

## **Auditory Processing Disorders Assessment and Intervention: Best Practices** **Task Force on Auditory Processing Disorders, Minnesota Speech-Language-Hearing Assoc.**

### **Introduction**

The Minnesota Speech-Language-Hearing Association developed the Task Force on Auditory Processing Disorders to survey practices pertaining to auditory processing assessment and intervention among audiologists and speech-language pathologists in Minnesota. This document summarizes the auditory processing protocols and practices endorsed by the following members of the task force:

- Vicki Anderson, AuD, CCC-A, FAAA, HealthPartners
- Sarah Angerman, PhD, CCC-A, University of Minnesota
- Cassandra Billiet, AuD, CCC-A, FAAA, Oakdale Ear, Nose, & Throat Clinic
- Sarah Hanson, MA, CCC-SLP, Associated Speech & Language Specialists, LLC
- Linda Kalweit, AuD, CCC-A, FAAA, Duluth Public Schools ISD #709
- Anne Lindgren, MA, CCC-SLP, Anoka-Hennepin School District #11
- Amy Sievert O'Keefe, AuD, CCC-A, FAAA, HealthPartners

### **Statement of Purpose**

The purpose of this document is to supplement the consensus statements provided by the national professional associations for audiology and speech-language pathology, namely the American Academy of Audiology (AAA) and the American Speech-Language-Hearing Association (ASHA):

- American Academy of Audiology. (2010). *Diagnosis, treatment, and management of children and adults with central auditory processing disorder* [Clinical Practice Guidelines]. Available from <http://audiology.org/resources/documentlibrary/Pages/default.aspx>
- American Speech-Language-Hearing Association. (2005). *(Central) auditory processing disorders* [Technical Report]. Available from [www.asha.org/policy](http://www.asha.org/policy).
- American Speech-Language-Hearing Association. (2005). *(Central) auditory processing disorders—the role of the audiologist* [Position Statement]. Available from [www.asha.org/policy](http://www.asha.org/policy).

This document is also meant to serve in conjunction with, and as an update to, the document cited below:

- Minnesota Department of Education. (2003). *Introduction to auditory processing disorders*. Available from <http://www.asec.net/Archives/APD.pdf>.

### **Considerations Prior to APD Testing**

Assessments for auditory processing disorder (APD) should be conducted when an individual demonstrates auditory concerns that are unexplained by another diagnosis. When possible, evaluations of hearing sensitivity, visual acuity, speech-language ability, cognitive ability, attention skills, and mental health should be conducted prior to or in conjunction with the administration of an auditory processing test battery. Audiologists may request that individuals/families provide copies of special education documents (e.g., report from

assessment/reassessment to determine special education eligibility, IEP, or 504 plan) or medical reports from physicians (e.g., pediatricians, ENT physicians, psychologists, or neurologists) or other health professionals (e.g., audiologists, speech-language pathologists, or occupational or physical therapists) that may provide pertinent information to determine the necessity of proceeding with an APD evaluation. Results of an auditory behaviors questionnaire (e.g., CHAPPS, SIFTER, etc.) may be requested from a classroom teacher. Testing for APD may be unnecessary if an individual's auditory behaviors are adequately accounted for by another diagnosis, or if an individual is currently receiving intervention services that are already appropriate for the remediation of auditory processing difficulties.

### **Exclusionary Criteria**

The following populations should be excluded from auditory processing testing due to the likelihood of test failure for reasons beyond an auditory processing weakness:

- Children younger than 7 years of age
- Listeners with hearing loss (i.e., pure-tone thresholds poorer than 25 dB HL at any frequency in either ear; at the audiologist's discretion, individuals with a mild hearing loss may be tested only for the purpose of documenting auditory difficulties, but not for providing an APD diagnosis)
- Individuals with IQ less than 80
- Individuals with a diagnosis of Autism Spectrum Disorder
- Individuals with Attention Deficit Hyperactivity Disorder whose symptoms are untreated and might result in inconsistent performance
- Non-native speakers of English (Note: depending on English competency, individuals may be tested, especially with non-linguistic stimuli, to document their auditory strengths and weaknesses, but they should not be given a formal diagnosis of APD if performance deficits arise)

### **Team Approach and the Diagnosing Professional**

As delineated in the AAA and ASHA consensus statements, APD is diagnosed by audiologists. Although tests of auditory comprehension, auditory memory, and auditory attention may be conducted by other professionals, results of these types of testing do not serve as a basis for professionals other than audiologists to diagnose an individual with APD. A team approach is beneficial to examine an individual's strengths and weaknesses for a broad range of skills. Individuals who appear to have APD may have disorders such as expressive or receptive language impairment, cognitive delay, Attention Deficit Hyperactivity Disorder, or a mental health issue (in particular, anxiety) that may be mistaken for an auditory processing weakness.

### **APD Test Battery**

The test battery used to evaluate an individual for APD should include at least one test with published norms from each of the four auditory processes listed below:

- Temporal Processing (tests of temporal patterning, such as the Frequency or Duration Pattern Tests, and tests of temporal resolution, such as gap detection)
- Dichotic Listening (tests of binaural separation, such as Competing Sentences, and binaural integration, such as Dichotic Digits)
- Monaural Low-Redundancy (tests that use filtering, time-compression, or noise to reduce the natural redundancy in speech signals)
- Binaural Interaction (tests of localization/lateralization, Masking Level Difference, or Binaural Fusion)

Failure on any given test represents performance equal to two or more standard deviations below the mean. If an individual fails a test from one of the above categories, it is recommended that a second test be given to confirm difficulty with that auditory skill.

When clinically available, physiologic tests of auditory function are recommended to examine whether physiological deficits exist and to help distinguish an auditory processing disorder from other types of auditory dysfunction. The following procedures are advised:

- Tympanometry: confirms middle-ear status
- Acoustic reflexes: tests the integrity of the peripheral auditory system in addition to the 8<sup>th</sup> nerve, cochlear nucleus, superior olivary complex, and 7<sup>th</sup> nerve
- Otoacoustic emissions: examines the cochlear outer hair cell function
- Efferent suppression of otoacoustic emissions: documents the medial olivocochlear reflex function
- Auditory brainstem response (ABR), middle latency response (MLR), and late-latency responses (LLR such as P1-N1-P2, MMN, P300, etc.): assesses the neural integrity of the auditory brainstem (pons and midbrain), thalamus, and auditory cortex

### **Appropriate Diagnosis of APD**

According to the AAA and ASHA consensus documents, APD is diagnosed when an individual fails two or more tests within the entire APD test battery. Audiologists are cautioned to review each individual's test results to identify any inconsistencies that would suggest that an issue other than APD may have produced test failure (e.g., fading attention producing poorer test results towards the end of a test session, low cognitive ability producing poor performance on all tests, difficulty with language processing producing poorer test results for tests with verbal rather than nonverbal stimuli).

### **Testing of Speech-Language Processing**

Due to the common confusion between APD and language impairment, it is strongly recommended that individuals with auditory processing concerns be evaluated by a speech-language pathologist for potential weaknesses in the processing of receptive or expressive language. The following categories of speech-language function should be examined:

- Receptive language
- Expressive language
- Auditory memory
- Phonological processing
- Vocabulary
- Higher-order language processing
- Articulation, fluency, or voice, as needed

### **Test Considerations**

In order to ensure that accurate test results are obtained, it is recommended that individuals:

- Eat a nutritious meal prior to testing and have a nutritious snack/drink available during test breaks
- Take medications for attention or mental health issues, per usual dosing, on the day of testing
- Consider scheduling testing in the morning rather than at the end of a school/work day

The chosen test battery should be limited to testing that can be accomplished in a clinic visit lasting no longer than one to two hours. If additional testing is required, such as for research purposes or when testing is being conducted by more than one professional in a single setting, multiple visits are strongly encouraged. Multiple breaks should be offered during an individual test session. The audiologist should use clinical judgment to ensure that test results are not negatively influenced by factors such as illness, fatigue, or lack of motivation.

### **Screening for APD**

In cases of suspected APD, screening for APD may be performed by an audiologist, speech-language pathologist, or psychologist using a procedure such as the SCAN-3:C Tests for Auditory Processing Disorders in Children, the SCAN-3:A Tests for Auditory Processing Disorders in Adolescents and Adults, or the Differential Screening Test for Processing. Audiologists may elect to administer APD measures with proven sensitivity/specificity, such as the Dichotic Digits test, as a screening for APD. Individuals who fail an APD screening, and whose auditory processing concerns are unexplained by another diagnosis, should be referred for a complete APD evaluation.

Behavioral questionnaires may also be used as a means of identifying individuals who may benefit from an APD assessment. These questionnaires are particularly useful for children under 7 years of age for whom APD testing is not yet appropriate. The primary purpose for administering these screening questionnaires is to determine those children who appear “at risk” for APD and would benefit from an assessment as soon as it becomes age-appropriate.

### **Intervention Strategies for Children Under 7 At Risk for APD**

A “Response to Intervention” approach is recommended for children under age 7 who are exhibiting auditory processing weaknesses, but who are too young for a formal diagnosis. Under this premise, parents or school professionals would engage the child in activities to strengthen auditory skills, with the idea that some children will improve and no longer show auditory concerns. Those children whose auditory skills do not improve are more likely to need a diagnostic APD evaluation when it becomes age-appropriate. The following activities may be suggested for use at home or school:

- Computer-based programs
- Board games with an auditory component
- Songs that focus on sequencing/ordering (e.g., Old MacDonald, The Wheels on the Bus, The Farmer in the Dell)
- Activities to strengthen auditory memory, such as “I’m going on a trip and I’m going to bring...” where each player adds to the list of items suggested by previous players
- Blindfolding to practice localizing sounds/voices in the room by pointing to the source
- Playing “Simon Says” to improve auditory comprehension of directions
- Combining singing with body movements or performing music with instruments to strengthen interhemispheric connections through tasks requiring both cerebral hemispheres

### **Intervention for APD**

Treatment of APD is highly individualized. There is no one treatment approach that is appropriate for all individuals with APD. Intervention for APD generally encompasses top-down and bottom-up strategies from the following categories:

- Environmental modification (improving access to the auditory signal through preferential seating, use of assistive listening devices, or improving the acoustics of the room)
- Compensatory strategies (promoting self-awareness and self-advocacy by teaching individuals with APD to take responsibility for their own listening success or failure through a variety of active listening and problem-solving techniques)

- Direct intervention (deficit-specific activities to address specific auditory deficits, or language therapy to improve receptive language, problem-solving, memory, attention, or other cognitive skills to help overcome the auditory disorder)

### Environmental Modification

- Request that the listener be placed closer to the speaker in order to increase the signal-to-noise ratio
- Request that the listener be placed away from auditory distractions such as fans, hallways, open windows, etc.
- Request a quieter environment with more visual cues
- Request access to assistive learning devices such as a FM system

### Compensatory Strategies

- To manage language-processing problems, a therapist will train and encourage a listener to ask a speaker to repeat or rephrase an instruction or comment. The therapist and listener might also work on developing a customized note-taking system that enables him/her to capture the information being taught in the classroom.
- When a listener has auditory memory problems, remembering information such as directions, lists, or study materials may be difficult. It can be immediate ("I can't remember it now") and/or delayed ("I can't remember it when I need it for later"). The listener is taught to recognize memory weaknesses and use supplemental strategies.
- Utilize the speaker's visual cues (watch the speaker's face and gestures) and any available written materials to supplement auditory information
- Increase awareness of listener's own empty words used as a time delay or request for repetition such as "huh" and "what." Instead, teach the listener to ask for clarification and repetition when needed.
- Teach assertiveness training and situational problem solving skills in order to develop self advocacy skills. Teach the listener to know *who* to ask for help and *how* to ask for help.

### Direct Intervention—Auditory Skills

- Train the listener's brain to differentiate sounds — first in a quiet environment, then with increasingly louder background noise.
- Speech-in-noise desensitization training addresses the brain's ability to process speech with background noise.
- Improve the ability to locate sounds in space by identifying the source of the sound and then the location of the sound.
- Phonemic training addresses the brain's ability to process speech sounds.

- Phonemic synthesis training requires the listener to discriminate individual speech sounds, remember them, and successfully blend them together in order to respond with the correct word.
- Dichotic listening training teaches the individual how to listen effectively with both ears to different stimuli.

#### Direct Intervention—Language Skills

- Consider where the breakdown is for the listener: the listener needs to detect the sound, pay attention to it, discriminate it, associate the words and/or sounds, integrate the information, and organize what they hear. Start at the level where the listener is successful and then build positive and accurate experiences with auditory information.
- Short-term auditory memory training: to sharpen auditory memory, use word lists, digits, sentences, etc., and have the listener repeat a series of numbers and directions to exercise the listening "muscles."
- Auditory sequencing training: auditory sequencing training can be taught in much the same manner as short-term memory; however, in this case the person is asked to maintain the proper sequence.
- Auditory memory for following directions with increasing length and complexity in addition to following directions in noise
- Teach auditory cohesion skills when higher-level listening tasks are difficult. Auditory cohesion skills — drawing inferences from conversations, understanding riddles, or comprehending verbal math problems — require heightened auditory processing and language levels.
- Additional language areas that may need to be targeted include similarities and differences, categories, analogies, attributes, reasoning, word classes, answering wh-questions, functions, associations, and multiple meanings.

#### **Lack of Support for Auditory Integration Training**

Auditory Integration Training (AIT) is the general term used to describe programs that involve listening to specified filtered or modulated music for the purpose of remediating auditory deficits. Due to a lack of scientific evidence, position statements against the use of AIT have been written by AAA, ASHA, the Educational Audiology Association, the American Academy of Pediatrics, and the New York State Department of Health.