Colorado Department of Education

(Central) Auditory Processing Deficits: A Team Approach to Screening, Assessment & Intervention Practices

Revised 2008[1]

Introduction

Guidelines for the screening, assessment, and intervention of (central) auditory processing deficits were developed by the Task Force on Auditory Processing, facilitated by the Colorado Department of Education in 1997. Task force members represented a variety of viewpoints both in work settings and professions, reflecting the multidisciplinary nature of (central) auditory processing deficits. A renewed interest in (central) auditory processing deficits had been fostered by research which continues to provide a better understanding of the neuroplasticity of brain function and its effect on remediation as well as the increased availability of appropriate instruments for assessing auditory processing skills. Since the publication of the 1997 document, additional professional guidance has been published, which further defines the screening, assessment and intervention process for children with auditory processing deficits. A small committee completed the revisions for this updated guidelines document based on this new evidence.

(Central) auditory processing is a primary function of the auditory structures of the central nervous system. This function is an extension of the peripheral auditory mechanism, the structures responsible for hearing sensitivity, or a person's ability to detect sound. The central auditory pathways perform the necessary tasks that result in a person's ability to interpret the auditory information that is transmitted from the peripheral system. Problems along the auditory pathways from the peripheral through the central system can result in a variety of difficulties that affect a person's ability to understand and respond to auditory information. As part of the continuum of auditory function, audiologists have a responsibility to evaluate the entire auditory system, both peripheral and central, and to consider possible deficits involving both areas (American Speech-Language-Hearing Association, 2005b).

There are several reasons to assess auditory processing function. These include:

- To determine **medical or audiological conditions** which may require medical treatment (Musiek et al, 1990);
- To increase **awareness** of the presence of a disorder which can truly affect a child's ability to learn (Musiek et al, 1990);
- To minimize **psychological factors** affecting the child and family as a result of not knowing the cause of the child's problem (Musiek, et al 1990);
- To determine the involvement of **linguistic and cognitive processing** problems in order to aid in language and educational remediation; (Geffner & Swain, 2007);
- To aid in the identification and implementation of **effective educational interventions** that include environmental modifications, management strategies, auditory/listening skill training, and use of hearing assistance technology (HAT) (Bellis, 2003).

(Central) auditory processing (CAP) is an area of ongoing research involving many disciplines. However, the interactions among acoustic, linguistic, and cognitive processing are becoming clearer (Richard, 2007). It is hoped that this document will provide a working base for school and clinical personnel to make more effective decisions regarding auditory processing deficits (APD) in children.

Definition of Auditory Processing

The operational definition used for these guidelines is the definition developed by the American Speech-Language-Hearing Association (ASHA) Task Force on Central Auditory Processing Consensus

[1] 12/8/08; Colorado Department of Education, Exceptional Student Leadership Unit, 1560 Broadway, Ste 1175, Denver, CO 80202

Development (AHSA, 1996) (see Appendix A). This definition was retained in the 2005 ASHA Technical Report on (Central) Auditory Processing Disorders (p.2):

> *(C)AP refers to the efficiency and effectiveness by which the central nervous system (CNS) utilizes auditory information. Narrowly defined, (C)AP refers to the perceptual processing of auditory information in the CNS and the neurobiologic activity that underlies that processing and gives rise to electrophysiological auditory potentials.*
>
> *(C)APD is a deficit in neural processing of auditory stimuli that is not due to higher order language, cognitive, or related factors. However, (C)APD may lead to or be associated with difficulties in higher order language, learning, and communication functions.*
>
> *Although (C)APD may co-exist with other disorders (e.g., attention deficit hyperactivity [ADHD], language impairment, and learning disability], it is not the result of these other disorders.*

(Central) auditory processing deficits manifest themselves differently depending on a variety of factors including the type and degree of processing problems present, the learning environment conditions, and how well a person is able to identify and compensate for the difficulties they are experiencing (ASHA, 2005a). Processing deficits occur along a continuum from mild processing and listening problems that might only necessitate minimal accommodations to more significant auditory processing disorders that require special education and related services. This document will use the term auditory processing "deficits" or APD to encompass the range of auditory processing problems that may be exhibited.

Roles of Audiologists and Other Team Members in the Diagnosis of Auditory Processing Deficits
Role of the Audiologist. The American Speech-Language-Hearing Association Position Statement on Central Auditory Processing Disorders – The Role of the Audiologist (ASHA 2005b) states that:

> *(Central) auditory processing disorder is an auditory deficit; therefore, it continues to be the position of ASHA that the audiologist is the professional who diagnoses (C)APD. Consistent with the ASHA Scope of Practice in Speech-Language Pathology, speech-language pathologists (and other professionals) collaborate with the audiologist in the overall screening and assessment process, differential diagnoses, and development and implementation of intervention plans where there is evidence of speech-language and/or cognitive-communicative disorders. Specifically, speech-language pathologists are uniquely qualified to delineate the cognitive-communicative and/or language factors that may be associated with (C)APD. Full understanding of the ramifications of (C)APD for the individual requires a multidisciplinary assessment to determine the functional impact of the disorder and to guide treatment and management of the condition and associated deficits* (p.1).

Role of other team members. The speech-language pathologist, learning disabilities specialist, school psychologist, and parents are critical members of the multidisciplinary team. Each contribute to the use of pre-referral interventions, assessments, and intervention planning if a deficit is identified. It is also common for speech-language pathologists to provide a significant component of the intervention program, particularly treatment to improve auditory and listening skills and to teach the student how to manage his/her learning environment to minimize the effects of the auditory processing problems.

APD & Special Education Eligibility
Students who are suspected of having APD, or who are diagnosed with (central) auditory processing disorders [(C)APD], may be considered for special education services or a 504 Plan through the same process as any student suspected of having a disability. According to Colorado Department of Education ECEA Rules, APD may be considered as a type of **specific learning disability** [ECEA 2.08 (6) (b) (ii) (A) (II)] when a "*child does not achieve adequately…in the area…of listening comprehension,"* or a type of **speech-language disability** [ECEA 2.02(7) (a) (ii)] meaning a dysfunction in *"auditory processing, including...perception (discrimination, sequencing, analysis and synthesis), association, and auditory*

attention." To qualify for special education and related services, the deficit must interfere with the student's ability to obtain reasonable benefit from regular education (see page 8, Appendix B, of this document for the full text of the Rules).

Prior to the initiation of a special education referral, students should be reviewed through the school's general intervention process. No Child Left Behind (NCLB) and IDEA 2004 have additional requirements to ensure that students who are being referred for special education have first had access to general education problem-solving practices designed to assess and support students who are having difficulty learning. These practices focus on improving academic achievement by using scientifically-based instructional interventions. They fall under a practice that is referred to as "Response to Intervention" (RtI) which, according to the National Association of State Directors of Special Education (NASDE) and the Council of Administrators of Special Education, includes the components of (1) providing high-quality instruction/intervention matched to student needs and (2) using learning rates over time and level of performance to (3) make important educational decisions (NASDSE, 2006). Interventions include the use of commonly accepted accommodations and strategies that improve the classroom learning environment as well as the student's ability to participate in the exchange of information. A three-level model of support (Multi-Tiered Model of Instruction and Intervention) for students with auditory processing problems is located on page 32, Appendix E-1, of this document.

Purpose of Guidelines

This document was developed to provide professionals who work with children with APD guidelines to assist with identification and intervention. Evidenced-based practices are a hallmark of today's school accountability process, yet many questions remain regarding the relationships between screening, assessment, management, and prescriptive intervention therapy as well as the reliability and validity of the instruments used for identification. A conscious effort was made in the development of these guidelines to ensure that the process of identifying and treating children with APD is a multidisciplinary one, with participation from the disciplines of audiology, speech/language pathology, learning disabilities, psychology, and health.

Application of Guidelines

These guidelines should be used to assist with decisions regarding the potential evaluation and intervention needs of students suspected of having auditory processing problems. Although it is recommended that observation and screening data be obtained prior to diagnostic assessment, some children may present with such significant concerns, that immediate assessment is warranted. The success of the intervention procedures should ultimately guide the decision for further assessment; that is, if the management strategies implemented following a screening or preliminary assessment result in an intervention plan that is effective for the child, then further assessment may not be necessary at that time. However, if the intervention strategies do not result in the desired effect, additional evaluation may be required to develop a more specialized treatment program.

Special Considerations

Prior to the assessment of auditory processing skills, certain factors must be considered to determine the appropriateness of the referral and the validity of the test results. Deviation from these criteria must be determined with appropriate professional judgment. Modifications of test procedures and the resulting impact on test interpretation should be clarified in the report. These include:

1. Peripheral hearing – hearing acuity must be normal or the child must be cleared by an audiologist prior to considering testing for auditory processing.
2. Age of the child – screening is generally not appropriate until a child is 5 or 6 years, assessment until 7 or 8 years; age criteria recommended with each screening or assessment instrument should be followed. An age criterion is important as it reflects the developmental component of the central auditory pathways and resulting developmental abilities of the child. For young children with potential auditory processing problems, observation checklists may be utilized to guide the use of general intervention strategies.

3. Cognitive ability – formal assessments of central auditory processing are normed on individuals with cognitive ability within a normal range. Therefore any child assessed must demonstrate cognitive ability within the normal range.
4. Language competence – language skills can significantly impact performance on auditory processing tasks, particularly those which require higher level language processing. Results must be interpreted carefully and extra caution is recommended with non-native English speaking students.
5. Co-morbid conditions – children with auditory processing deficits share many behavioral characteristics with other conditions, particularly ADD/ADHD, language disorders, and learning disabilities. While these conditions may co-exist, the auditory processing problem is not the result of these problems (ASHA, 2005). It is important to try to sort out the behaviors associated with these conditions so that an accurate diagnosis can be made and to insure the interventions are targeted to the problem and analyzed for their impact on the auditory processing problem.
6. Speech intelligibility – significant speech intelligibility problems can affect administration and interpretation of auditory processing test results. If reasonable accommodations cannot be implemented, auditory processing assessment may not be appropriate until a later time.
7. Validity and reliability – norms for instruments used must be reviewed and considered. Caution must be used in interpretation since some of the measures have limited normative data for children and may require that local norms be developed.
8. Test interpretation and scoring – test manual procedures and interpretation must be adhered to and considered along with the results of the multidisciplinary assessment.
9. Multidisciplinary assessment – the intent of these guidelines is to look holistically at the child. Auditory processing assessment should not occur in isolation from other psychoeducational screening or evaluation. Consideration must be given to all factors which may affect a child's performance.

Criteria for Determination of an Auditory Processing Deficit

A deficit of central auditory function may be identified when test performance can be associated with significant learning problems and when test interpretation supports a diagnosis that can be differentiated from related deficits that have overlapping attributes such as ADHD, language deficits, cognitive deficits, or learning disabilities (ASHA, 2005). Specifically, diagnosis of a (central) auditory processing disorder requires one of the following:

- Performance deficits of at least two standard deviations below the mean on two or more tests in the battery (Musiek and Chermack, 1997);
- Performance deficits on one test of at least three standard deviations below the mean or when the finding is accompanied by significant functional difficulty in auditory behaviors reliant on the process assessed (ASHA, 2005).

Intratest, intertest, and cross discipline analysis of test performance are essential steps in the interpretation process to consider patterns of performance, potential sites of dysfunction, co-morbid clinical profiles and impact of non-audiological factors such as speech-language, multimodal sensory function, psychoeducational and cognitive test findings (ASHA, 2005). Eligibility for special education and related services requires that a student meets Colorado eligibility requirements, as stated earlier in this document and on page 8, Appendix B of this document, by exhibiting that the problem has adversely affected the student's ability to learn.

Re-evaluation Recommendations

Auditory processing skills should be re-evaluated at a minimum of every three years and timed to coincide with triennial eligibility reviews when the child receives special education and/or related services. Students who evidence a change in their classroom performance or auditory behavior, or children who display any other unusual symptoms should be considered for re-evaluation more frequently as the situation warrants.

Independent Evaluations

Some parents may seek evaluations in the private sector from university or hospital clinics, speech and hearing centers, or independent audiology or speech and language practitioners. In most cases these independent evaluations are not arranged or recommended by the school district or BOCES. Regardless of the outcome of the evaluation, and whether the student receives special education or related services or not, the school is only obligated to consider the information contained in the report and its impact for the student in the classroom. Independent evaluators and school personnel should work together to help parents understand that the special education process, and specifically that a clinical diagnosis of a specific condition or learning problem does not automatically lead to eligibility for special education services in the schools. They should also help parents understand the terminology that is contained in clinical reports since it is often not the same as the disability categories identified in State and Federal regulations. Independent evaluators can assist schools by ensuring that their recommendations for intervention include specific information about the student's needs in order to support the development of an effective educational plan rather than specifying programs or school services.

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Appendices

APPENDIX A. ASHA CONSENSUS STATEMENT ON CENTRAL AUDITORY PROCESSING[1]

Definitions of Central Auditory Processes and Central Auditory Processing Disorder

Central Auditory Processes are the auditory system mechanisms and processes responsible for the following behavioral phenomena:

- Sound localization and lateralization
- Auditory discrimination
- Temporal aspects of audition including
  - temporal resolution
  - temporal masking
  - temporal integration
  - temporal ordering
- Auditory performance decrements with competing acoustic signals
- 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 behavioral 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.

A central auditory processing disorder (CAPD) is an observed deficiency in one or more of the above listed behaviors. 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 coexisting 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.

[1] Task Force on Central Auditory Processing Consensus Development. (1996). Central auditory processing: current status of research and implications for clinical practice*, American Journal of Audiology*, 5(2), pp 41-54. Reprinted with permission.

APPENDIX B. COLORADO DEPARTMENT OF EDUCATION RULES FOR THE ADMINISTRATION OF THE EXCEPTIONAL CHILDREN'S EDUCATION ACT[1]

Eligibility Options Regarding Auditory Processing Deficits

2.08 (6) Specific Learning Disability

2.08 (6) (a) A child with a **specific learning disability** shall have a learning disorder that prevents the child from receiving reasonable educational benefit from general education.

2.08 (6) (a) (i) Specific learning disability means **a disorder in one or more of the basic psychological processes involved in understanding or in using language**, spoken or written, that may manifest itself in the imperfect ability **to listen**, think, speak, read, write, spell or to do mathematical calculations, including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. Specific learning disability does not include learning problems that are primarily the result of: visual, hearing, or motor disabilities; significant limited intellectual capacity; significant identifiable emotional disability; cultural factors; environmental or economic disadvantage; or limited English proficiency.

2.08 (6) (b) Alternative Criteria. A child may be determined to have a specific learning disability that prevents the child from receiving reasonable educational benefit from general education if the following criteria are met:

2.08 (6) (b) (i) Criteria under the Discrepancy Model. The eligibility determination under the Discrepancy Model shall include documentation that the child meets both of the following criteria:

2.08 (6) (b) (i) (A) A disorder in the psychological process which affects language and learning as evidenced by:

2.08 (6) (b) (i) (A) (I) Significant discrepancy between estimated intellectual potential and actual level of performance, and

2.08 (6) (b) (i) (A) (II) Difficulty with **perceptual, cognitive and/or language processing**; and

2.08 (6) (b) (i) (B) Significantly impaired achievement in one or more of the following areas:

2.08 (6) (b) (i) (B) (I) Pre-reading and/or reading skills.

2.08 (6) (b) (i) (B) (II) Reading comprehension.

2.08 (6) (b) (i) (B) (III) Written language expression, such as problems in handwriting, spelling, sentence structure and written organization.

2.08 (6) (b) (i) (B) (IV) Comprehension, application and retention of math concepts.

Administrative units and state-operated programs may continue to use the criteria set out in this Section 2.08(6)(b)(i) through August 14, 2009.

2.08 (6) (b) (ii) Criteria under the Response to Intervention Model. The child must meet the following criteria:

2.08 (6) (b) (ii) (A) The **child does not achieve adequately** for the child's age or to meet state-approved grade-level standards in one or more of the following areas, when provided with learning experiences and instruction appropriate for the child's age or state-approved grade-level standards:

[1]CCR Document:1 CCR 301-8 RULES (FOR THE) ADMINISTRATION OF THE EXCEPTIONAL CHILDREN'S EDUCATIONAL ACT, Effective 12/30/2007

2.08 (6) (b) (ii) (A) (I) Oral expression;
2.08 (6) (b) (ii) (A) (II) **Listening comprehension**;
2.08 (6) (b) (ii) (A) (III) Written expression;
2.08 (6) (b) (ii) (A) (IV) Basic reading skill;
2.08 (6) (b) (ii) (A) (V) Reading fluency skills;
2.08 (6) (b) (ii) (A) (VI) Reading comprehension;
2.08 (6) (b) (ii) (A) (VII) Mathematical calculation;
2.08 (6) (b) (ii) (A) (VIII) Mathematics problem solving; **and**

2.08 (6) (b) (ii) (B) The child does not make sufficient progress to meet age or state-approved grade-level standards in one or more of the areas identified in Section 2.08(6)(b)(i) when using a process based on the child's response to scientific, research-based intervention as determined by a body of evidence demonstrating:

2.08 (6) (b) (ii) (B) (I) Academic skill deficit(s); and
2.08 (6) (b) (ii) (B) (II) Insufficient progress in response to scientific, research-based intervention.

The criteria set forth in this Section 2.08(6)(b)(ii) may be used as of the effective date of these Rules but must be used by administrative units and state-operated programs no later than August 15, 2009. No later than August 15, 2008, each administrative unit and state-operated program shall submit a plan to the Department describing how the administrative unit or state-operated program will implement the criteria set forth in this Section 2.08(6)(b)(ii) by August 15, 2009.

2.08 (7) A child with **speech-language disability** shall have a communicative disorder which prevents the child from receiving reasonable educational benefit from regular education.

2.08 (7) (a) Speech-language disorders may be classified under the headings of articulation, fluency, voice, functional communication or delayed language development and shall mean a dysfunction in one or more of the following:

2.08 (7) (a) (i) Receptive and expressive language (oral and written) difficulties including syntax (word order, word form, developmental level), semantics (vocabulary, concepts and word finding), and pragmatics (purposes and uses of language).
2.08 (7) (a) (ii) **Auditory processing**, including sensation (acuity), **perception (discrimination, sequencing, analysis and synthesis), association and auditory attention.**
2.08 (7) (a) (iii) Deficiency of structure and function of oral peripheral mechanism.
2.08 (7) (a) (iv) Articulation including substitutions, omissions, distortions or additions of sound.
2.08 (7) (a) (v) Voice, including deviation of respiration, phonation (pitch, intensity, quality), and or resonance.
2.08 (7) (a) (vi) Fluency, including hesitant speech, stuttering, cluttering and related disorders.
2.08 (7) (a) (vii) **Problems in auditory perception such as discrimination and memory.**

2.08 (7) (b) Criteria for a <u>speech-language</u> <u>disability</u> preventing a child from receiving reasonable educational benefit from regular education shall include:

2.08 (7) (b) (i) Interference with oral and/or written communication in academic and social interactions in his/her primary language.
2.08 (7) (b) (ii) Demonstration of undesirable or inappropriate behavior as a result of limited communication skills.
2.08 (7) (b) (iii) The inability to communicate without the use of assistive, augmentative/alternative communication devices or systems.

APPENDIX C. GENERAL INFORMATION ABOUT AUDITORY PROCESSING

Typical Behaviors of Children "At Risk" for APD[1]

- Behaves as if a hearing loss is present, despite normal hearing;
- Has difficulty with auditory discrimination, often expressed as diminished ability to discriminate among speech sounds (phonemes);
- Has difficulty remembering phonemes and manipulating them (e.g., on tasks such as reading, spelling, and phonics as well as phonemic synthesis or analysis);
- Has difficulty understanding speech in the presence of background noise;
- Has difficulty with auditory memory (either span or sequence); unable to remember auditory information or follow multiple instructions;
- Demonstrates scatter across subtests with domains assessed by speech-language and psychoeducational tests, with weaknesses in auditory-dependent areas;
- Has poor listening skills characterized by decreased attention for auditory information, distractible or restless in listening situations;
- Responds inconsistently to auditory information or has inconsistent auditory awareness;
- Has a receptive and/or expressive language disorder; there may be a discrepancy between expressive and receptive language skills;
- Has difficulty understanding rapid speech or persons with an unfamiliar dialect;
- Has poor musical abilities and does not recognize sound patterns or rhythms; has poor vocal prosody in speech production.

These are only a few of the behaviors that are associated with APD. Not every child with a central auditory processing problem will exhibit all of the behaviors mentioned.

[1] Adapted from Keith, R.W. (2000a). *SCAN-C Test for Auditory Processing Disorders in Children-Revised.* San Antonio, TX Psychological Corporation.

Flowchart of APD Screening and Assessment Procedures

1) Observation of Behaviors
What behaviors does the student exhibit which may be indicative of or associated with auditory processing difficulties? How does the child respond to general auditory processing intervention strategies? What are the outcomes of RtI interventions?

2) Referral Considerations
Age of student; cognitive status; speech/language competence; English proficiency; hearing acuity

3) Auditory Behaviors Checklists, Case History
Is the referral appropriate and will it guide instruction? This preliminary screening data gathered will help the audiologist select an appropriate diagnostic test battery.

Multidisciplinary Screening and Assessment

Full understanding of the effects of auditory processing deficits **REQUIRES** a multidisciplinary assessment to determine the functional impact and to guide treatment and management. Audiologists should collaborate with other professionals to assist in differential diagnosis and co-morbid diagnoses.

4) Diagnostic Assessment by Audiologist
An audiological assessment examines the integrity of the central auditory nervous system to determine the presence of APD and describe its parameters. The assessment includes measures that examine different processes and include both verbal and non-verbal stimuli. The assessment should include the following:

- Complete peripheral auditory assessment including pure tone and speech audiometry, tympanometry, acoustic reflexes, otoacoustic emissions, and case history
- Auditory temporal processing and patterning tests
- Dichotic speech tests
- Monaural low-redundancy speech tests
- Binaural interaction tests

For some students, electrophysiologic tests may provide important information about the integrity of the central auditory system. Typically these tests are not available within the public school setting.

5) Assessment Interpretation & Intervention Recommendations
Based on the multidisciplinary assessment, is there evidence of an auditory processing deficit?

- Intratest analysis (comparing patterns within a given test)
- Intertest analysis (comparing trends across the diagnostic test battery)
- Cross-discipline analysis (comparing audiological test results to multidisciplinary test results)

Do the findings on these assessments combined with the educational impact qualify this student for special education or a 504 Plan? What are the characteristics or profile of the (C)AP disorder? What are the possible accommodations and/or services that might be considered for this student (determination of accommodations and/or services must be made by the individual educational planning team)?

FAQs for Professionals: Auditory Processing Referral and Assessment

Hearing is a complex process that involves sensitivity to sound (e.g., one's ability to detect sound), as well as the interpretation of sound, resulting in meaningful recognition and comprehension of information. Even individuals who have normal hearing sensitivity can have problems understanding conversation in noisy environments, sustaining or dividing auditory attention, and following complex oral directions. This type of auditory problem is often referred to as an **auditory processing deficit** or **APD** (also called a "central auditory processing disorder" or CAPD). The problems can affect a student's ability to develop language skills and communicate effectively. In recognition of the complexity of issues involved in APD assessment, the Colorado Department of Education has published guidelines, *Auditory Processing Deficits: A Team Approach to Screening, Assessment and Intervention Practices*. (Guidelines are available at the CDE website: http://www.cde.state.co.us/cdesped/Audiology.asp)

What is an "auditory processing deficit?"

The definition, which emerged from two Consensus Conferences on APD sponsored by the American-Speech-Language-Hearing Association and the American Academy of Audiology, reflects the complexity of the many functions involved in the processing of auditory information. *Note APD is not a label for a unitary disease entity, but rather a description of functional deficits.*

> *(C)AP refers to the efficiency and effectiveness by which the central nervous system (CNS) utilizes auditory information. Narrowly defined, (C)AP refers to the perceptual processing of auditory information in the central nervous system and the neurobiologic activity that underlies that processing and gives rise to electrophysiological auditory potentials. (C)APD is a deficit in neural processing of auditory stimuli that is not due to higher order language, cognitive, or related factors. However, (C)APD may lead to or be associated with difficulties in higher order language, learning, and communication functions.*
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> *Although (C)APD may co-exist with other disorders (e.g., attention deficit hyperactivity [ADHD], language impairment, and learning disability], it is not the result of these other disorders.* -**American Speech-Language-Hearing Association (ASHA).** (2005a*). (Central) auditory processing disorders*. Available at www.asha.org.

What behaviors might lead one to suspect APD?

Children with APD frequently **ask for repetition, say "what" or "huh," have trouble paying attention, are easily distracted, often misunderstand messages, have trouble following complex auditory directions or commands, and may have difficulty localizing to sound**. They also often present related deficits in auditory memory, phonologic awareness, reading and academic achievement. Individuals with APD may also have difficulty comprehending spoken language in noisy backgrounds or poor acoustical environments.

How is APD differentiated from learning disabilities, language disorders, and ADHD?

All of these disorders share common characteristics and are often interrelated. Many students may present with difficulty learning in the auditory modality, especially those with speech language and learning disabilities; however, there are many disorders that can affect a student's ability to understand auditory information. For example, individuals with ADHD may be poor listeners and have trouble understanding and remembering verbal information but the act of processing auditory input is intact. It is important to remember that APD is an auditory deficit that is not the result of other higher order cognitive, language, or related disorders. Hence, there is significant co-morbidity within this group of problems. APD is differentiated from these other disorders when the **deficit occurs primarily in the auditory modality**.

How is APD assessed and who makes the APD diagnosis?

The assessment of APD requires a multidisciplinary approach involving audiologists, speech language pathologists, psychologists, classroom and special education teachers, related service providers, and parents. The audiologist will perform an extensive assessment that includes multiple tests spanning a variety of auditory processes. This assessment will provide information as to the nature of the student's auditory processing abilities (i.e., which processes are deficient) and can guide intervention planning and implementation. **The diagnosis of APD should be determined by the audiologist working in collaboration with a multidisciplinary team.**

How do children with APD qualify for Special Education services?

Since APD is not a category within the special education disability definitions, students who exhibit auditory processing deficits must qualify with either a speech-language disability or a specific learning disability.

APPENDIX D. APD ASSESSMENT INFORMATION

Parent Information Regarding Auditory Processing Assessment

What is (Central) Auditory Processing?

Simply stated, auditory processing can be defined as "what the brain does with what the ears hear." (Katz, 1994)

Hearing is a process that consists not only of the ability to detect sound, but also the ability to extract meaningful information from that sound. Individuals experiencing difficulties with auditory processing are able to hear the incoming signal yet may struggle to decipher the incoming message. Students demonstrating apparent auditory processing deficits (APD) often behave in a similar manner to children with hearing loss, even though audiometric testing indicates hearing to be within a normal range. Noisy environments, complex oral directions, and maintaining auditory attention may be quite taxing for some students with APD resulting in a significant impact on classroom performance.

Who Conducts the Assessment?

An Audiologist. Audiologists hold either a master's or doctoral degree, and have been trained to assess hearing, balance, and other related disorders. Audiologists who are employed in educational settings work to ensure students have the best possible access to auditory information presented in the classroom as well as to guide intervention strategies. An audiologist is to the ears what an optometrist is to the eyes.

How Should I Prepare my Child For Testing?

Most importantly, your child should arrive well-rested. Testing may take 1-2 hours; so it may be necessary to bring a light snack. If your child has a "best" time of day, please share this with the person scheduling the appointment. If your child takes medication, continue with the recommended dosage.

How Does The Evaluation Process Work?

A multi-disciplinary approach is essential to the evaluation process. Information is gathered from you and your child, the audiologist, classroom teacher, school psychologist and speech-language pathologist. Other team members may also be involved.

Prior to the evaluation the child's age, cognitive ability, classroom performance, and hearing sensitivity are carefully considered. A case history is obtained, examining both the medical history and auditory behaviors that may be present in your child and/or in the family. Based on the initial information gathered, the audiologist will choose an appropriate test battery.

Areas of Assessment:

***Dichotic Listening*:** *Information is presented to both ears simultaneously. Tests of integration require the student to repeat the information heard by both ears, while tests of separation require the student to identify what is heard in one ear while ignoring information presented to the opposite ear.*

***Monaural Low Redundancy*:** *Spoken language is processed at multiple levels within the auditory system, allowing the listener to receive the message a number of ways. During low redundancy testing, each ear is tested independently. The speech signal is degraded in order to reduce redundancy, making the listening task more difficult.*

***Temporal Processing*:** *Tests of temporal processing examine the student's ability to recognize tonal stimuli (e.g., pitch, duration, loudness) and to perceive auditory patterns.*

***Binaural Interaction*:** *Complimentary information is presented to each ear and the listener must integrate the information into a meaningful message.*

What Happens Following the Assessment?

Recommendations will be made on an individual basis and will include careful review of factors such as the child's age, specific areas of concern, and overall impact on academic performance. The suggestions of other team members (parents, teachers, speech-language pathologists, etc.) will also be considered. Because APD is not a recognized disability category within IDEA special education services, students exhibiting auditory processing deficits must qualify under an existing category, usually speech-language disability or specific learning disability.

How Can I Learn More About APD?

The following websites can provide current information about research, testing, and intervention. Your child's educational audiologist is an excellent resource to provide information and assist you in understanding implications specific to your child. Do not hesitate to ask questions!

www.edaud.org	Educational Audiology Association
www.audiology.org	American Academy of Audiology
www.asha.org	American Speech-Language-Hearing Association
www.ldonline.org	Learning Disabilities Online

Audiological Assessments of Auditory Processing

Classroom and Auditory Behaviors Observation Tools

Screening for auditory processing deficits typically involves systematic observation of auditory behaviors related to academic achievement, listening skills, and communication. The following are questionnaires which have been suggested for use in identifying individuals who may be candidates for auditory processing evaluation.

Children's Auditory Processing Performance Scale (CHAPPS)

Smoski, W.J., PhD, Brunt, M.A., PhD, and Tanahil, J.C., PhD (1998). Educational Audiology Association, 11166 Huron Street, Suite #27, Denver, CO 80234 (800-460-7322). www.edaud.org

This checklist is used by educators and parents to assess listening difficulties in children. Six listening conditions are assessed in this 36 item checklist, including noise, quiet, ideal, multiple inputs, auditory memory/sequencing and auditory attention span. The observation assessment is done by comparing the student to a reference population of other children of similar age and background. Items are rated on a scale from +1 (less difficulty) to -5 (cannot function at all). This instrument can be used as a pre- and post-treatment evaluation.

Fisher's Auditory Problems Checklist

Fisher, L.I. (1985). Educational Audiology Association, 11166 Huron Street, Suite #27, Denver, CO 80234 (800-460-7322).www.edaud.org

This checklist is used by educators and other school support personnel to assist in identifying behaviors which characterize children as at risk for APD. It includes many components of auditory processing, including attention, auditory-visual integration, comprehension, figure-ground, and memory. A score is derived by multiplying by 4 each item not identified on this 25 item checklist. Normative data is available for grades kindergarten through sixth grade.

Screening for Central Auditory Processing Difficulties

Kelly, Dorothy A. (2001). Academic Communication Associates, Inc., PO Box 4279, Oceanside, CA, 92052-4279. www.acadcom.com

This screening tool has three sections. Section A assesses auditory behaviors both with and without auditory stimuli. It requires administration of 20 commands which the child needs to complete and is then assigned a score. Section B assesses at-risk behaviors as observed by the examiner and the parent. Section C compiles the information and determines risk status. Section D has a list of recommendations with a tiered approach.

The Listening Inventory

Geffner, Donna, PhD., and Ross-Swain, Deborah, EdD. (2006). Academic Therapy Publications, 20 Commercial Blvd., Novato, CA 94949 (800-422-7249). www.academictherapy.com

This is an informal behavior observation completed by parents and teachers. It can be used as a starting point to determine the need for further testing and as a discussion tool. It consists of 103 statements (0-5pt scale) to assess specific behaviors that can be associated with auditory processing weaknesses. It is divided into six areas: Linguistic Organization, Decoding/Language Mechanics, Attention/Organization, Sensory/Motor, Social/Behavioral, and Auditory Processes. Index scores are used and compared to criterion based cut-off scores.

Classroom Performance/Impact Questionnaire (Appendix F-3 of CDE Guidelines)

Massine, Donna (2008). Colorado Department of Education (Central) Auditory Processing Deficits: A Team Approach to Screening, Assessment & Intervention Practices. www.cde.state.co.us/cdesped/Audiology.asp

This is an informal checklist (available in this document) that may be used as a teacher questionnaire or interview. It takes into account a myriad of classroom concerns including listening/language processing, sustained attention, working memory, thinking/reasoning, academics, metacognition, task initiation, organization, time management, self-regulation, motor skills and environmental conditions. It is designed to identify specific areas that may be impacting auditory access in the classroom.

Auditory Diagnostic Assessments

The following tests of auditory processing may be selected for use after completion of a comprehensive audiological assessment of peripheral hearing, which includes pure tone and speech thresholds, word recognition in quiet, immittance measures (tympanometry and acoustic reflexes), and otoacoustic emissions.

1. Dichotic Speech Tests

Dichotic speech tests involve the presentation of stimuli to both ears simultaneously, with the information presented to one ear being different from that presented to the other ear. They assess either: binaural integration (the listener may be required to repeat everything that is heard; also referred to as "divided attention") or binaural separation (listener is required to repeat or indicate what is heard in a designated ear; also referred to as "directed attention").

Competing Environmental Sounds Test (CES)

Katz, Jack (2001). Central Test Battery. Precision Acoustics, 411 NE 87th Ave, Vancouver, WA 98664 (360-892-9367).

The CES is a dichotic test, not of speech, but of environmental sounds. 14 familiar, everyday sounds are presented dichotically and young listeners can choose from a set of 4 pictures.

Competing Sentences Test (CST)

Willeford (1968); Willeford and Burleigh (1994); adapted & modified by Carver; AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (1-800-669-9065) www.auditec.com

The test stimuli are 30 pairs of simple sentences (six to seven words in length), with the two paired sentences being of similar theme. The target sentence is presented to one ear at a 35dB SL (re: SRT) and the competing sentence is presented to the other ear at 50dB SL (re: SRT). The listener is instructed to repeat the target sentence and ignore the competing sentence, which assesses the binaural separation of auditory information. A "quadrant" method of scoring by Hall & Mueller (1997) and Bellis (1996) is recommended.

Dichotic Consonant-Vowel (CV) Test

Berlin et al. (1972), AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) www.auditec.com

Stimuli consist of six CV segments (pa, ta, ka, ba, da, ga). Single CV segments are presented to each ear using a dichotic paradigm. Using a printed list, the listener is asked to choose both segments heard. Presentation of CV segment to one ear may lag behind presentation of differing CV segment to the other ear by 15, 30, 60, or 90 msec to investigate lag time effect.

Dichotic Digits Test (DDT)

Musiek (1983). AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) www.auditec.com

Quick and easy to administer and relatively resistant to peripheral hearing loss. Dichotically presented digit pairs require the listener to repeat all four digits. Recording also includes single and triple pairs.

Dichotic Rhyme Test (DRT)

Introduced by Wexler and Hawles (1983); modified by Musiek, Kurdziel-Schwan, Kibbe, Gollegly, Baran and Rintelmann (1989). AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) www.auditec.com

Composed of rhyming, CVC words, each beginning with one of the stop consonants (p,t,k,b,d,g); each pair of words differs only in the initial consonant. Pairs are almost perfectly aligned and fusion takes place, so listener repeats just one of the two words presented.

Dichotic Sentence Identification Test (DSI)

Fifer, Jerger, Berlin, Tobey and Campbell (1983). AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) www.auditec.com

This is a modification of the SSI-CCM. SSI sentences are presented dichotically, and the listener is required to identify both sentences from a printed list of 10 sentences.

SCAN-C: Test for Auditory Processing Disorders in Children – Revised / SCAN-A (Adolescents and Adults) *Competing Words Subtest*

Keith, R. (2000). Harcourt Brace Assessment Inc., 19500 Bulverde Road, San Antonio, TX 78259 (800-211-8378). www.harcourtassessment.com

Pairs of monosyllabic words are presented dichotically, and the listener is required to repeat both words. On the first list, the listener repeats the word heard in the right ear first, followed by the word heard in the left ear. On the second list, the reverse order is required.

SCAN-C: Test for Auditory Processing Disorders in Children – Revised / SCAN-A (Adolescents and Adults) *Competing Sentences Subtest*

Keith, R. (2000). Harcourt Brace Assessment Inc., 19500 Bulverde Road, San Antonio, TX 78259 (800-211-8378). www.harcourtassessment.com

The Competing Sentences subtest consists of two lists of 10 paired sentence lists. The listener is requested to repeat the sentence heard in the right ear first for the first list and the left ear first for the second list.

Staggered Spondaic Word Test (SSW)

Katz, Jack (2001). Central Test Battery. Precision Acoustics, 411 NE 87th Ave, Vancouver, WA 98664 (360-892-9367).

The SSW is a dichotic test of binaural integration. The bisyllabic stimuli in the SSW are arranged in a manner such that spondaic words are presented in four conditions: 1)right ear non-competing (RNC), 2) right ear competing (RC), 3) left ear competing (LC), 4) left ear non-competing (LNC). Stimulus presentation is alternated between the left leading and the right leading. The listener is required to simply repeat the words heard, and scoring using the NOE (Number of Errors) format is suggested for evaluating AP in children.

Synthetic Sentence Identification with Contralateral Competing Message (SSI-CCM)

Jerger and Jerger (1994-5). AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) www.auditec.com

The test consists of ten third order approximations of English sentences resembling nonsense sentences (e.g. Small boat with a picture has become). These "synthetic" sentences are presented to the target ear while competing message of continuous discourse is presented to the contralateral ear. The listener is required to choose which sentence was heard from a printed list.

2. Monaural Low Redundancy Speech Tests

Monaural low redundancy speech tests involve modification (distortion) of the acoustic (extrinsic) signal to reduce the amount of redundancy. If there is a central auditory system pathology which reduces the (intrinsic) redundancy of the system, the signal cannot be processed. Extrinsic redundancy is provided by the characteristics of the auditory signal, whereas the intrinsic redundancy refers to the repeated representation of that signal throughout the auditory system (Bellis, 1996).These tests assess auditory closure, or the ability to fill in the missing components (e.g. phonemes, syllables, words). Monaural low-redundancy speech tests include: low-pass filtered speech, time altered speech, and speech-in-noise.

A. Low-pass filtered speech and time altered speech

SCAN-C: Test for Auditory Processing Disorders in Children – Revised / SCAN-A (Adolescents and Adults) *Filtered Words Subtest*

Keith, R. (2000). Harcourt Brace Assessment Inc., 19500 Bulverde Road, San Antonio, TX 78259 (800-211-8378). www.harcourtassessment.com

The Filtered Words subtest is a monotic test of low-pass filtered speech. It includes two 20-word lists which are low pass filtered at 1000Hz (a roll off filter of 32dB/octave). It is a low redundancy speech test that is a measure of auditory closure ability.

Northwestern University Auditory Test Number 6 (NU-6)

AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) or Tonal and Speech Materials for Auditory Perceptual Assessment (CD version), Richard Wilson, VAMC Audiology, 126 Mountain Home, TN 37684 (423-926-1171).

- NU-6 Low-Pass Filtered Speech
- NU-6 Time Compressed Speech
- NU-6 Time Compressed Speech with Reverberation

These three versions of the NU-6 monosyllabic words lists are monaural low redundancy speech tests. Each version represents an alteration of the word stimuli by reducing redundancy, by manipulating the timing feature, or by adding reverberation. The NU-6 Low-Pass Filtered Speech Test is available with cut-off frequencies of 500, 750, 1000, or 1500 Hz.; however, the 1000 Hz. cut-off frequency is most commonly used with children. The NU-6 Time Compressed Speech Test is available with 45% or 65% compression, although 45% compression is typically used with children. The NU-6 Time Compressed Speech with Reverberation Test is identical to the compressed version previously described, with the addition of 0.3 second reverberation.

Time Compressed Sentence Test (TCST)
Keith, R. (1999). AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) www.auditec.com
This test was designed to assess the ability to process a speech signal that is presented at a rapid rate. There are two lists of ten sentences with 40% compression and two sets of ten sentences at 60% compression presented monotically. Results are compared to normative data according to age.

B. Speech-in-noise

Pediatric Speech Intelligibility Test (PSI)
Jerger and Jerger (1984). AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) www.auditec.com
The PSI consists of 20 monosyllabic words grouped into four lists and two levels of sentence materials based on receptive language ability. The child is asked to point to an appropriate picture while the stimuli are presented either in quiet, or with a competing message. Performance-intensity functions are obtained at different intensity levels in quiet and in noise.

SCAN-C: Test for Auditory Processing Disorders in Children – Revised / SCAN-A (Adolescents and Adults) *Auditory Figure Ground Subtest*
Keith, R. (2000). Harcourt Brace Assessment Inc., 19500 Bulverde Road, San Antonio, TX 78259 (800-211-8378). www.harcourtassessment.com
The Auditory Figure Ground subtest is a speech-in-noise test. It is a monotic presentation of two 20-word lists with ipsilateral competing multitalker babble recorded at +8dB signal-to-noise ratio.

Speech in Noise: CID-W22
Katz, Jack (2001). Central Test Battery. Precision Acoustics, 411 NE 87th Ave, Vancouver, WA 98664 (360-892-9367).
This test can be used in quiet and in noise as a comparative measure. It is a monotic presentation with ipsilateral competing white noise. The speech spectrum noise is presented at -5 SL in the test ear. Norms are provided for each ear in quiet and in noise. Norms are also provided for speech-in-noise difference and interaural difference.

Selective Auditory Attention Test (SAAT)
Cherry (1980). AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) www.auditec.com
This is a speech-in-noise test which uses the Word Intelligibility Picture Identification (WIPI) test picture stimuli. The SAAT has two parts: Quiet Listening (a list of 25 monosyllabic words prerecorded in quiet) and Selective Listening (an equivalent prerecorded monosyllabic word list with a semantic distracter at 0dB signal to noise ratio). A selective attention listening score is derived from a comparison between two listening conditions.

Synthetic Sentence Identification with Ipsilateral Competing Message (SSI-ICM)
Jerger, J., and Jerger, S. (1974). AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) www.auditec.com
A synthetic sentence is presented to one ear at a comfortable listening level while a meaningful competing message is delivered to the same ear. The intensity level is varied from +10 to +20dB for each presentation of sentences. The listener must be able to read the response choice to select the correct number of the stimulus sentence heard. The percent correct is plotted on a chart as a function of the difference between the sentences and competing message in dB (message to competition ratio).

3. Temporal Processing Tests

These tests require the listener to discriminate sound based on temporal order, sequence or resolution. Usually, non-speech stimuli such as tones or clicks are used. There are three types of temporal processing tests: frequency patterns, duration patterns, and gap detection.

Auditory Fusion Test-Revised (AFT-R)

Keith, R. (1996). AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) www.auditec.com

The AFT-R is a gap detection test designed to identify auditory processing disorders that manifest themselves as an inability to process auditory information in the time domain. A threshold of detection is measured by having the listener attend to a series of pure tones presented in pairs. The time between the pure tones increases or decreases in duration from 0 msec. to 300 msec. The test includes stimuli at five frequencies: 250 Hz, 500 Hz, 1000 Hz, 2000 Hz, and 4000 Hz. As this time interval changes, the listener is asked to report whether the stimulus pairs heard were perceived as one tone, or two tones. The auditory fusion threshold is the average of the points in which two tones are heard as one.

Duration Pattern Sequence Test (DPS)

Pinheiro and Musiek (1985). AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) www.auditec.com or Tonal and Speech Materials for Auditory Perceptual Assessment(CD version,) Richard Wilson, VAMC Audiology, 126 Mountain Home, TN 37684 (423-926-1171)

This is a test of temporal processing ability to order tonal stimuli, discriminate duration, and attach a linguistic label. It is similar to the PPST, however, the frequency of the tones is held constant at 1000 Hz and the duration is the variable to be discriminated by the listener. Stimuli are short (250 msec.) or long (500 msec.) tone bursts presented monotically in triad sequences consisting of two tones of one duration and one tone of the other duration (e.g. SSL, LSL, LSS). The listener is asked to verbally report the pattern heard. One modification of test procedure is to have patients hum, sing, or point to the response rather than report verbally. Listeners who have difficulty with interhemispheric transfer of information show improved performance when the need for linguistic labeling is removed.

Gaps in Noise (GIN)

Musiek et al. (2006). Oaktree Products Inc., 716 Crown Industrial Court, Suite J, Chesterfield, MO 63005 (800-347-1960) www.oaktreeproducts.com

This is a test of temporal resolution. Critical to speech perception, temporal resolution involves the ability of the auditory system to detect rapid changes in offsets and onsets of sound. The test is scored according to the ability to detect changes in the duration of gaps of silence embedded within a noise burst.

Pitch Pattern Sequence Test (PPST)

Pinheiro and Ptacek, (1971). AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) www.auditec.com

This is a test of frequency discrimination used to assess temporal patterning ability, as well as frequency discrimination and linguistic labeling. The stimuli are three tone bursts, two of one frequency and one of the other (e.g. HHL, LLH, HLH). The frequencies used are as follows: 1122 Hz-high pitch and 880 Hz-low pitch; they are 150 msec. in duration and the interstimulus interval is 300 msec. The listener is instructed to verbally report the pattern heard. One modification of test procedure is to have patients hum, sing, or point to the response rather than report verbally. Listeners who have difficulty with interhemispheric transfer of information show improved performance when the need for linguistic labeling is removed. Although the PPST was designed to be administered monotically, it may be administered binaurally under headphones or in a sound field as well. (Musiek & Chermak, 2007)

Random Gap Detection Test (RGDT)

Keith, R. (2000). AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) www.auditec.com

The RGDT is a modified version of the Auditory Fusion Test-Revised. The test includes stimuli at four frequencies: 500 Hz, 1000 Hz, 2000 Hz, and 4000 Hz. and white noise clicks of 50 msec. duration. Interpretation is made by averaging the gap detection threshold for all tonal stimuli and comparing results to normative data. Results can be helpful in identifying disorders of auditory timing in which the child is unable to perceive rapid changes in formant frequencies of ongoing speech.

4. Binaural Interaction Tests

In binaural interaction tests, complementary but separate information is presented to each ear. Unlike dichotic tests, the information is presented in either a non-simultaneous, sequential manner, or a portion of the message is presented to each ear. The listener is required to integrate the information to perceive the whole message. The clinical utility of a majority of binaural interaction tests remains in question as many are only grossly sensitive to brainstem lesions. Therefore, they are not considered to be in widespread clinical use at this time (Bellis, 2003).

CVC Fusion Test

Wilson, Zizz, and Sperry, (1994). Tonal and Speech Materials for Auditory Perceptual Assessment (CD version,) Richard Wilson, VAMC Audiology, 126 Mountain Home, TN 37684 (423-926-1171).
Carrier phrase and vowel segment of a word is presented to one ear and consonant segments of the word are presented to the other ear.

Masking Level Differences (MLD) Test

Wilson, Zizz, and Sperry, (1994). Tonal and Speech Materials for Auditory Perceptual Assessment (CD version,) Richard Wilson, VAMC Audiology, 126 Mountain Home, TN 37684 (423-926-1171).
Various conditions with monaural and binaural presentation of noise and speech stimuli at various signal-to-noise ratios to determine at what level and what phase interaction the listener fails to be able to discriminate stimulus words.

Rapidly Alternating Speech Perception Test (RASP)

Willeford and Bilger, (1978). AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) www.auditec.com
Sentences are divided into brief segments that are alternated rapidly between ears. Fusion of the two segments is necessary to yield a complete sentence. It has been noted that this test may not be sensitive to anything other than grossly abnormal brainstem function (Musiek, 1983), (Willeford and Burleigh, 1994), (Bellis, 2003).

Spondee Binaural Fusion

AUDiTEC of St. Louis, 2515 South Big Bend Blvd., St. Louis, MO 63143 (800-669-9065) www.auditec.com
Band-passed spondaic words are used as stimuli, with the low-pass segment of each word presented to one ear and the high-pass segment presented to the opposite ear.

Supplementary Behavioral Assessments for Auditory Processing

Auditory Continuous Performance Test (ACPT)

Keith, R. (1994). Tartan Products, 7833 Pinemeadow Lane, Finneytown, OH 45224 (513-522-4908). www.capdtest.com
The ACPT was developed to establish if a child's difficulty is related to deficits in attention or if the child has an auditory processing disorder. The test consists of an auditory vigilance task in which the child listens to a list of words and gives a signal every time the target word is heard. The test is scored by recording number of target words missed and number of responses given when the target word was not heard. Results are then compared to age normative data.

Auditory Processing Abilities Test (APAT)

Long, N., PhD, and Ross-Swain, D., EdD (2006). Academic Therapy Publications, 20 Commercial Blvd., Novato, CA 94949-6191 (800-422-7249). www.academictherapy.com
This test provides an overview of specific skills that impact the development and use of spoken and written language: phonemic skills, auditory memory, processing of semantic relationships and complex sentences, following directions, and comprehension of the details and main ideas in passages. It provides scaled scores, a global standard score, and index standard scores for auditory memory and linguistic processes.

Bamford-Kowal-Bench Speech in Noise Test (BKB-SIN)

Etymotic Research Inc. (2005). 61 Martin Lane, Elk Grove, IL 60007 (888-389-6684) *www.etymotic.com*
This is a speech-in-noise test using the BKB sentences and it is designed to identify issues. Sentences are presented at prerecorded signal to noise ratios that decrease in 3dB steps (+21dB to -6dB). The noise is represented by a four-talker babble with level variations to simulate a social gathering.

Differential Screening Test for Processing

Richard, G.J., and Ferre, J. (2006). LinguiSystems Inc., 3100 4th Avenue, East Moline, IL 61244 (800-776-4332) www.linguisystems.com

This test is designed to differentiate among three levels of the processing hierarchy. Level One: dichotic digits, temporal patterning, and auditory discrimination. Level Two: phonemic manipulation, phonic manipulation. Level Three: antonyms, prosodic interpretation, language organization. It is scored as pass or fail.

Functional Listening Evaluation (FLE)

Johnson, C.D., and VonAlmen, P. (1993). Revised by C.D. Johnson in 2001. In the Educational Audiology Handbook (pp. 336-339). Johnson, Benson, and Seaton (1997). San Diego: Singular Publishing Group, Inc.

The purpose of this evaluation is to determine the functional impact of noise, distance, and visual input on the listening abilities of the student. It is designed to simulate listening in situations that are more acoustically representative of an actual classroom.

Phonemic Synthesis Test & Phonemic Synthesis Picture Test

Katz, Jack (2001). Central Test Battery. Precision Acoustics, 411 NE 87th Ave, Vancouver, WA 98664 (360-892-9367).

This test assesses phonemic decoding ability which is an important skill that underlies speech and language development and is closely related to reading and spelling. There are 25 items which vary from two to four sounds, each ordered according to level of difficulty. The results are scored quantitatively and qualitatively according to age level norms. There is also a picture version available for younger children.

Test of Auditory-Perceptual Skills (TAPS)-Third Edition

Gardner, M.F. (2006). Academic Therapy Publications, 20 Commercial Blvd., Novato, CA 94949-6191 (800-422-7249). www.academictherapy.com

The TAPS was developed to assess the auditory skills necessary for the development, use, and understanding of language commonly used in academic and everyday activities. The test has been divided into four areas: auditory attention, basic phonological skills, auditory memory, and auditory cohesion. It is not timed and provides age level norms and standard scores.

Electrophysiologic Assessment of Auditory Processing

For certain children, electrophysiologic measures may provide additional information about the integrity of the central auditory system through examination of the neuromaturation and neuroplasticity of the central auditory pathways. These measures are typically only available at university or clinical sites which specialize in electrophysiologic assessment. While these measures are mentioned here, it is not expected, nor is it considered appropriate, for schools to provide these assessments at this time. They are:

- Auditory brainstem response (ABR)
- Middle latency response (MLR)
- Auditory steady-state response (ASSR)
- Frequency following response (FFR)
- Cortical event-related potentials (including P1, N1, P2, P300)
- Mismatched negativity (MMN)
- Topographical mapping

Summary of Audiological Tests of Auditory Processing

Test by Type	Age Range	Linguistic Loading	Process(es) Assessed
Dichotic Speech Tests			
Competing Environmental Sounds Test	3-12	No	Binaural integration
Competing Sentences Test	7-adult	Yes	Binaural separation
Dichotic Consonant-Vowel (CV)Test	7-adult	Yes (Low)	Binaural integration
Dichotic Digits Test	5-adult	No	Binaural integration
Dichotic Rhyme Test	8-adult	Yes (Low)	Binaural integration
Dichotic Sentence Identification Test	7-adult	Yes	Binaural integration
SCAN-C/A Competing Words Subtest	5-adult	Yes	Binaural integration
SCAN-C/A Competing Sentences Test	5-adult	Yes	Binaural separation
Staggered Spondaic Word Test (SSW)	5-adult	Yes	Binaural integration
Synthetic Sentence Identification – Contralateral (SSI-CCM)	8-adult	Yes (Low)	Binaural separation
Monaural Low Redundancy Tests			
SCAN-C/A Filtered Words Subtest	5-adult	Yes	Auditory closure
NU-6 Low Pass Filtered	7-adult	Yes	Auditory closure
NU-6 Time Compressed	7-adult	Yes	Auditory closure
NU-6 Time Compressed + Reverberation	7-adult	Yes	Auditory closure
Time Compressed Sentence Test	6-11.11	Yes	Auditory closure
Pediatric Speech Intelligibility Test	3-7	Yes	Auditory figure/ground
SCAN-C/A Auditory Figure Ground Subtest	5-adult	Yes	Auditory figure/ground
Speech-in-Noise W-22 (Katz Battery)	5-adult	Yes	Auditory f/g, closure
Selective Auditory Attention Test (SAAT)	5-adult	Yes (Low)	Auditory figure/ground
Synthetic Sentence Identification – Ipsilateral (SSI-ICM)	8-adult	Yes	Auditory f/g, closure
Temporal Processing and Patterning Tests			
Auditory Fusion Test-Revised	3-adult	No	Temporal resolution
Duration Pattern Test	8-adult	No	Temporal ordering
Gaps in Noise Test	6-adult	No	Temporal resolution
Pitch Pattern Test	6-adult	No	Temporal ordering
Random Gap Detection Test	5-adult	No	Temporal resolution
Binaural Interaction Tests			
CVC Fusion Test	7-adult	Yes	Binaural interaction
Masking Level Difference (MLD)	5-adult	No	Binaural interaction
Rapidly Alternating Speech Perception (RASP)	5-adult	Yes	Binaural interaction
Spondee Binaural Fusion	7-adult	Yes	Binaural interaction
Supplemental Behavioral Auditory Tests			
Auditory Continuous Performance Test (ACPT)	6-11	Yes	Auditory attention/vigilance
Auditory Processing Abilities Test (APAT)	5-12	Yes	Various auditory skills
BKB-SIN	4-14	Yes	Speech in noise
Differential Screening Test for Processing	6-12	Yes/No	Screens 3 processing areas
Functional Listening Evaluation (FLE)	4-adult	Yes	Distance, noise, visual input
Phonemic Synthesis Picture Test (PSPT)	4-7	Yes	Phonemic decoding
Phonemic Synthesis Test (PST)	6-adult	Yes	Phonemic decoding
Test of Auditory Processing Skills – 3rd Ed. (TAPS)	5-adult	Yes	Various auditory skills

Multidisciplinary Tests of Auditory Processing

Full understanding of the ramifications of APD for the individual requires a multidisciplinary assessment to determine the functional impact and to guide treatment and management of the condition and associated deficits. Cross-discipline analysis of APD results, with results from non-audiological disciplines, may assist audiologists and related professionals in differentially diagnosing APD from disorders having overlapping behavioral attributes (e.g., ADHD, language disorder, cognitive disorder, learning disorder). (ASHA, 2005). Included is a partial list of available assessments in a variety of disciplines.

SPEECH-LANGUAGE ASSESSMENTS

Organized below by various auditory skill area; most speech-language tests measure auditory-language, and higher order components of auditory processing. Adapted from Geffner, D. S. & Ross-Swain, D. (Eds.) (2007). *Auditory Processing Disorders: Assessment, management and treatment.* San Diego, CA: Plural Publishing

Auditory Perception and Discrimination

- The Goldman-Fristoe-Woodcock Test of Auditory Discrimination (**GFWTAD**; Goldman, Fristoe, & Woodcock 2000) *Subtests of Quiet and Selective Attention*
- Lindamood Auditory Conceptualization Test – Third Edition (**LAC-3**; Lindamood & Lindamood, 2004)
- Test of Auditory Processing Skills – Third Edition (**TAPS-3**; Martin & Browness, 2005)
- The Test of Language Development-Primary – Third Edition (**TOLD-P:3**; Newcomer & Hammill, 1997)
- Wepman's Auditory Discrimination Test (Wepman & Reynolds, 1997)

Auditory Association/Receptive Vocabulary

- The Comprehensive Receptive and Expressive Vocabulary Test – Revised (**CREVT-2**; Wallace & Hammill, 2002)
- The Clinical Evaluation of Language Function – Fourth Edition (**CELF-4**; Semel et al., 2003)
- The Comprehensive Assessment of Spoken Language (**CASL**; Carrow-Woolfolk, 1994)
- The Peabody Picture Vocabulary Test (**PPVT**; Dunn & Dunn, 1997)
- The Receptive One-Word Picture Vocabulary Test (**ROWPVT**; Brownell, 2000)
- **TOLD P:3** *Subtest 1*

Auditory Memory

- The Auditory Processing Abilities Test (**APAT**; Ross-Swain & Long, 2004) *Subtests 2, 6, and 9*
- **CELF-4** *Subtests of Understanding Concepts and Following Directions; Number Repetition; and Familiar Sequences, Recalling Sentences*
- The Comprehensive Test of Phonological Processing (**CTOPP**; Wagner et al., 1999) *Subtest 3*
- **TOLD-P:3** *Subtest 5*
- The Token Test for Children – Second Edition (**TTFC-2**; McGhee, Ehrer & DiSimoni, 1978)
- **TAPS-3** *Subtests of Number Memory Forward; Number Memory Reversed; Word Memory and Sentence Memory*
- Wepman's Auditory Memory Battery (Wepman & Morency, 1985)
- The Wide Range Assessment of Memory and Learning – Second Edition (**WRAML-2**; Sheslow & Adams, 2003)

Phonemic Awareness Skills

- **APAT** *Subtest 1*
- **CELF-4** *Subtest of Phonological Awareness*
- **CTOPP** *Subtests 1, 2, 8, 10, 11, and 12*
- **LAC-3**
- The Phonological Awareness Test (**PAT**)
- **TOLD-P:3**
- **TAPS-3** *Subtests of Phonological Segmentation and Phonological Blending*

Auditory Closure Skills

- **CASL** *Subtest of Meaning from Context*
- Test of Language Competence (**TLC**; Wiig & Secrord, 1989) *Subtest 3*

Auditory Comprehension and Auditory Cohesion Skills

- **APAT** *Subtests 7,8 and 10*

- **CELF-4** *Subtests of Linguistic Concepts, Sentence Structure, Understanding Concepts and Following Directions, and Understanding Spoken Paragraphs*
- **CASL** *Subtests of Sentence Comprehension, Paragraph Comprehension, Nonliteral Language, Ambiguous Sentences, and Inference*
- The Listening Test (Barrett et al., 1992)
- **TAPS-3** *Subtests of Auditory Comprehension and Auditory Reasoning*
- **TLC** *Subtests 1 and 4*
- **WRAML-2** *Subtests 1 and 6*

Expressive Vocabulary Skills

- **CREVT-2**
- **CELF-4** *Subtest of Expressive Vocabulary and Word Definitions*
- The Detroit Test of Learning Abilities – Fourth Edition (**DTLA-4**) Subtest of Story Construction
- The Illinois Test of Psycholinguistic Abilities – Third Edition (**ITPA-3**; Hammill et al., 2001) Subtest 3
- The Expressive One-Word Picture Vocabulary Test (**EOWPVT**; Browness et al., 2000)
- **TOLD P:3** *Subtest 3*
- The Expressive Vocabulary Test (**EVT**; Williams, 1997)

Word Retrieval Skills

- **CELF-4** *Subtests of Word Associations and Rapid Automatic Naming*
- **CASL** *Subtests of Antonyms, Synonyms, and Sentence Completion*
- **CTOPP** *Subtests 4, 6, 7 and 9*
- **ITPA-3** *Subtest 1*
- **TOLD-P:3** *Subtests 2 and 6*
- The Test of Word Finding – Second Edition (**TOWF-3**; German, 1999)
- The Boston Naming Test

Auditory/Speech Perception Under Degraded Listening Conditions

- **GFWTAD** *Subtest of Selective Attention*
- **TAPS-3** *Subtest of Auditory Figure-Ground*

PSYCHOLOGICAL ASSESSMENTS

Test patterns to consider are those observed deficiencies specific to the auditory modality. Those which are more pervasive in the overall functioning may suggest a more generalized cognitive or emotional challenge.

- WISC-IV (Wechsler Intelligence Scale for Children)
- DAS-II (Differential Ability Scales)
- SB-V (Stanford-Binet Intelligence Scale)
- WJ-III (Woodcock-Johnson III Tests of Cognitive Abilities)
- BASC-2 (Behavior Assessment System for Children)
- ASEBA (Achenbach System of Empirically Based Assessment)
- BYI-II (Beck Youth Inventories)
- CRS-R (Conners' Rating Scales, Revised)
- BRIEF (Behavior Rating Inventory of Executive Functioning)
- KABC-II (Kaufman Assessment Battery for Children)
- UNIT (Universal Nonverbal Intelligence Test)
- VMI (Beery Test of Visual Motor Integration)

EDUCATIONAL ASSESSMENTS

Tests and measures specific to academic skills and current level of academic performance.

- WJ-III (Woodcock-Johnson III Tests of Achievement)
- Benchmark Tests (DRA, DIBELS, etc.)
- CSAP (Colorado Student Assessment Program)
- District Assessments

Auditory Processing Deficit (APD) Profiles

All assessments of auditory processing are individualized, as are the results. It is possible, however, to see patterns of results that have led some researchers and practitioners to develop specific "profiles" of auditory processing deficits. The purpose for the categorization models is to aid in the interpretation of auditory processing and related assessments to facilitate development of an individualized, comprehensive, management plan that addresses the student's functional deficits. Identifying the auditory processing profile aids in the development of a responsive intervention and management plan. Students may exhibit characteristics of more than one profile or may not exhibit all the given characteristics in a particular profile. A profile approach can be used to provide a better understanding of the student's strengths and weaknesses with respect to academic achievement, communicative success, and life skills.

The organizational models of auditory processing profiles presented here are based on the work of Bellis and Ferre; Katz, et al; Lucker; and Medwetsky. Collaborative management strategies from Chermak and Musiek are also included. The following six profiles are identified as: ***auditory decoding, auditory integration, auditory temporal processing, organization, auditory memory, and auditory attention.***

While this organizational model of auditory processing profiles does not dictate a protocol including specific test instruments, it does infer that the behavioral auditory processing battery should include at least the following: dichotic speech tasks, monaural low-redundancy speech tasks, tests of temporal processing, and binaural interaction tasks (Bellis, 1996; Bellis & Ferre, 1999; Chermak & Musiek, 1997).

Profile References and Additional Readings

Bellis, T.J. (1996). *Assessment and management of central auditory processing disorders in the educational setting.* San Diego, CA: Singular Publishing Group.

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Musiek, F. E., & Chermak, G. D. (Eds.) (2007). *Handbook of (central) auditory processing disorder: Auditory neuroscience and diagnosis, Volume I.* San Diego, CA: Plural Publishing.

Auditory Processing Deficit (APD) Profiles
Deficit Area: AUDITORY DECODING

Related to the: Bellis/Ferre "Decoding" profile, Buffalo Method "Decoding" profile, Lucker "Decoding" profile, Medwetsky "Lexical Decoding Speed / Phonological Awareness" profile

COMMUNICATION / ACADEMIC DIFFICULTIES	MANAGEMENT STRATEGIES
• Inefficient analysis (discrimination) of fine acoustic differences within the speech spectrum • Language deficits in vocabulary, grammar or semantics • Deficits in spelling, sound blending, reading decoding or reading comprehension, particularly when material is new, noise is present or visual cues are limited • Listening difficulties may include excessive auditory fatigue, deterioration of listening attitude/habits, mishearing information or misunderstanding directions • Appears to have a high frequency hearing loss, mishearing and substituting similar sounds • Performs better in math than in reading	• Modification of environment to reduce background noise • Preferential seating • Repetition or rephrasing to enhance target signal • Use of visual cues to clarify or to complement auditory target • Specific speech / language therapy for secondary language processing deficits and/or specific academic work on those skills that may be poor • Multisensory approach • Improving discrimination based upon distinctive features (both temporal features such as syllables and rhymes, and spectral features • Therapy may include word association, categorization and labeling game • Vocabulary building • Auditory closure activities designed to teach use of contextual cues • Training of consonant and vowel discrimination and speech-to-print skills • Noise tolerance training • Speech reading / lip reading • Critical listening activities • Use of an assistive listening device (ALD) • Use of commercial practice programs such as Earobics, FastForward, LIPS, etc

AUDITORY PROCESSING TEST FINDINGS

- Bilateral difficulty on degraded speech tasks consistent with deficit in auditory closure skills
- Intact dichotic listening skills for less linguistically loaded tasks, but increased difficulty on more linguistically loaded dichotic listening tasks
- Deficit on phonemic synthesis tasks
- Intact labeling on temporal patterning tests

Auditory Processing Deficit (APD) Profiles
Deficit Area: AUDITORY INTEGRATION

Related to the: Bellis/Ferre "Integration" profile, Buffalo Method "Integration" profile, Lucker "Integration" profile, Medwetsky "Auditory-Linguistic Integration" profile

COMMUNICATION / ACADEMIC DIFFICULTIES	MANAGEMENT STRATEGIES
• Difficulty with tasks requiring multi-modality input or output • Difficulty with reading, spelling, and/or writing (poor sound-symbol association and sight-recognition skills) • Difficulty with symbolic language • Difficulty with peer communication (secondary to poor syntactic, semantic, and pragmatic skills) • Poor music skills • Poor prosodic skills • Difficulty listening in background noise or listening to multiple speakers • Difficulty completing assignments in a timely manner • Difficulty "getting started" on long multi-step assignments	• Musical instrument training or singing • Dancing or athletic activity that encourages multi-modal, cross-midline actions in a specified pattern • Linguistic labeling of tactile stimuli • Practice in extracting key words and information from complex messages • Classroom setting that includes highly animated teacher with melodic voice (to maximize access to prosodic features of speech) • Use of demonstration and examples in the classroom • Experiential, well-structured, "hands-on" learning environment • Use of multi-modality learning environment with each sensory experience presented sequentially (one modality at a time) • Ample repeated practice and review • FM technology may be useful as the demands of listening task and environmental noise dictate (the more demanding a listening task, the less noise that can be tolerated)

AUDITORY PROCESSING TEST FINDINGS

- Adequate performance on degraded speech tests (filtered speech, time-compressed speech, and speech in noise)
- Poor performance on dichotic listening tasks, often with left-ear suppression (Staggered Spondaic Words, Dichotic Digits, Competing Words, Competing Sentences, and Synthetic Sentence Identification)
- Poor performance for labeling on temporal patterning task, contrasted with good performance for mimicking response on same task (Pitch-Pattern Sequence)

Auditory Processing Deficit (APD) Profiles
Deficit Area: AUDITORY TEMPORAL PROCESSING

Related to the: Bellis/Ferre "Prosodic" profile

COMMUNICATION / ACADEMIC DIFFICULTIES	MANAGEMENT STRATEGIES
• Difficulty recognizing the "ebb and flow" of multiple acoustic cues in a stream of speech (acoustic contours or patterns) • Difficulty using salient features of a target signal to "get the message"; speech can be perceived as a "blur" • Difficulty perceiving and attaching meaning to timing cues in speech (i.e., pacing and segmentation) • Difficulty sequencing critical elements within a message • Adverse effect on reading and spelling, listening in noise, direction-following, note-taking, auditory attention skills, and processing speed • "Flat" monotone readers • Difficulty understanding sarcasm and/or using heteronyms • Difficulty recognizing and using non-verbal, pragmatic language cues such as facial expressions, body language, and gestures • Music-based skills may be compromised	• A classroom experience that includes an experiential, well-structured, "hands-on" learning environment is beneficial • An animated teacher who uses demonstration and examples in her teaching • Frequent repetition of information with emphasis on key words and liberal use of associated visual cues • Therapeutic use of prosody training • Instruction in extraction of key words • Frequent reading aloud with emphasis on intonation, stress, and rhythm

AUDITORY PROCESSING TEST FINDINGS

- Poor performance on degraded speech tests (low-pass filtered speech, speech in noise) with good use of visual cues to assist word recognition
- Poor performance on temporal patterning tasks (pitch-pattern sequence and duration-pattern sequence) whether responses are verbal labels or mimicked responses
- Poor performance on dichotic listening tasks (Staggered Spondaic Words and Dichotic Digits)

Auditory Processing Deficit (APD) Profiles
Deficit Area: ORGANIZATION

Related to the: Buffalo Method "Organization" profile, Lucker "Organization" profile, Medwetsky "Sequencing/Organization" profile

COMMUNICATION / ACADEMIC DIFFICULTIES	MANAGEMENT STRATEGIES
• Disorganized (poor note-taking skills and poor assignment completion skills) • Impulsive • Poor planner • Difficulty with expressive language and word retrieval, including poor syntactic skills • Motor planning difficulties (articulation deficits, fine and gross motor skills) • Difficulty following oral directions • Poor sequencing and follow through such as remembering assignments • Difficulty acting on incoming information • May demonstrate good reading comprehension but spelling and writing may be poor due to the multi-element nature of the task • Difficulty getting started • Difficulty with open ended tasks • May have difficulty hearing in noise but will still complain when it is quiet	• Highly structured, systematic, rule-based environment • Training and practice in the rules for organization • Training in use of external organizational aids (lists, planners, PDA) • Avoid situations requiring self-monitoring of learning behavior • Metacognitive strategies • Break information into smaller units • Strategies for study skills, note taking, test taking • Speech language therapy focusing on expressive language and word retrieval deficits • May do better with written instructions • May require occupational or physical therapy to address motor planning and execution skills • Alphabet games, drama, follow the leader

AUDITORY PROCESSING TEST FINDINGS

- Normal phonemic decoding
- Normal monaural low redundancy speech tests
- Deficit on any task requiring report of more than two critical elements (Dichotic Digits, Staggered Spondaic Words, Pitch-Pattern Sequence Test, Duration-Pattern Sequence Test, Competing Sentences)
- Reversals
- Normal temporal tests

Auditory Processing Deficit (APD) Profiles
Deficit Area: AUDITORY MEMORY

Related to the: Buffalo Method "Tolerance Fading Memory" profile, Lucker "Memory" profile, Medwetsky "Fading Memory" profile

COMMUNICATION / ACADEMIC DIFFICULTIES	MANAGEMENT STRATEGIES
• Exhibit a tendency to forget earlier presented items and to retain what was heard most recently • Difficulty following and retaining conversation and instructions especially if the information is novel and if competing stimuli are present • Tend to exhibit reading comprehension problems • Possible spelling problems due to difficulties in retention of visual orthographic representation of words • Limited amount of information can be held at one time • Easily over-stimulated • Sensitive to loud sounds • Handwriting problems due to motor planning problems • Easily distracted • Adequate decoding skills • Spoken language is often "cluttered" • Weak receptive language skills • Difficulty making inferences	• Improve signal to noise ratio (FM system or classroom amplification) • Strategies to improve memory such as chunking, verbal chaining, mnemonics, rehearsal, reauditorization, paraphrasing, summarizing • Preferential seating • Tape record class • Pre-teach information • Note taker or copy of teacher notes

AUDITORY PROCESSING TEST FINDINGS

- Staggered Spondaic Words (SSW) excessive errors on left competing condition
- SSW High/Low order effect (more errors on first spondee due to impulsivity)
- SSW Low/High ear effect (more errors on items to the left ear first due to impulsivity)
- Qualitative errors of quick responses on Phonemic Synthesis test
- Difficulty on Speech in Noise tests

Auditory Processing Deficit (APD) Profiles
Deficit Area: AUDITORY ATTENTION

Related to the: Lucker "Attention" profile, Medwetsky "Deficiencies in Attention" profile

COMMUNICATION / ACADEMIC DIFFICULTIES	MANAGEMENT STRATEGIES
• Difficulty choosing what to attend to (inability to correctly determine the target) • Distractibility (inability to selectively attend to a target) • Poor listening skills (inability to allocate attentional resources effectively) • Difficulty hearing in background noise (inability to block out competing stimuli while attending to a target) • Difficulty taking notes effectively (requires attending to multiple stimuli) • Difficulty following oral instructions • Difficulty maintaining attention over time (limited attention span) • Difficulty attending to an intermittent target *Auditory attention deficits are often confused with the global attention deficit present in ADHD. APD students with auditory attention issues have difficulties described above. As opposed to APD, ADHD students are commonly referred to as hyperactive, fidgety, restless, hasty, impulsive, intrusive and interrupting.*	• Metacognitive Strategies - Attending Skills • Eye contact • Identifying and inhibiting external and internal distractions • Identifying verbal cues that signal important auditory information (i.e., stress, repetition, key words) • Waiting for direction before beginning • Initiating clarification of unfamiliar words or words that cannot be heard

AUDITORY PROCESSING TEST FINDINGS

- Difficulty on both portions of Auditory Continuous Performance Test, even with well controlled ADHD
- Difficulty on dichotic tasks

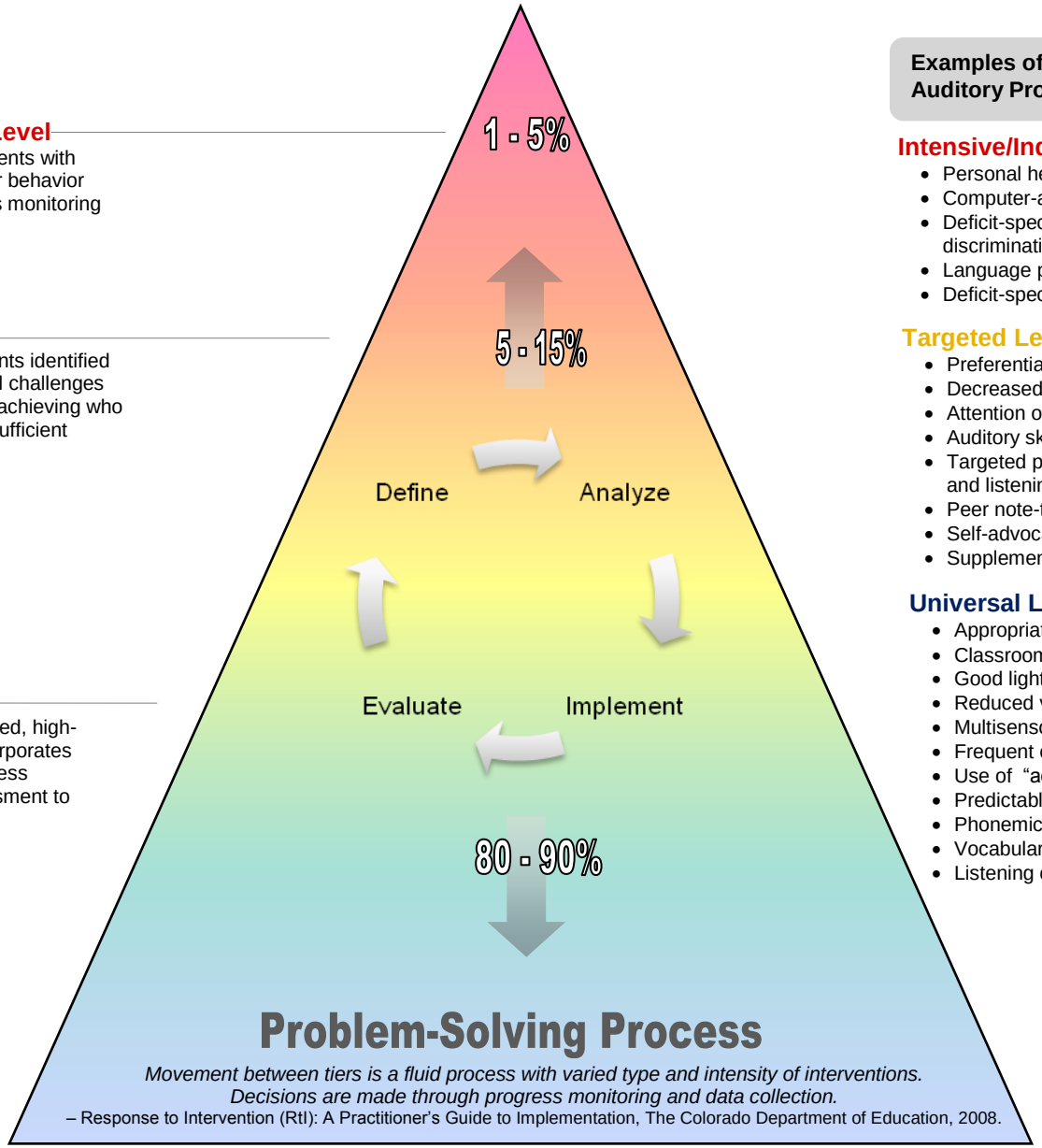
APPENDIX E. MANAGEMENT AND INTERVENTION OF SUSPECTED & DIAGNOSED AUDITORY PROCESSING DEFICITS

Multi-Tiered Model of Instruction & Intervention

Intensive/Individualized Level
Interventions are provided to students with intensive/chronic academic and/or behavior needs based on ongoing progress monitoring and/or diagnostic assessment.

Targeted Level
Interventions are provided to students identified as at-risk of academic and/or social challenges and/or students identified as underachieving who require specific supports to make sufficient progress in general education.

Universal Level
ALL students receive research-based, high-quality, general education that incorporates ongoing universal screening, progress monitoring, and prescriptive assessment to design instruction.



Movement between tiers is a fluid process with varied type and intensity of interventions.
Decisions are made through progress monitoring and data collection.
– Response to Intervention (RtI): A Practitioner's Guide to Implementation, The Colorado Department of Education, 2008.

Examples of Interventions for Students with Auditory Processing Difficulties

Intensive/Individualized Level [all below plus]
- Personal hearing assistance technology (HAT)
- Computer-assisted note-taking
- Deficit-specific auditory training activities including discrimination, closure, comprehension, recall, etc.
- Language processing therapy
- Deficit-specific compensatory strategies

Targeted Level [all below plus]
- Preferential, flexible seating
- Decreased distance and greater eye contact
- Attention obtained before speaking
- Auditory skills training
- Targeted phonemic awareness, vocabulary building and listening training
- Peer note-taking
- Self-advocacy skills for listening
- Supplemental visual cues

Universal Level
- Appropriate classroom acoustics (ANSI)
- Classroom amplification system
- Good lighting
- Reduced visual/auditory distractions
- Multisensory instruction
- Frequent checks for comprehension
- Use of "active listening" techniques
- Predictable routines
- Phonemic awareness training
- Vocabulary building
- Listening comprehension training

Managing the Physical and Acoustical Environment

Classroom Acoustics & Auditory Processing

The negative effects of excessive classroom noise and reverberation on learning have been well documented. It should come as no surprise that students with developing language skills, attention problems, and emerging or delayed auditory skills would be particularly impacted by classrooms with poor acoustics given the difficulties these students may have with auditory attention, auditory discrimination, localization, auditory closure, or auditory figure-ground.

The American Speech-Language-Hearing Association published guidelines for optimal acoustics in learning environments first in 1995 and most recently in 2005[1]. Yet, as early as 1950 Knudsen and Harris[2] stated that unoccupied noise levels should not exceed 35 dBA "in classrooms in which a quiet environment is especially desirable and 40 dBA in ordinary classrooms." Current terminology refers to these enclosures as core learning spaces and ancillary learning spaces respectively (ANSI, 2002). Noise levels greater than 35-40 dBA interfere with receptive communication primarily by acoustically masking the phonemes of speech. Sources of noise may be intrinsic to the classroom such as HVAC systems, noisy light fixtures or may be extrinsic in nature such as noise from adjacent classrooms, traffic, or airport noise.

The deleterious effects of background noise are exacerbated by excessive classroom reverberation times. Noise and reverberation appear to act synergistically to reduce speech intelligibility. Reverberation compromises receptive communication via temporal masking. This is, in effect, a "smearing" of the speech signal over time. In a highly reverberant environment, speech sounds do not decay rapidly enough for accurate perception of subsequent speech sounds. Regardless of the source, poor classroom acoustics compromise students' access to direct and indirect instruction.

School architects and facility planners have historically employed a number of strategies to reduce the ambient noise and reverberation in classrooms with varying levels of success. These strategies have included:

- bringing walls to deck (leaving no gaps at floors/ceilings)
- sealing other penetrations between classrooms
- providing boots on return air pathways between classrooms to reduce sound transfer
- installing acoustical ceiling tile, using acoustical panels/diffusers
- providing carpeted classrooms
- using low speed/high volume heating and air conditioning (HVAC) units.

Classroom amplification systems may be incorporated or retrofitted to provide students with improved access to direct instruction.

These strategies, while helpful, have not necessarily ensured that optimal acoustical characteristics are necessarily attained for a given learning space. Therefore, in response to parent/professional requests, the Acoustical Society of America, under the auspices of the American National Standards Institute (ANSI), developed standards for noise and reverberation in core and ancillary learning spaces. The standards were submitted and approved by ANSI as ANSI S12.6-2002 "Acoustical Performance Criteria, Design Requirements and Guidelines for Schools" – the first such standard for classroom acoustics in U.S. history. The complete document is available at no charge at http://asastore.aip.org.

The ANSI S12.6-2002 standard for core learning spaces:

Core Learning Space	Noise level (dB)	Reverberation
Vol. up to 20,000 cubic ft.	35 dBA	.6-.7 seconds

Expertise is accessible to school districts in Colorado to incorporate appropriate predictive metrics during the design phases of construction, as well as to appropriately measure the acoustical properties of existing enclosures as per the ANSI standard. Any use of classroom amplification should include analysis of the enclosure prior to implementation. Strategies that can be used as short-term solutions to address classroom noise and acoustical problems include:

STRATEGY	BENEFIT
Place carpet or rugs on floors; put rubber tips or balls on the bottom of table and chair legs	• reduces noise created when students move their chairs or tables to minimize auditory distractions during instruction
Cover walls with sound absorbing material such as heavy fabric and bulletin boards; some rooms may require strategically placed acoustical panels on walls	• increases absorptive wall surfaces in a room to reduce noise level and reverberation
Locate noise sources in one part of the room that is away from primary instructional areas (pencil sharpeners, aquariums, computer printers)	• minimizes impact of noise interruptions
Divide room into smaller spaces using bookshelves or other furniture	• creates smaller learning spaces
Close the door(s) and windows of the learning environment	• reduces external noise from sources such as hallways, playground, and traffic

1. American Speech-Language-Hearing Association. (2005). *Guidelines for Addressing Acoustics in Educational Settings* [Guidelines]. Available from www.asha.org/policy.

2. Knudsen, V., & Harris C (1978). *Acoustical design in architecture.* American Institute of Physics—Acoustical Society of America.

3. American National Standards Institute. (2002). *ANSI S12.60-2002, Acoustical performance criteria, design requirements and guidelines for schools.* Melville, NY: Acoustical Society of America

Instructional Interventions for Students with APD

Instructional modifications and accommodations consist of purposeful adaptations made by the educator to improve the student's opportunity to learn**.** All students, including those with auditory processing deficits (APD), require an optimum listening environment. Classroom management suggestions identified for a student with an APD should be based on the student's individual profile of auditory processing strengths and weaknesses. The audiologist should select those strategies most appropriate for the student's needs.

UNIVERSAL LEVEL

STRATEGY	BENEFIT
Teach and cue students to "look and listen"	• improves students' comprehension by watching person who is speaking
Check students' comprehension of verbal information by asking open-ended questions	• determines students' level of understanding information • identifies information that needs to be restated • verifies when students are ready to move into new material
S = state the topic to be discussed P = pace your conversation at a moderate speed with occasional pauses to permit comprehension E = enunciate clearly, without exaggerated lip movements E = enthusiastically communicate, using body language and natural gestures CH = check comprehension before changing topics	• provides a mnemonic device for highlighting basic strategies dealing with attending, memory, and receptive language deficits
Provide multisensory instruction	• increases instructional access through the use of multiple learning modalities • allows sustained reference to instruction when visual supplements are utilized

TARGETED LEVEL

(includes all of the above plus those below)

STRATEGY	BENEFIT
Seat student near teacher or speaker with full face to face view	• provides louder, less reverberant signal • provides advantage of visual instruction aids • provides access to visual spoken language • helps maintain attention and interest to task
Decrease distance and obtain eye contact while redirecting	• improves audibility • gains auditory attention
Obtain student's attention through visual, auditory, or tactile cues as appropriate	• prepares student for listening
Provide earmuffs or quiet study areas that are free from visual distractions during independent work time	• helps to minimize problems with auditory and visual distractions in the environment to improve concentration and productivity
Monitor student for fatigue and length of attending time, providing breaks when necessary	• permits student to have "downtime" and then redirects attention
Assign peer note-taker	• permits student to have access to additional student notes

INTENSIVE / INDIDUALIZED LEVEL

(includes all of the above plus those below)

STRATEGY	BENEFIT
Use classroom or personal FM under direction of the educational audiologist	• allows for direct access to teacher's voice
Make available computer assisted notetaking	• provides student with notes of lectures

Therapy and Remediation Techniques for Students with APD[1]

While some educators may select programs that are evidenced based in teaching students skills and implement them at a universal or targeted level, it is recognized that most of the therapy and remediation techniques are considered specialized instruction and will typically be provided at the intensive level. Research from the National Reading Panel (NRP) has identified the importance of phonemic awareness training as one of five critical areas to develop for literacy. As a result of this research, some schools have specifically looked at phonemic awareness training and have included it in both the universal and targeted levels.

UNIVERSAL LEVEL

TECHNIQUES/ACTIVITIES	BENEFIT
Phonological awareness training: multisensory, whisper or PVC phones, sound tapping for sounds from L-R orientation	• Student receives direct explicit and systematic practice for developing phonemic awareness skills necessary for reading (decoding/encoding)
Vocabulary building: derivatives, rules of English use	• Systematic vocabulary instruction
Listening comprehension training: Note taking skills	• Student provided with hands on "graphic organizer" to facilitate listening and retelling stories, take notes, etc.
Active listening: Body Basics/High Five Listeners, etc. signal to be used in multiple setting with school staff	• Teaches elements of good listening behaviors and active listening
COMMERCIALLY AVAILABLE MATERIALS	
Phonemic awareness training: *Lindamood-Bell (LIPS), LEXIA, Fast ForWord, Fundations (K-1), Systematic Sequential Phonics*	• Student receives direct explicit and systematic practice for developing phonemic awareness skills necessary for reading (decoding/encoding)
Vocabulary building: *Words Their Way*	• Systematic vocabulary instruction
Listening comprehension training: *Story Grammar Marker, Visualization (Lindamood-Bell)*	• Student provided with tools to enhance listening skills (multisensory or visualization techniques)
Active listening: *125 Ways to Be a Better Listener, 125 Ways to Be a Better Student, Classroom Listening and Speaking CLAS*	• Student provided with strategies to improve listening skills in different settings

TARGETED LEVEL

(includes all of the above plus those below)

TECHNIQUES/ACTIVITIES	BENEFIT
Phonemic awareness training, vocabulary building, listening Comprehension, Active Listening (as listed above)	• Student receives direct explicit and systematic practice for developing phonemic awareness and listening skills
Listening comprehension training: download podcasts for listening, summarize/retell. Use read aloud with follow-up activity such as drawing picture to convey what was heard.	• Student receives direct explicit and systematic practice for improving listening comprehension
COMMERCIALLY AVAILABLE MATERIALS	
Phonemic awareness training: *Star Fall, Earobics, Fast ForWord, Funnel Toward Phonics, Start-In, LANGUAGE!*	• Student receives direct explicit and systematic practice for developing phonemic awareness skills necessary for reading (decoding,/encoding)
Vocabulary building*: Bringing Words to Life*	• Systematic vocabulary instruction

[1] Therapy resources include: *Bringing Words to Life* (guilford.com), Cognitive Concepts (earobics.com), Communication Skill Builders (800-866-4446), Language! (sopriswest.com), Lexia Learning (lexialearning.com), Lindamood-Bell (lindamoodbell.com), LinguiSystems, Inc. (linguisystems.com), Mindwing Concepts, Inc. (mindwingconcepts.com), Scientific Learning (scilearn.com), Starfall Education (starfall.com), Super Duper Publications (superduperinc.com), Wilson Language Training (fundations.com), *Words Their Way* (pearsonschool.com); Game manufacturers include: Hasbro, Mattel, Milton Bradley.

INTENSIVE LEVEL

Auditory Closure: Sound/Syllable Level	
TECHNIQUES/ACTIVITIES	**BENEFIT**
Auditory closure: missing phoneme(s)	• Student accesses instruction when message is not audible/intelligible, e.g., After Friday comes (S)aturday
Vowel training (long and short vowels)	• Student improves identification and discrimination of vowels • Student improves understanding of effect of other phonemes on vowel sounds (closure)
Blend and diagraph training	• Student improves identification and discrimination of blends and diagraphs
Diphthong training	• Student improves identification and discrimination of diphthongs
Auditory closure: missing syllable/phoneme	• Student improves ability to use context to fill in missing sounds (Animals: ti---(ger)
Consonant training: minimal pairs contrast (/p/ /b/)	• Student improves ability to discriminate between sounds that are sound similar (voicing difference)
Speech to print skills: syllable chart technique	• Student uses consonant stops (p,b,t,d,k,g) in the beginning position to make one syllable words with CVC format
Hannah's Last Sound Game: each player says a word that begins with the same sound as the last sound in the previous word (shoP - PaT-TiMe-MoM)	• Student improves auditory discrimination and awareness of initial and final sounds in words
COMMERCIALLY AVAILABLE MATERIALS	
Phonemic awareness training: *Earobics, LANGUAGE!, Fast ForWord*	• Student receives direct explicit and systematic practice for developing phonemic awareness skills necessary for reading (decoding,/encoding)
Auditory discrimination and closure: *A Rhyme in Time*	• Student improves auditory closure and sound discrimination skills

Auditory Closure: Word Level	
TECHNIQUES, PROGRAMS, ACTIVITIES	**BENEFIT**
Vowel and auditory summation: speech reading, background, message and gestural cues	• Student supplements auditory information with visual information at the word level
Vocabulary building: see and say word, contextual derivations, motivation for word learning, immediate question solving and review	• Student expands vocabulary, activates prior knowledge and promotes use of contextual and other cues to increase access to spoken message/comprehension
Auditory closure: missing word using nursery rhymes, riddles, etc.	• Student improves ability to use contextual cues to increase access to spoken message Jack and Jill went up the _____. (hill)
Word classes: description/attribute, function, categories, opposites, synonyms	• Student increases knowledge of word classes to promote use of context and ability to comprehend and internalize language presented in auditory mode
COMMERCIALLY AVAILABLE MATERIALS	
Auditory discrimination & phonological awareness: *Auditory Rhyme Fun Deck, Phonemic Awareness Fun Deck, Look Who's Listening, No Glamour Auditory Processing Game, The Auditory Processing Game*	• Student supplements auditory information with visual information at the word level

Vocabulary building: *Bringing Words to Life, 125 Vocabulary Builders, 100% Curriculum Vocabulary, Spotlight on Vocabulary, More Vocabulary to Go, No Glamour Vocabulary cards, etc.*	• Systematic vocabulary instruction
Auditory closure: *Wheel of Fortune*	• Students improve auditory closure skills
Other auditory skills: *Scattergories, Catch Phrase, Password, Taboo*	• Students improve vocabulary, auditory memory, use of contextual cues, integration, metalinguistic strategies, and/or processing speed

Auditory Closure: Sentence Level	
TECHNIQUES, ACTIVITIES	**BENEFIT**
Following directions: identify action words, important words, steps, temporal information and activities in directions	• Student identifies key words to improve accuracy in following directions
Following directions: conditional directions, directions with objects, increasing complexity, multiple level directions	• Student improves ability to follow directions with increased length or linguistic complexity
Interpreting directions: identifying parts/sequence e.g. "What is the second step?"	• Student analyzes direction in entirety then breaks it down in to sequential steps
Identifying listening cues: first, don't, be sure, before, one thing, reason, finally, etc.	• Students improves ability to follow directions, instruction at the sentence level
Answer questions: common objects, word classes, attributes, choose appropriate answers	• Student listens and identifies correct answer
Ask questions: choose appropriate questions, gather information by asking questions	• Students ask questions to learn or to seek clarification
COMMERCIALLY AVAILABLE MATERIALS	
Conditional Following Directions Fun Deck, Auditory Closure Fun Deck, Learning to Listen (audiocards), Auditory Memory for Rhyming Words in Sentences Fun Deck, Listen for Absurdities Fun Deck, Following Directions Fun Deck, Question the Direction, No Glamour Auditory Processing Game (following directions), The Auditory Processing Game (listen, repeat and follow directions)	• Student supplements auditory information with visual information at the word level

Auditory Comprehension/Recall	
TECHNIQUES, ACTIVITIES	**BENEFIT**
Sequencing activities: understand sequences in paragraphs, sequences in stories, answer sequence questions	• Student improves auditory sequential memory skills and accuracy/comprehension of information involving sequence
Story recall: identify characters, time, places, main idea, remembering details, sequence, retell summary	• Student improves auditory memory for elements of a story as well as ability to summarize and retell
Identifying semantic absurdities	• Student improves listening skills and use of context to identify information that does not fit
Draw inferences from stories, answer interpretive questions from stories	• Student improves listening and problem solving skills
COMMERCIALLY AVAILABLE MATERIALS	
Auditory memory: *Auditory Memory for Quick Stories, Comprehending More Complex Auditory Information, Rapid Recall of Specific Information, Recalling the Sequential Story, Remember Subtle Parts of Story, Look Who's Listening (Auditory Memory: facts with paragraphs, multiple level commands), Auditory Processing Game (Cohesion), No Glamour Auditory Processing Game (Riddles, main idea, details, story comprehension)*	• Student improves ability to process and recall information that is presented through the auditory mode

Story recall and listening to details: *Story Grammar Marker*	• Student improves listening and reading comprehension, and ability to summarize and recall auditory details
Following directions: *Question the Direction, 125 Ways to Be A Better Listener, HELP Series*	• Student improves ability to accurately receive, interpret and internalize language presented in auditory mode

Prosody Training	
TECHNIQUES, ACTIVITIES	**BENEFIT**
Multiple meaning words with syllable stress change (*re*cord vs. re*cord*, *sub*ject vs. sub*ject*)	• Student improves skills in recognition and use of prosodic aspects of speech, such as rhythm, stress and intonation
Sentences that change meaning with changes in the word stressed/ identifying the stressed word in the sentence. Look *out* the door vs. *Look out*… the door	• Student improves skills in recognition and use of prosodic aspects of speech, such as rhythm, stress, and intonation
Key word extraction: listen for important words	• Student improves ability to remember and understand complex directions or messages
Role playing or charades	• Student improves prosodic and nonverbal expression of emotion
Draw inferences from stories, answer interpretive questions from stories	• Student improves listening and problem solving skills
PVC pipe phone	• Student increases access to own voice, improves auditory feedback
COMMERCIALLY AVAILABLE MATERIALS	
Whisper Phone, Toobloo	• Student increases access to own voice, improves auditory feedback

Temporal Patterning Training	
TECHNIQUES, ACTIVITIES	**BENEFIT**
Sequence strings of environmental sounds, speech sounds or words recognizing and then imitate 2-3 patterns (high-low) (long-short); play Marco Polo	• Student improves listening by developing awareness of timing aspects of signal • Student enhances music appreciation
Phoneme sequencing and sound blending activities	• Student enhances discrimination and patterning skills
Temporal patterning training: clapping patterns	• Student improves ability to analyze and imitate rhythmic patterns of auditory stimuli
COMMERCIALLY AVAILABLE MATERIALS	
Processing Power: A Guide to CAPD Assessment and Management. (Ferre, J.)	• Student enhances discrimination and patterning skills
Central Auditory Processing Disorders: Strategies for Use with Children and Adolescents (Kelly, D.)	• Student improves patterning and temporal processing skills
Lindamood Bell Learning Process (LIPS)	• Student enhances discrimination and patterning skills
Boggle, card games, Mad Gab	• Student improves pattern recognition skills

Binaural Processing	
TECHNIQUES, ACTIVITIES	**BENEFIT**
Binaural separation activities: listen to live single words, sentences and eventually paragraphs/stories while background noise (music, story, white noise) is presented via earphone to other ear	• Student improves listening in background noise, listening during transitions and/or simultaneous large and small group instruction

Binaural interaction activities: close eyes and identify where sound is coming from (e.g., keys jingle, play Marco Polo, etc.)	• Student improves localization skills
Dichotic listening training: listening to varied signals presented to both ears (listen to both or ignore one)	• Student improves binaural integration skills which will help them track one conversation and ignore another one
COMMERCIALLY AVAILABLE MATERIALS	
Assessment and Management of Central Auditory Processing Disorders in the Educational Setting: From Science to Practice. (Bellis)	• Student improves listening skills in noise
Bopit, Bopit Extreme, Brain Warp, Boggle, Catch Phrase, Rummikub, Scrabble, Twister, Upwords	• Student improves integration skills
Dichotic Interaural Intensity Difference training (DIID, Muskiek)	• Student strengthens weaker ear (pathways)

Interhemispheric Transfer Training	
TECHNIQUES, ACTIVITIES	**BENEFIT**
Activities that require cross-hemisphere communication: musical instrument training, singing, labeling items that are in a bag, Name That Tune, Simon Says (directions with motor response), Twister	• Student improves communication between the two sides of the brain
Any bipedal (dancing, jumping, moving with legs) or bimanual activities (tossing ball, signing, etc) or both (Jumping Jacks, Windmills, Follow the Leader-cross midline)	• Student improves communication between the two sides of the brain
Listen to songs and answer questions about lyrics	• Student improves multimodality and interhemispheric skills as it requires work from both hemispheres of the brain

Auditory Vigilance Training	
TECHNIQUES, ACTIVITIES	**BENEFIT**
Play Red Light-Green Light, Simon Says, Musical Chairs	• Student improves auditory vigilance
COMMERCIALLY AVAILABLE MATERIALS	
Play *Bopit, Bopit Extreme, Brain Warp*	• Student improves auditory vigilance
Earobics- Step Two Program (vigilance task that also develops discrimination skills)	• Student improves ability to sustain attention over time

Speech Recognition in Noise	
TECHNIQUES, ACTIVITIES	**BENEFIT**
Listening activities (progress words, sentences, stories, following directions) in presence of background noise such as tape player playing "chatter/cafeteria noise"	• Student improves ability to comprehend speech in noise • Student improves ability to follow directions/instruction during transitions
COMMERCIALLY AVAILABLE MATERIALS	
Noise Desensitization Training (Katz)	

Compensatory and Metacognitive Strategies for Students with APD[1]

Students learn to use compensatory and metacognitive strategies to increase their access to auditory instruction at the universal, targeted and intensive levels. Since all students are expected to listen in the classroom, there are skills that the regular classroom teacher or other professional can model and teach. Organization, active listening and self advocacy are skills that all students need. As students' needs become more significant, specialized instruction is critical.

UNIVERSAL LEVEL

STRATEGY	BENEFIT
Students learn to become active rather than passive listeners to instruction -Teach students to accept responsibility for listening comprehension -Teach students listening behaviors such as physical posture	• Students make connections with what is being heard, increasing retention • Students learn how to avoid or prevent pitfalls in the communicative environment • Students demonstrate appropriate listening behaviors with peers in discussions as well as teacher directed instruction • Students ask questions to seek clarification to enhance learning

TARGETED LEVEL

(includes all of the above plus those below)

STRATEGY	BENEFIT
Teach and model self-advocacy so student learns to identify obstacles for learning and understands appropriate time and manner to approach the teacher	• Student learns how the environment impacts access to instruction and identifies compensatory strategies to increase access
Teach and model organizational skills to promote use of planners	• Student develops good organizational skills to find materials, manage assignments, and complete work
Encourage use of visualizing skills	• Student activates visual modality to supplement auditory modality.
Use of peer note-taker	• Student accesses additional student notes

INTENSIVE / INDIDUALIZED LEVEL

(includes all of the above plus those below)

STRATEGY	BENEFIT
Teach awareness of communication breakdown	• Student learns to recognize need for communication repair strategies
Teach specific chunking skills	• Student learns to chunk information from word to complex sentence level
Teach visualizing skills	• Student uses visualization to increase recall and comprehension of auditory information
Teach subvocalizing skills	• Student uses subvocalizing skills (auditory rehearsal) to increase auditory recall
Encourage and promote use of technology to increase access to instruction such as personal FM system, note-taking system, voice recorder, captioning	• Student is aware of needs and uses technology and other accommodations to increase access

[1] Hamaguchi, P.M., (2002) *It's Time to Listen: Metacognitive activities for improving auditory processing in the classroom.* Austin, TX: Pro-Ed; Hamaguchi, P.M. (2003) *A Metacognitive Program for Treating Auditory Processing Disorders.* Austin, TX: Pro-Ed

Parent Tips for Communicating at Home[1]

1. Set aside specific times during the day to work with your child. Let these times be for you and your child to work one on one.

2. Start with short work periods and gradually increase them. A good rule is to stop when your child is at the peak of success. Don't push him or her to the point of failure.

3. Be as objective and patient as you can. Speak to your child in a quiet, firm voice.

4. Give short and simple commands or directions.

5. If a task is too difficult for your child, move on to something easier. Then come back to the first task after changing it so that your child can succeed.

6. When your child is capable of doing a task, gently insist that he or she finish it.

7. Be aware of your child's abilities as well as his or her weaknesses. Don't continue using tasks that are too easy for your child. There should be some challenge to hold your child's attention.

8. Praise your child for even the smallest success. Do not emphasize failures.

9. Really listen to your child. Be there when he or she needs your help.

10. Relax with your child. Enjoy your time together.

11. Be honest with your child. Don't say there is nothing wrong. No one knows better than your child that something is wrong with the way he or she learns.

12. Take a positive approach: "There is help. You can learn. Learning might seem slow for a while. But I'm in this with you."

13. The latest and most important tip is this: Be easy on yourself: You didn't create your child's learning disabilities. You can't handle everything at once. You're human. Sometimes you won't have the patience to work with your child. Sometimes you'll feel like giving up. Don't. Ask for help when you need it. Go to your child's doctor, teacher, or school psychologist. Talk regularly with other parents of children with learning disabilities. Remember, *you're not* in this *alone* either.

Specific Difficulties and Helpful Hints For Listening Problems

- *"There's too much going on at once. It's hard for me to really listen."*

    1. Have your child tell you when a sound begins and ends. Stand behind your child and make a noise. Ask your child to raise a hand when the noise stops and to lower it when the noise begins again.

    2. Encourage your child to listen for the direction of a sound. While your child is sitting at a table with eyes closed, ring a bell or make another sound. Ask your child to turn toward the direction the sound is coming from. Begin the activity standing close and then move away to different parts of the room.

[1] D'Antoni, A. et.al. (1978) *A Parent's Guide to Learning Disabilities: Understanding and Helping Your Child.* Continental Press Educational Publishers, 1978 pp. 22-29.

3. Hum a tune or play notes on a piano or other instrument. Have your child tell you when he or she hears a high sound, a low sound, a soft sound, a loud sound, a group of fast notes, or a group of slow notes.

4. Cover small jars (such as baby food jars) with paper. Inside put various things to shake: coins, macaroni, salt, etc. Be sure the things make different sounds. Put a sample of each thing on a table. Then have your child shake each jar and match the sound with the correct sample.

- *"I can't remember what certain things sound like. And I can't tell if sounds are the same or different."*

1. Have your child match sounds with the objects or people that make them.

   a. Have your child listen to objects that make sounds, such as a doorbell, an alarm clock, or an oven timer. Imitate the sounds and have your child do the same.

   b. Point to objects around the house that sounds, such as a faucet, a pocket watch, or an electric mixer. Ask you child to imitate the sound of each one.

   c. On a table, place various objects that make noise. Have your child turn around while you use one of them. For example, blow a whistle, ring a bell, crumble paper, or hit a board with a hammer. Then have your child pick out the correct object and repeat the sound.

   d. Ask your child to identify familiar voices on the telephone or on tape recordings.

2. Have your child tell you whether two sounds are the same or different. Start with very different sounds, such as a clap and a whistle. Gradually work up to similar sounds, such as a pencil tapping against wood and a pencil tapping against glass.

3. Help your child identify beginning letter sounds.

   a. Say the beginning sound of a letter, such as "b". Have your child look through an old magazine to find three pictures whose names begin with the "b" sound.

   b. Say three words (cow, pan, call) and have your child tell which two have the same beginning sound.

   c. Say three words (tell, talk, run) and have your child tell which one has a different sound.

4. Help your child identify word sounds.

   a. Say a word, such as sun, and have your child repeat it. Then say three words (horse, play, sun) and have your child clap when he or she hears sun.

   b. Say three words (barn, run, girl) and have your child clap when he or she hears a word that rhymes with sun.

- *"I can't remember what I hear."*

1. Tap out simple rhythm patterns with your fingers or clap your hands in a pattern. Ask your child to repeat the patterns. Gradually make the patterns more difficult.

2. Read a short list of four words to your child. First ask how many words were in the list. Then read the list again and ask what words were in it. Start with related words (milk, apple, cake, bread). Gradually begin to use related words and numbers.

3. Have your child listen to a radio or television report and remember to tell you a specific item, such as the time, the weather conditions, the score of a game, etc.

4. Go over the words of a short song or a poem very slowly. Ask your child to repeat short phrases after you. Discuss the meaning of difficult words and sentences to be sure your child understands them. Help your child repeat longer phrases until he or she can say the entire song or poem.

- "*I don't always understand what words mean."*

1. Try to face your child when talking. Your expressions will help him or her understand what you mean.

2. Talk with your child about the meaning of jokes and riddles.

3. Read a story with your child every day. Ask questions about the story, letting your child tell you about his or her favorite part, the funniest part, the scariest part, and so on.

4. While reading a familiar story to your child, occasionally insert nonsense sentences or sentences that have nothing to do with the tale. Ask you child to listen for the sentences that do not belong and to tell you about them.

- "*I can't follow directions."*

1. *Tell* your child how to do things instead of *showing* him or her. Use simple, familiar words in your directions and allow enough time for your child to respond. Begin with one direction at a time, building up slowly to a series of directions: "Toast a piece of bread. Spread butter on it. Sprinkle it with cinnamon and sugar."

2. Have your child write simple directions as you give them: "Open the door." "Turn on the light." "Carry out the trash." This exercise will help your child write homework assignments in school. If your child cannot write yet, have him or her draw simple pictures of the series of directions. Then have your child carry them out.

3. Play "Simon Says" with your child. Tell your child to move a certain way (to hop on one foot, take two steps forward, and so on). If you say "Simon Says" first, your child should follow your directions. If you do not say "Simon Says," your child should stand still.

- *"It's hard for me to make my sentences make sense."*

1. Emphasize associations by having your child finish incomplete sentences: "I carry an umbrella when it _____. " "I clap with my_____." "I went to the grocery store and bought _____."

2. Really talk with your child for a few minutes each day. Give him or her full attention and listen carefully. Ask questions about what your child likes and dislikes, what happened in school, what games your child plays. Remember to encourage the use of complete sentences.

3. Have your child describe the objects and people he or she sees while riding in a car or bus: "Look out the window and see if you can find anything that's big. Tell me in a sentence what you see that is small."

APPENDIX F. FORMS
Auditory Processing Assessment Profile

Name:_____ DOB:_____ CA:_____ Date:_____

	Below Average				***Average***											***Above Average***			
Standard Deviation	-3			-2			-1			0			+1			+2			+3
Standard Score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	55			70			85			100			115			130			145
Percentile Rank			1	5	10		20	30	40	50	60	70	80		90	95	99		
AUDITORY:																			
LANGUAGE:																			
COGNITIVE:																			
SOCIAL/EMOTIONAL:																			
EDUCATIONAL:																			

OBSERVATIONS/COMMENTS:

Referral for Auditory Processing Assessment

Student Name_____School_____Date_____

Date of Birth_____Grade_____ ID#_____Sex___IEP Date_____

Referred By_____Position_____Phone #_____

Name and Phone # of person with whom to schedule the appointment_____

_____

When referring for an auditory processing assessment, the following must occur **PRIOR** to the assessment and should be considered **only after the diagnostic evaluations have been conducted and examined.** Please check and complete the following information. All information will be kept confidential. Feel free to attach any additional information which you think may be helpful. Thank you.

REFERRAL CRITERIA
Please confirm ALL of the following:

- ❑ The student has passed a hearing screening in the past year
- ❑ The student is seven years of age or older
- ❑ The student is English proficient; APD assessments are normed on native English speakers
- ❑ The student has intelligible speech according to the Colorado Severity Rating Scale; if speech is not intelligible, it will be difficult to differentiate a production error from a processing error
- ❑ The student's cognitive function (non-verbal scales) is within the average range
- ❑ The student has participated in at least two RtI interventions without measurable progress; or the student is already on an IEP but demonstrating limited progress

REFERRAL CHECKLIST
All of the items below must be ATTACHED to this referral. Please do not submit until all items have been checked off.

- ❑ APD Referral Checklist (this form)
- ❑ Auditory checklist completed by the classroom teacher, special educator, and parent
- ❑ Current speech/language assessment
- ❑ Current educational assessment
- ❑ Current psychological assessment
- ❑ Current health history

Please state specific referral concerns_____

_____

_____

_____

_____

_____

_____

Classroom Performance / Impact Questionnaire[1]

Student's Name: _____ School: _____ Date of Birth: _____ Grade: _____ Teacher: _____

Case Manager: _____Speech Pathologist: _____ Provider Interviewed: _____

Classroom Concerns (check all that are concerns, then prioritize top 3)

___ listening in large group
___ participation in large group
___ sustained attention
___ memory/retention
___ work completion
___ homework completion
___ social skills/friendships
___ cognitive shift/flexibility
___ work accuracy
___ organizational skills
___ low frustration level
___ anxiety
___ risk taking
___ impulsive/ lack of inhibition
___ learns poorly from auditory channel (visual is stronger)

___ **listening/language processing (check all that apply then prioritize top 3**)
- ___ difficulty listening __ small group __ large group __ 1:1
- ___ difficulty understanding age appropriate vocabulary
- ___ difficulty understanding directions __simple__ complex
- ___ difficulty understanding complex language (longer sentences)
- ___ difficulty paraphrasing/summarizing
- ___ difficulty answering questions accurately
- ___ difficulty retelling stories
- ___ needs extra wait time to answer questions
- ___ difficulty with immediate recall
- ___ difficulty with immediate recall but will answer later
- ___ confuses sounds/words with others
- ___ difficulty localizing sounds
- ___ difficulty with abstract language (figurative language)
- ___ difficulty participating or maintaining relevancy in discussions

describe accommodations or interventions that are successful (i.e. getting eye contact, moving closer to redirect, cueing transitions, etc.)

___**sustained attention (check all that apply)**
- ___easily distracted ___noise ___visuals___ items within reach
- ___day dreams/stares off
- ___gets started but loses focus during task___
- ___needs constant prompts/reminders to complete work
- ___difficulty following directions during transitions
- ___doesn't pay attention to detail __auditory __visual
- ___loses train of thought while talking

describe typical distracters and accommodations that are successful

___ **working memory (check all that apply**)
- ___ difficulty repeating directions __simple __complex
- ___ difficulty repeating directions with slight delay
- ___ difficulty recalling information auditorally when delayed
- ___ difficulty remembering instructional sequences (e.g. long division)
- ___ difficulty recalling details __ auditory __ visual
- ___ difficulty recalling order __first ___last __middle
- ___ difficulty following classroom procedures/knowing routines
- ___ memorization of rote facts __auditory __visual
- ___ difficulty recalling usual details __ auditory __visual
- ___ long term memory concerns

___ **thinking/reasoning concerns**
- ___ difficulty with abstract concepts
- ___ difficulty solving problems
- ___ difficulty understanding cause/effect
- ___ difficulty reading non-verbal cue
- ___ difficulty generalizing concept

___ **reading concerns**
- ___phonics ___decoding/word attack ___vocabulary ___sight words
- ___comprehension (indicate which is most impacted) ___fluency

describe interventions (especially if phonics/word attack is checked)
describe impact of environment, length of text on comprehension

___ **math concerns**
- ___ difficulty aligning numbers (computation)
- ___ difficulty with visual relationships (i.e., $=dollar signs)
- ___ difficulty using space

___ **writing concerns**
- ___ difficulty copying
- ___ difficulty planning/formulating ideas
- ___ difficulty with organization and content
- ___ difficulty with spelling (describe errors: ___ words sounded out
  - ___ words have beginning/end sounds but errors in middle
  - ___ some recognizable error patterns ___ consonants ___ vowels
  - ___ no recognizable error patterns but words have correct length)
- ___ difficulty with handwriting

describe interventions (especially if spelling is checked or if lack of progress/ retention is a concern)

[1] CPI Questionnaire © 2008 Donna Massine

CPI Questionnaire - Page 2 Name: _____

___ **metacognition (check all that apply)**
- ___ unaware when not understanding instruction
- ___ unaware when not following directions accurately
- ___ gets stuck on one approach/solution
- ___ unaware of resources or ways to seek help
- ___ doesn't attempt to resolve problems, waits for help
- ___ doesn't check or edit work

___**task initiation (check all that apply)**
- ___ difficulty getting started but completes task once it is begun
- ___ needs redirection (__can't repeat ___can repeat, ___doesn't start)
- ___ difficulty starting task with incomplete previous task
- ___ difficulty following directions during transitions
- ___ watches peers for additional cues to begin work
- ___ needs assurance before starting (hesitates with taking risks)
- ___ waits for personal redirection before starting (learned behavior)

___**organization concerns**
- ___ difficulty tracking assignments
- ___ difficulty remembering order/sequence
- ___ difficulty finding materials (misses directions)
- ___ difficulty remembering to write assignments down
- ___ difficulty keeping belongings neat/appropriate place
- ___ difficulty keeping backpack organized
- ___ difficulty with home/school communication

___**time management concerns**
- ___ difficulty breaking assignments into smaller steps
- ___ difficulty developing a timeline (plan)
- ___ difficulty finishing task in time given
- ___ difficulty using time efficiently
- ___ gets started but loses focus during task

___**emotional regulation/self control/ inhibition concerns**
- ___ becomes easily upset
- ___ acts impulsively (verbally or physically)
- ___ interrupts others
- ___ difficulty waiting for turn
- ___ anxious

___ **motor concerns**
- ___ difficulty with writing (legibility)
- ___ awkward, clumsy (bumps into things)
- ___ balance
- ___ difficulty crossing midline

___ **environment issues**
- ___ classroom placement next to noisy area (gym, band/music room)
- ___ classroom located in portable
- ___ classroom has poor acoustics (i.e. no carpet, HVAC, windows, hall noise)
- ___ number of students in classroom ___ single grade
  ___ multi grade
- ___ current seating arrangement/placement in class

Strengths *Describe what the student can do well.*

Describe what approaches/strategies have worked well.

Additional notes/observations: *(previous history-frequent ear infections, sensory integration/attention issues)*_____

Auditory Processing Case History

Date: _____

General History

Student's Name:_____ Date of Birth:_____Age: _____

Person completing form:_____ Relationship to student:_____

Mother's Name:_____Father's Name:_____

Home Address:_____ Phone:_____

City:_____State:____Zip code:_____Email: _____

Languages spoken in the home: _____

Student's primary language: _____ Is the student right or left-handed? _____

Please list the # and ages of student's siblings: _____

Does anyone in the family (parents, siblings, aunts, uncles, etc) have a similar problem?_____ If yes, please describe _____

Has the student been seen in this department before? _____ If yes, when? _____

Educational Information

Grade: _____ School: _____Teacher or school contact: _____

Classroom type: traditional _____ portable _____ open pod _____

Is the student's school performance: Above average_____ Average_____ Below average_____

Has student repeated a grade?____Which grade(s)?_____Is student frequently absent from school?_____

Does the student struggle in any subjects? ___ If yes, please list _____

Does the student excel in any subjects?____If yes, please list _____

Does the student receive any special education services? _____ If yes, what services? _____

_____

Does the student have any learning problems? _____If yes, please explain _____

_____

_____

Does the student have any speech-language problems? _____ If yes, please explain _____

_____

_____

Processing Concerns

Does the student have a problem listening or understanding? _____ If yes, please describe the problem: _____

_____

_____

_____

_____

When was the problem first noticed?_____

What treatment has the student received for this problem? _____

_____

_____

What questions would you like answered about the student's problem?_____

_____

_____

_____

Developmental/Medical History

Please indicate if the student has experienced any of the following:

____ Premature Birth

____ Problems before, during or after birth

____ Hyperbilirubinemia/Jaundice

____ Bacterial Meningitis

____ Congenital or perinatal infections

____ Asphyxia/lack of oxygen at birth

____ Mechanical ventilation

____ Head or neck abnormalities

____ Fetal Alcohol Syndrome

____ Delays in development

____ Fever over 104 degrees

____ Currently takes medication

____ Known hearing problems

____ Speech-language difficulties

____ Sensory Integration Issues

____ Autism Spectrum Disorder

____ Attention Deficit Hyperactivity Disorder

____ Syndromal abnormality

____ Serious illness or accidents

____ Ear problems (Including: infections, eardrum perforations, wax, drainage, ear pain)

____ Ear surgeries (i.e. tubes, etc.)

If your child has experienced any of the above, please explain (include specific treatment and medications): _____

_____

_____

_____

Behaviors and Characteristics

Please indicate if the student exhibits any of the following:

____ Sensitive to loud sounds

____ Appears to be confused in noisy places

____ Easily upset by new situations

____ Difficulty following directions

____ Restless/problems sitting still

____ Hyperactive

____ Short attention span

____ Impulsive

____ Easily distracted

____ Daydreams

____ Forgetful

____ Asks for repetition

____ Reverses words, numbers or letters

____ Prefers to play with older children

____ Prefers to play with younger children

____ Prefers to play alone

____ Seeks attention

____ Disruptive or rowdy

____ Temper tantrums

____ Shy

____ Anxious

____ Lacks self confidence

____ Lacks motivation

____ Uncooperative

____ Disobedient

____ Inappropriate social behavior

____ Does not complete assignments

____ Easily frustrated

____ Tires easily

____ Irritable

____ Dislikes school

____ Difficulty understanding the meaning of words

____ Difficulty learning new concepts

____ Difficulty with reading

____ Difficulty expressing ideas

Please provide any additional information to help us understand the student's strengths and challenges.

IEP Accommodations and Modifications for APD

NAME _____ **DOB** _____ **DATE** _____

SCHOOL _____ **ID** _____ **GRADE** _____

The following accommodations and modifications are recommended for this student to improve access to auditory information and are specific to the student's APD profile. Accommodations are in regular print; modifications are italicized.

ENVIRONMENT

- ❑ Quiet, acoustically appropriate classroom
- ❑ Reduce/minimize distractions:
  Visual _____ Auditory _____
  Spatial _____ Movement_____
- ❑ Appropriate seating

PACING

- ❑ Decrease rate of speaking and delivery of instructions; use pauses before and after important points, emphasize critical information
- ❑ Extend time requirements for processing, responding and task completion
- ❑ Send school text, materials home for preview/review

PRESENTATION OF MATERIALS

- ❑ Obtain student's attention prior to delivery of information
- ❑ Monitor student for fatigue/length of attending time; provide breaks if necessary
- ❑ Present demonstrations (model)
- ❑ Utilize manipulative/hands-on instruction
- ❑ Pre-teach vocabulary
- ❑ Use visual sequences/pictorial directions
- ❑ Use outlines, overheads, graphic highlighting, organizers (e.g. highly structured)
- ❑ Provide animated, expressive teaching
- ❑ Repeat; do NOT rephrase information
- ❑ Rephrase; do NOT repeat information

ASSIGNMENTS

- ❑ Give directions in small, distinct steps
- ❑ Use written back-up for oral directions
- ❑ Give extra cues or prompts
- ❑ *Adapt worksheets, packets according to student's capabilities*

MATERIALS

- ❑ Use supplementary materials
- ❑ Provide note taking assistance; copy of notes from another student

SELF-MANAGEMENT/FOLLOW THROUGH

- ❑ Use visual daily schedule and calendars
- ❑ Train students to "look and listen"
- ❑ Check often for understanding/review
- ❑ Have student repeat directions
- ❑ Use study sheets to organize material
- ❑ Design/write/use long term assignment timelines
- ❑ External organizational aids (e.g., lists, outlines, planners)

TESTING ADAPTATIONS

- ❑ Use pictures
- ❑ Read test to student
- ❑ *Paraphrase instructions and test items*
- ❑ Preview language of test questions
- ❑ Administer test by resource person
- ❑ Extend time frame
- ❑ *Vary amount to be tested*
- ❑ *Vary grading system*
- ❑ *Vary response expectations*

SOCIAL INTERACTION SUPPORT

- ❑ Provide peer partners
- ❑ Incorporate cooperative learning group
- ❑ Utilize home-school communication notebook

HEARING ASSISTANCE TECHNOLOGY

- ❑ Use personal system _____
- ❑ Use classroom system _____

OTHER STRATEGIES

_____

_____

_____

_____

_____

_____

Tips for Teachers: Suggestions for Successful Management of Students with Auditory Processing Deficits (APD)

The student with a central auditory processing deficit (APD) will respond in a variety of ways to changes within his or her environment and/or instructional program. Management suggestions identified for a student with APD should be based on the student's individual profile of auditory processing strengths and weaknesses. Suggestions in this listing are in the areas of attention, preferential seating, instructions, preview and review, time, classroom adaptations, self-advocacy, and organizational strategies. The audiologist has selected those strategies most appropriate for the student's APD profile.

STUDENT_____ SCHOOL _____GRADE:_____

ATTENTION

❑ **Gain bi-sensory attention**
Gain the student's visual as well as auditory attention before speaking with him or her. Auditory processing is maximized when the same information is received simultaneously through different modalities.

❑ **Speak at eye level**
Whenever possible, speak at the student's eye level, get close to the student, and face the student to provide clear visual and auditory information.

❑ **Use cueing**
Develop a cueing system to help students become aware of times when they are not paying attention. These "pre-tuning" techniques help to focus the student's attention on the subject coming up. Use words such as "listen," "ready," and "remember this one."

❑ **Assign peer partners**
Assign a peer partner to the student with APD. The peer partner can assist the student in activities such as paying attention, getting assignments listed, participating in small group projects, and tuning in for key information. Peer tutoring may also be a part of the buddy system if appropriate.

❑ **Mark transitions between activities**
Define transitions between activities by clearly identifying the new activity by naming and explaining the sequence of steps needed to accomplish the task. Students with auditory processing difficulties often need more time to make transitions.

❑ **Review and transition**
Close activities clearly by briefly summarizing what the student should have learned and/or completed before transitioning to the next activity.

❑ **Provide note-taking assistance**
Provide a copy of another student's notes, get a copy of the teacher's notes, have a study guide, and/or be able to tape record the lesson for future reference and study. Watching the teacher and taking notes simultaneously is challenging for students with auditory processing deficits.

FLEXIBLE, PRIORITY SEATING

❑ **Provide priority seating distance**
Seat the student near the primary sound source (e.g., teacher, television, computer, center activity area). A distance of three to four feet is best for individual and small group instruction and access to audio sources, but a distance up to six to eight feet for large group instruction should be adequate. This allows the student to derive maximum benefit from both auditory and visual information cues.

❑ **Avoid seating near noise sources**
Place the student away from competing or distracting noise sources (e.g., external noise sources, bathroom area, telecommunications equipment, and aquarium). Seating away from windows and doorways also will reduce possible sources of distraction.

❑ **Provide better ear option**
Seat the student so that the better ear, if indicated, is directed toward the primary sound source. (The audiologist will provide this recommendation if appropriate.)

❑ **Allow flexible seating option**
Permit flexibility in seating to continuously achieve the best seating advantage. This enables the student to attend and actively participate as the classroom activities and the teacher or other primary sound source change location.

❑ **Provide quiet study/work area**
Make available a "private" or isolated area, such as a study carrel, for individual seatwork, testing, or tutoring. This helps to minimize the student's problems in foreground/ background discrimination.

❑ **Use daily routines**
Use daily routines or schedules to help keep the student focused and organized.

❑ **Use earplugs**
Allow the student to use earplugs or earmuffs during individual seatwork time to help tune out distractions. (The audiologist will provide this recommendation if appropriate.)

❑ **Use FM system**
Use a personal or sound field FM system to improve access to auditory information, if this is indicated by the student's CAP profile. Students with difficulty hearing in noise, integrating information, or organizing information may benefit from FM amplification. An audiologist should make the recommendation for an FM system. The teacher(s) will receive an inservice on the use of the FM system.

INSTRUCTIONS

❑ **Speak in a clear, well modulated voice**
Speak distinctly, at comfortably loud level, and at a rate the student can follow easily. Vary loudness to increase the student's attention. Remember not to over-exaggerate your speech. Emphasize important information using intonation and stress. Repeat important words when necessary.

❑ **Use natural gestures**
Utilize natural gestures that enhance the message. Avoid extraneous gestures and excessive movement while delivering the message if this appears to distract the student.

❑ **Reduce distractions**
Avoid extraneous noises and visual distractions, especially when giving instructions and teaching new concepts.

❑ **Alert student**
Before giving instructions, stand close to the student, call the student's name, and gently tap the student's shoulder, or use another cue to make sure you have the student's attention. Using the student's name during teaching time also will help to maintain attention.

❑ **Reduce motor activities during instruction time**
Reduce motor activities during verbal presentations, which may be helpful for the student with APD, especially if the student has an integration deficit.

❑ **Define purpose**
State the purpose of each activity clearly and directly before introducing the specific instructions for task completion.

❑ **Give age and ability-appropriate directions**
Give direct and uncomplicated directions. Use age-appropriate vocabulary that clarifies the logical, time-ordered sequence (e.g., first, second, last).

❑ **Repeat direction and allow ample response time**
Repeat each step of the instruction and allow time between each step for the student to process the information.

❑ **Provide examples**
Work on an example together and leave the example on display.

❑ **Use modeling**
Model or demonstrate to help explain student performance expectations.

❑ **Identify key words**
Accentuate key words when speaking or writing, especially when presenting new information.

❑ **Give written and verbal instructions**
Provide both written and verbal instructions to aid the student in following directions and completing tasks.

❑ **List the steps**
List steps on a reference card to help the student with APD learn multi-step sequences. As the student becomes more familiar with the sequence, steps in the written directions may be omitted gradually and systematically until the student is able to complete the sequence automatically without referring to the written cues.

❑ **Encourage student to repeat or paraphrase instructions**
Have the student repeat the content of the instructions to provide comprehension feedback. This technique allows the teacher to see which parts of the instruction need to be corrected or repeated. Ask for verbal accounts rather than a “yes” or “no” response.

❑ **Give positive feedback**
Offer positive feedback to ensure understanding of the message or instruction correctly. Feedback is important even if the student understood only a portion of the message.

❑ **Boost self-confidence**
Reinforce all work performed successfully. Many students with APD lack of self-confidence due to comparisons made by themselves or others about their performance.

❑ **Check instruction comprehension**
Check the student’s work after the first few items to ensure that the student understood and retained the instructions. The teacher should watch for signs of inattention, decreased concentration, or understanding. Periodic comprehension checks (e.g., paraphrasing instructions, main idea, and key points) are helpful to keep the student on task.

❑ **Allow sub-vocalization**
Permit the student to sub-vocalize while reading, to help with reading comprehension, until such time as this is unnecessary.

❑ **Allow reauditorization**
Some students have a need to reauditorize information as they formulate their response. This strategy also strengthens the memory trace.

PREVIEW AND REVIEW

❑ **Review, preview, and summarize class lessons**
For all class lessons, review previous material, preview material to be presented, and help students summarize the material presented. Discuss new and previously introduced vocabulary words and concepts. Whenever possible, relate new information to the student's previous experiences and environment.

❑ **Provide pre-teaching materials and assignments**
Give pre-assigned readings and home assignments to help introduce new concepts and topics.

❑ **Avoid divided attention**
Avoid asking the student with APD to divide his/her attention between listening and taking notes at the same time. Allow student to tape record lessons or provide student with a detailed outline of the information presented in the class lesson.

❑ **Review and orient**
Present a short review statement about the topic(s) to be discussed to orient the student. Write a brief outline and list key vocabulary on the board or an overhead projector. Provide the student with a copy of the outline and key vocabulary to use in following the discussion and for review.

❑ **Summarize key points frequently**
Repeat and summarize key points frequently. Emphasize key vocabulary words during the discussion.

❑ **Give salient clues**
Provide salient clues to identify and emphasize important information (e.g., "This is important," "The main points are…," "This could be a test question.").

❑ **Use verbal review strategies**
Use verbal review strategies to ask questions periodically about the material being presented. This is a helpful topic-maintenance strategy. Verbal review questions should include language required for description, explanation, exemplification, comparison, and relating real events to abstract principles.

❑ **Give individual attention**
Students with APD often need individual attention. Inform resource personnel and parents of planned vocabulary and curriculum topics to be covered in the classroom to allow opportunity for pre-teaching as a supplement to classroom activities.

❑ **Provide references for important pages**
Refer students to important textbook pages for less review and preview.

❑ **Promote class participation**
Encourage participation in expressive language activities related to each lesson. Reading is especially important, since information and knowledge gained through reading help compensate for what may be missed because of auditory difficulties.

TIME

❑ Avoid fatigue

Students with APD often become fatigued more easily than their peers. It is often difficult for the student to attend because of the effort required to keep up and compete in classroom activities. To minimize fatigue, consider the following suggestions:

- Give several short classroom activities instead of one long activity.
- Provide short periods of instruction with breaks so the student can move around if needed.
- Alternate activities requiring greater auditory processing requirements with those that are less demanding.
- Avoid higher level auditory tasks when the student is already fatigued. (Consider presenting high-auditory content information during the morning.)

❑ Allow extended time

Avoid giving penalties for not completing assignments in the prescribed classroom time. Whenever possible, give students fewer items to complete in the amount of classroom time available or give them additional time in the resource room to complete the assignment. Students with APD need more time to comprehend and complete tasks.

❑ Give adequate response time

Allow students with APD more time to formulate responses to verbal questions, especially questions that include comparisons, generalizations, and explanations requiring lengthier and more complex language organization.

CLASSROOM ADAPTATIONS

❑ Record instructions

Class lessons or instructions can be recorded so that the student can listen to and review the material later.

❑ Sound "tune" the classroom

Acoustical modifications may be implemented to create a positive acoustical listening and learning environment (e.g., carpeting, drapes, sound absorbing materials).

❑ Arrange classroom

Structure the classroom to reduce background noise, reverberation, and distractions. Noise interferes with reception of auditory information and distracts the listener from the complex task of processing (e.g., organizing and interpreting) information. Special areas for small group instruction that are relatively quiet and distraction free are helpful for many students.

❑ Avoid open classrooms

Avoid placement of student with APD in open classroom settings. In these settings, reduce distractions by using sound barriers (e.g., bookshelves, flannel boards) and other modifications to improve the listening environment.

❑ Close windows and doors

Keep doors and windows closed to reduce external noise entering the classroom.

SELF-ADVOCACY

❑ Support self-monitoring

Encourage the student to self-monitor the listening environment and identify any problems that may be interfering with the learning process.

❑ **Encourage self-advocacy**

Encourage the student to self-regulate by using strategies to modify conditions and situations that may compromise effective learning. This will assist the student in learning self-regulation strategies and becoming an effective manager of his listening and learning environment.

❑ **Suggest counseling**

If necessary, the student should be referred for counseling for social/emotional concerns as part of the management plan. The student (and parents) needs to understand the nature of the APD and why it is essential to develop compensatory strategies.

ORGANIZATIONAL STRATEGIES

❑ **Use organizer**

Encourage the student to consistently use an agenda book (or other organizer or calendar) to ensure that assignments, upcoming events, and other important class information are recorded.

❑ **Present organizational expectations clearly**

Ensure that the student understands specific organizational expectations for the classroom (e.g., where to place homework, use of folders, required classroom tools). Use cue cards as reminders.

References:

Bellis (1996, 1999); Chermak & Musiek (1997); Boswell (1988); Chermak & Musiek (1997); Colorado Department of Education (1997); Educational Audiology Association (1996); Ferre (1999); Florida Department of Education (1995 and 2001); Hall & Mueller (1997); Johnson, Benson & Seaton (1997); Keith (1996); Matkin (1985); Mayer (1996); Schneider (1992); Strand & West (1994).