demonstrates poor performance on any task that requires report of more than two critical elements; poor memory-based skills such as word recall or sequential memory
- F. demonstrates poor organizational skills, reversals, poor recall and word retrieval abilities, and difficulty following directions, taking notes, or remembering assignments that have several parts
- G. listening behaviors are disorganized and impulsive; poor planning may look like Attention Deficit Disorder
- H. spelling, writing, and sound blending are often poor; with good reading comprehension
- I. possible difficulty with fine or gross motor skills

### III. COMPONENTS OF AN ASSESSMENT FOR CENTRAL AUDITORY PROCESSING

When an evaluation committee is considering a student's need for special education based upon CAPD, there are some basic criteria that the student must meet. The student must:

- A. Be three years of age or older;
- B. Have normal or near normal cognitive functioning;
- C. Have normal or near normal hearing sensitivity;

- D. Have normal middle ear functioning;
- E. Have no primary emotional disturbance; and
- F. Be a native English speaker.

Other components that should be considered by the student's evaluation committee consist of:

- A. Audiometric assessment that includes pure-tone, speech audiometry and impedance audiometry;
- B. CAPD assessment component including auditory attention, auditory figure-ground or selective listening, binaural separation, binaural integration and temporal sequencing; and
- C. Speech and language assessment including information on phonological awareness. The language assessment should also provide information concerning the student's auditory perception, auditory discrimination, auditory memory/recall, auditory reasoning/association, and auditory comprehension.

#### IV. PROGRAMMING

Management of CAPD should involve a team of professionals that can include speech-language pathologists, psychologists, learning disabilities specialists, audiologists, neurologists, and physicians. The amount of each member's involvement depends on what the specific disorder is, its practical effects on the child's daily life, and how necessary medical treatment is. Management can be divided into three (3) main categories:

- A. **Environmental Modifications** – adjusting the environment to minimize noise and improve the child's ability to process auditory information. Examples of environmental modifications are preferential classroom seating, reduction of extraneous noise, and repeating or rephrasing information.
- B. **Direct Intervention** – techniques used to improve auditory discrimination, integration skills, and associative skills, as well as teaching specific language or academic skills. Examples of direct intervention are training the child to hear differences in sounds or words, teaching the child to pick out sounds or words when there is background noise, and teaching the child to use rhythm and tempo cues in speech.
- C. **Compensatory Strategies** – allowing the child to use or teaching the child strategies to compensate for the auditory deficit, and strategies for coping in daily life. Examples of compensatory strategies are allowing a child to tape record class lectures, teaching the child how to ask for repetition, and encouraging the child to use visual cues to enhance the auditory signal.

Regardless of the specific type of CAPD, every child should have a management plan that includes intervention techniques from each of these categories. However, programming must be individualized based on the specific type of CAPD and the specific education, communicative, and social-emotional problems being experienced by the child.

Environmental modifications, direct interventions, and compensatory strategies, consistent with subprofile characteristics, may include:

#### **Auditory Decoding Deficits:**

- A. consonant and vowel training, as well as specific training of speech-to-print skills
- B. vocabulary building and other auditory closure activities designed to teach the child to use contextual cues

- C. therapy to improve auditory discrimination, listening, and noise tolerance skills
- D. preferential seating with line of vision to primary speaker emphasized over distance
- E. improve signal-to-noise ratio through acoustic modifications and/or use of assistive listening devices
- F. minimize noise in classroom
- G. use clear, concise, and explicit language
- H. repeat if you can say the message acoustically clearer
- I. rephrase information only if sufficient information is added to clarify the original message
- J. use an attention getting device, such as calling the child's name or using *tag* words to mark key points (*first, last, before, after, this, that, etc.*)
- K. give instruction, information, and assignments in writing
- L. pre-teach new and/or unfamiliar vocabulary
- M. use visual and contextual cues
- N. avoid or modify oral tests
- O. give spelling words in sentences
- P. tape record class lectures
- Q. consider use of a computer, books on tape, notetaker/classroom "buddy"
- R. improve lip reading skills
- S. allow use of Sign Language as foreign language requirement

#### **Auditory Integration Deficits:**

- A. preferential seating with line of vision to primary speaker emphasized over distance
- B. because the quality of sound is not the issue, the USE OF ASSISTIVE LISTENING DEVICES IS NOT RECOMMENDED
- C. management approaches designed to improve interhemispheric transfer of information
- D. linguistic labeling of tactile stimuli, music, singing, and dance activities, and following verbal instructions to complete art projects
- E. training in the use of prosodic aspects of speech, including key word extraction reading aloud daily while emphasizing rhythm, stress, and intonational patterns is a good home-based activity
- F. playing "Simon Says," identifying the *who, what, when, and where* from a story, newspaper, or magazine article, playing with a Simon® toy, cooking with a recipe, doing household chores that have a specific order/pattern, working jigsaw puzzles or building models
- G. placement in a well-structured, "hands-on" learning environment, with a teacher who is animated rather than quiet, reserved, or monotonous
- H. use of multimodality cues, such as visual and tactile aids, may result in confusion rather than Clarification; effective only if concrete examples and repeated modeling of the desired outcome are provided
- I. repeat information with related gestures, demonstration, or emphasis on key points; never rephrase – this confuses the child who may think it's a new message
- J. provide extra time and practice to complete tasks
- K. give tests that are not timed, including standardized tests
- L. provide an alternative way to complete tasks
- M. provide regular review of learned material
- N. consider use of tape recorders, notetakers, or books-on-tape

- O. use of behavioral “contracts” which define the task and the time or number of items necessary for completion

#### **Auditory Association Deficits:**

- A. language intervention and speech-language services are often a key component  
metacognitive techniques designed to strengthen the memory and aid in item recall
  1. training the child to utilize verbal rehearsal, chunking, tag words, paraphrasing, outlining, and other organizational aids
  2. therapy to improve problem solving, decision making, and semantic mapping
  3. teach categories and labels, multiple-meaning words, negative *wh*-questions, antonyms, synonyms, and homonyms
  4. teach use of linguistic rules to the sounds a child hears
- B. preferential seating with line of vision to primary speaker emphasized over distance
- C. because the quality of sound is not the issue, the USE OF ASSISTIVE LISTENING DEVICES IS NOT RECOMMENDED
- D. adjust environment to minimize noise
- E. placement in an educational environment that uses a systematic, logical, multi-sensory, rule-based approach to language and learning; a whole language classroom is not appropriate
- F. provide frequent opportunities to learn and practice language rules
- G. use multiple choice or closed set fill-in-the-blank tests; avoid open-ended test questions
- H. encourage child to draw diagrams, highlight, and make notes in the margin
- I. teach use of a dictionary and/or thesaurus
- J. waive foreign language requirement
- K. use clear, concise, and explicit language
- L. pre-teach new or unfamiliar vocabulary
- M. rephrasing information using simpler language rather than repeating; comprehension should be checked by asking the child to paraphrase or demonstrate what is expected
- N. impose external organization within the classroom to guide independent work and self- monitoring

#### **Output-Organization Deficits:**

- A. language intervention and speech-language services are often a key component
- B. management strategies designed to improve organization
- C. improve signal-to-noise ratio through acoustic modifications; use of assistive listening devices *may* be useful; audiologist should confirm true noise intolerance
- D. preferential seating with line of vision to primary speaker emphasized over distance
- E. impose external organization within the classroom
- F. emphasize metacognitive techniques
- G. use *both* repetition and rephrasing of critical messages and instructions, but only if the message and required response is broken down into smaller linguistic units of no more than two critical elements
- H. teach use of outlines, checklists, and assignment notebooks
- I. if demonstrating poor written expression, allow dictation of child’s answers by a parent or use of a tape recorder when completing assignments

- J. allow use of a computer in the classroom
- K. teach the use of specific order or sequence, verbal rehearsal, and mnemonic devices; story retelling, picture sequencing, and describing the action in cartoon strips box by box
- L. teach the use of visualization and visual imagery

