

## Auditory Processing Disorders: A Team Approach to Screening, Assessment & Intervention Practices<sup>1</sup>

### Introduction

These guidelines were developed by the Task Force on Auditory Processing (AP) Disorders, facilitated by the Colorado Department of Education. Task force members represented a variety of viewpoints both in work settings and professions reflecting the multidisciplinary nature of central auditory processing disorders. This Task Force was formed as an outcome of a conference on AP disorders in Denver, Colorado in May, 1995 to respond to concerns of professionals with the current status of assessment and remediation of APD in children. A renewed interest in central auditory processing disorders (APD) has been fostered by recent research which has provided 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 AP.

Musiek et al (1990) list the following reasons to conduct AP assessment: (1) to determine if “**medical aspects**” of the disorder exist which are neurologically based and which may require medical treatment, (2) to increase “**awareness**” of the presence of a disorder which can truly affect a child’s ability to learn, (3) to reduce “**shopping around**” by parents for help and understanding of the child’s difficulties, (4) to minimize “**psychological factors**” affecting the child and family as a result of not knowing the cause of the child’s problem, (5) to enable “**insightful educational planning**” to occur once a problem is confirmed and defined, and, (6) to determine interventions which are helpful to the student’s learning process which include “**FM assistive listening devices, auditory training, strategies, and environmental modifications**”. The authors further state that “**audiologists have a responsibility to evaluate the entire auditory system, both peripheral and central, and to consider possible disorders involving both areas...if such evaluation is not possible, referral and/or appropriate counseling about the possibility of a perceptual problem should be recommended**”. Another reason to consider APD assessment is to determine the nature of the linguistic and cognitive processing problems to aid in planning language and educational remediation.

The area of APD remains controversial and complex. While the interactions among language, audition, and cognitive processing are unclear, it is hoped that this document will provide a working base for all school personnel to make more effective decisions regarding AP disorders in children.

### Definition of AP

The operational definition used for these guidelines was the definition developed by the ASHA Task Force on Central Auditory Processing Consensus Development (1996) (see Appendix A.).

### APD & Special Education Eligibility

Students who are suspected of having APD or who are diagnosed with APD should be considered for special education services 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 perceptual communicative disorder [ECEA 2.02(6) (b) (i)] “*difficulty with cognitive and/or language processing*”, or a type of speech-language disability [ECEA 2.02(7) (a) (ii)] “*auditory processing, including...perception (discrimination, sequencing, analysis and synthesis) association, and auditory attention*. To qualify for special education and related services, the disorder must interfere with the student’s ability to obtain reasonable benefit from regular education (see Appendix B for the full text of the Rules).

### Purpose of Guidelines

These guidelines were developed to provide professionals who work with children with AP disorders “best practices” to assist with identification and intervention. As with most guidelines, they represent the best of what we know at this time; 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 very conscious effort was made to insure 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.

### How to use these Guidelines

These guidelines should be used to make decisions regarding the potential evaluation needs of the child. Although it is recommended that observation data (Level I) be obtained, some children may present with

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such significant concerns, that assessment (Level II) is warranted as the initial point of entry. 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 procedure result in an intervention plan which is effective for the child, then further assessment may not be necessary at that time. However, if the intervention strategies are not effective, additional evaluation may be required to develop a more specialized treatment program. Level III assessment should be necessary for only a very small number of students who display unusual symptoms or characteristics of neurological disorders.

The guidelines are set up to consider increasingly more diagnostic procedures as is suggested by the interpretation questions at each level (observation, screening and preliminary assessment, and diagnostic assessment). This approach parallels the school child identification process beginning with the child study review (use of AP Observation Procedures) to psychoeducational assessment (AP Assessment Procedures).

**Special Considerations**

Prior to assessment of AP, certain factors must be considered to determine the appropriateness of the screening and evaluation. These include:

- (1) peripheral hearing-hearing acuity must be normal or child cleared by an audiologist prior to considering AP testing
- (2) age of the child-screening is generally not appropriate until a child is 3 or 4, assessment until 7 or 8 yrs; age criteria recommended with each screening or assessment instrument should be followed; age criteria is important as it reflects the developmental component of the central auditory pathways and resulting developmental abilities of the child; [current AP measures normed on young children (3 & up) are the SCAN (Keith, 1986), SAAT (Cherry, 1980) and the PSI (Jerger & Jerger, 1984); the TAPS (may be used for 4 & up)].
- (3) cognitive ability- performance on central auditory tasks are affected by cognitive ability; therefore any child assessed must have cognitive ability within a normal range.
- (4) language competence- children with poor language skills will generally have more difficulty on AP tasks, particularly those which require more sophisticated language processing (i.e. linguistically loaded); results must be interpreted carefully and extra caution is recommended with bilingual students.
- (5) validity & 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.
- (6) test interpretation & scoring-test manual procedures and interpretation must be adhered to and considered along with the results of the multidisciplinary assessment.
- (7) multidisciplinary assessment- the intent of these guidelines is to look holistically at the child; AP 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.

**Re-evaluation Recommendations**

AP skills should be re-evaluated at a minimum of every three years timed to coincide with triennial assessments if the child receives special education and/or related services. Preschool-age children, children 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 or as the situation warrants.

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**I. Observation Procedures**

- Purpose:
1. To identify children who may have behaviors associated with APD.
  2. To identify and implement general intervention strategies which may assist in the child's classroom functioning (Appendix D).
  3. To identify children who may need further assessment.

<b>OBSERVATION PROCEDURES</b>				
<u>Auditory</u>	<u>Language</u>	<u>Psychological</u>	<u>Educational</u>	<u>Other</u>
<ul style="list-style-type: none"> <li>• hearing acuity must be normal or candidate cleared by an audiologist prior to considering AP testing;</li> <li>• auditory behavior checklist (choose one of the following): →Fisher's Auditory Problems Checklist →CHAPPS (Children's Auditory Processing Performance Scale) →Observation Profile of Classroom Communication (Sanger)</li> <li>• optional: parent checklist, student self- checklist</li> </ul>	<ul style="list-style-type: none"> <li>• Observation checklist (Loban's Oral Language Scales)</li> <li>• The Classroom Communication Skills Inventory (Psych Corp)</li> </ul>	<ul style="list-style-type: none"> <li>• behavior checklist (choose one of the following): →Connor's Behavior Rating Scale →BASC (Behavior Assessment for School Age) →ACTeRS</li> </ul>	<ul style="list-style-type: none"> <li>• review class work, report cards, district assessments</li> </ul>	<ul style="list-style-type: none"> <li>• review of health records for health history &amp; otitis media</li> <li>• review of performance on existing interventions</li> <li>• consideration of social/family/environment factors</li> </ul>

**Observation Interpretation**

1. What behaviors does the child exhibit which may be indicative of or associated with APD difficulties?
2. How did the child respond to intervention strategies?
3. Is further assessment needed?
  - a. Should it be preliminary or diagnostic?
4. What factors need to be considered for further assessment?
  - a. age of child
  - b. cognitive status
  - c. speech/language competence/limited English proficiency
  - d. Other factors: attention/distractibility, social emotional/developmental maturity, motivation, motor skills

**II. Assessment Procedures**

Purpose: 1. To determine the presence of a AP disorder.

2. To develop and implement an individual therapeutic intervention plan (Appendix H).

Note: Appropriate instruments should be chosen to assess each functional area.

SCREENING & PRELIMINARY ASSESSMENT PROCEDURES				
Auditory	Language	Psychological	Educational	Other
<ul style="list-style-type: none"> <li>• SCAN / SCAN-A</li> <li>• TAPS (Test of Auditory Perceptual Skills)</li> <li>• ACPT (Auditory Continuous Performance Test)</li> <li>• SAAT (Selective Auditory Attention Test)</li> <li>• PSI (Pediatric Sentence Intelligibility)</li> </ul>	<p>purpose one:</p> <ul style="list-style-type: none"> <li>• STAL (Screening Test of Adolescent Language)</li> <li>• CELF-screening (elem. students)</li> <li>• informal speech/language sample</li> </ul>	<p>mination is to rule in/rule out another diagnosis that may look like APD</p> <ul style="list-style-type: none"> <li>• Achenbach Child Behavior Scale</li> <li>• SNAP IV</li> <li>• Beery Visual-Motor Integration</li> <li>• Beck Depression Inventory</li> <li>• social-emotional &amp; family considerations</li> <li>• Auditory-verbal memory perception</li> </ul>	<p>amination is to determine if APD is manifested in the classroom/academic program</p> <ul style="list-style-type: none"> <li>• nationally normed tests, district standardized assessments</li> <li>• classroom observations</li> <li>• multiple validations within classroom/school performance</li> </ul>	<ul style="list-style-type: none"> <li>• Developmental Health HX</li> <li>• review of previous treatment/management interventions</li> <li>• parent checklist</li> </ul>
<b>DIAGNOSTIC ASSESSMENT PROCEDURES</b>				
<p>Test Battery<sup>2</sup> - to be completed by audiologist; choose at least one from each of the following areas unless otherwise indicated:</p> <ul style="list-style-type: none"> <li>• Dichotic - (use one of each): linguistically loaded (SSW, competing sentences, SSI-CMM) &amp; non-linguistic loaded (dichotic digits, dichotic cv's, dichotic rhyme)</li> <li>• Low redundancy monaural speech (LPFS, time compressed speech, time compressed speech + reverberation)</li> <li>• Temporal processing (frequency patterns and/duration patterns)</li> <li>• Binaural interaction (binaural fusion, masking level differences) Speech-in-noise (SSI-ICM)</li> </ul>	<ul style="list-style-type: none"> <li>• TOLD-3</li> <li>• LAC</li> <li>• EOWVT</li> <li>• PPVT-3 or ROWVT</li> <li>• WORD-R</li> <li>• Test of word Knowledge</li> <li>• CELF-3</li> <li>• Detroit II</li> <li>• Woodcock Language Proficiency Battery</li> <li>• Test of Word Finding</li> <li>• TOAL-2</li> <li>• Fullerton Language Test for Adolescents</li> <li>• Analysis of Language of Learning: Practical Test of Metalinguistics</li> <li>• Language sample</li> <li>• Oral &amp; Written Language Scales (OWL)</li> <li>• Test of Problem Solving</li> </ul>	<p>mination is to rule in/rule out another diagnosis that may look like APD</p> <ul style="list-style-type: none"> <li>• WISC-III</li> <li>• Woodcock-Johnson-R (cognitive)</li> <li>• Kaufman ABC</li> <li>• Stanford-Binet IV</li> <li>• Boder</li> <li>• MAT (Matrix Analogies Test)</li> <li>• emotional-social considerations (interview/observation)</li> <li>• Detroit III (preschool, school age or adult)</li> <li>• DAS (Differential Abilities Scale), Fisher et al, Psych Corp</li> </ul>	<ul style="list-style-type: none"> <li>• Weschler Individual Achievement Test (WIAT)</li> <li>• Woodcock-Johnson Achievement Battery-Revised</li> <li>• IRI - (Informal Reading Inventory)</li> <li>• GORT (Gray Oral Reading Test III)</li> <li>• WRAT-3</li> <li>• Bader Reading &amp; Language Inventory</li> <li>• Diagnostic Achievement Battery-2</li> </ul>	<ul style="list-style-type: none"> <li>• Incomplete sentences</li> <li>• interview parents, child, teacher</li> </ul>

**Assessment Interpretation**

1. Based on the multidisciplinary assessment, is there evidence of a AP disorder?
2. Does the severity of the disorder qualify this child for special education and/or related services?
3. What are the characteristics or profile of the AP disorder?

<sup>2</sup>**Caution:** Some of these measures have limited normative data for children. Therefore local clinical norms may need to be established; see test manuals for each instrument for specific age-normative data and test reliability etc.

4. What are the possible services that might be considered for this child; i.e., PCD, speech/language, audiology, counseling, health (determination of services must be made by the IEP team).

**Intervention Recommendations**

1. What are the specific interventions recommended for this child? Consider each of the following areas when developing the treatment plan.
  - classroom management:** environmental accommodations to help the student access information more directly; examples include: specialized seating, noise reduction.
  - instructional modifications and accommodations:** purposeful adaptations made by the teacher to improve the child's opportunity to learn; examples include: one-to-one or small group instruction, paraphrasing.
  - therapy:** direct intervention which is needs driven and is aimed at providing improvement in deficit areas or teaching techniques for learning compensatory strategies; examples include: modality specific adaptations, auditory training.
  - assistive Listening devices:** improvement of the audibility of the sound source (speaker's voice, audio equipment) using FM sound transmission equipment; examples include personal FM systems, sound field FM systems.

See Appendix H for specific intervention information and resources.

**III. Additional Diagnostic Procedures**

Additional assessment may be recommended for children with organic-based problems, traumatic brain injury, syndromes (Fragile X, autism, PDD, metabolic) or for children who demonstrate poor progress with a variety of interventions.

<b>ADDITIONAL DIAGNOSTIC PROCEDURES</b>			
<b><u>Auditory</u></b>	<b><u>Language</u></b>	<b><u>Psychological</u></b>	<b><u>Educational</u></b>
Electrophysiological measures when indicated (ABR, MLR, LEPs, P300, MMN)	<ul style="list-style-type: none"> <li>• Boston Naming Test</li> <li>• additional measures to supplement as needed</li> </ul>	<ul style="list-style-type: none"> <li>• Neuropsychological Battery</li> </ul>	<ul style="list-style-type: none"> <li>• additional measures to supplement as needed</li> </ul>
			<b><u>Other</u></b>

## Appendix A

**ASHA Consensus Statement on Central Auditory Processing<sup>3</sup>****DEFINITIONS**

**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 too 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.

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<sup>3</sup>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**

Regarding Auditory Processing Disorders:

- 2.02 (6) A child with **perceptual or communicative disability** shall have a disorder in one or more of the psychological processes involved in understanding or in using language which prevents the child from receiving reasonable educational benefit.
- 2.02 (6) (a) A basic disorder in the psychological processes affecting language and/or learning may manifest itself in an impaired ability to listen, think, attend, speak, read, write, spell or do mathematical calculations. The term perceptual/communicative disability does not include students who have learning problems which are primarily the result of visual, hearing, or motor handicaps, or limited intellectual capacity or significant identifiable emotional disability, or who are of environmental, cultural, or economic disadvantage.
- 2.02 (6) (b) Criteria for perceptual or communicative disability preventing a child from receiving reasonable educational benefit from regular education shall include documentation of both.
- 2.02 (6) (b) (i) A disorder in the psychological process which affects language and learning consisting of:
- Significant discrepancy between estimated intellectual potential and actual level of performance.
  - **Difficulty with cognitive and/or language processing.**
- 2.02 (6) (b) (ii) And significantly impaired achievement in one or more of the following areas:
- Prereading and/or reading skills.
  - Reading comprehension.
  - Written language expression, such as problems in handwriting, spelling, sentence structure and written organization.
  - Comprehension, application and retention of math concepts.

- 2.02 (7) A child with **speech-language disability** shall have a communicative disorder which prevents the child from receiving educational benefit from regular education.
- 2.02 (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:
- 2.02 (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).
  - 2.02 (7) (a) (ii) **Auditory processing, [including sensation (acuity)], perception (discrimination, sequencing, analysis and synthesis) association and auditory attention.**
  - 2.02 (7) (a) (iii) Deficiency of structure and function of oral peripheral mechanism
  - 2.02 (7) (a) (iv) Articulation including substitutions, omissions, distortions or additions of sound.
  - 2.02 (7) (a) (v) Voice, including deviation of respiration, phonation (pitch, intensity, quality), and/or resonance.
  - 2.02 (7) (a) (vi) Fluency, including hesitant speech, stuttering, cluttering and related disorders.
  - 2.02 (7) (a) (vii) **Problems in auditory perception such as discrimination and memory.**
- 2.02 (7) (b) Criteria for a speech-language disability preventing a child from receiving reasonable educational benefit from regular education shall include:
- 2.02 (7) (b) (i) Interference with oral and/or written communication in academic and social interactions in his/her primary language.
  - 2.02 (7) (b) (ii) Demonstration of undesirable or inappropriate behavior as a result of limited communication skills.
  - 2.02 (7) (b) (iii) The inability to communicate without the use of assistive, augmentative/alternative communication devices or systems.

## Appendix C

**Typical Behaviors of Children “at risk” for APD<sup>1</sup>**

- says “huh” or “what” frequently
- gives inconsistent responses to auditory stimuli
- often misunderstands what is said
- constantly requests that information be repeated
- has poor auditory attention
- is easily distracted
- has difficulty following oral directions
- has difficulty listening in the presence of background noise
- has difficulty with phonics and speech sound discrimination
- has poor auditory memory (span and sequence)
- has poor receptive and expressive language
- gives slow or delayed response to verbal stimuli
- has reading, spelling, or other academic problems
- confuses words that sound alike
- learns poorly through the auditory channel
- exhibits behavior problems

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<sup>1</sup> Adapted from: Keith, R. , (1986). *SCAN: A screening test for auditory processing disorders*. San Antonio, TX: The Psychological Corporation.

## Appendix D-1

### **Guidelines for Classroom Management of Children with Auditory Processing Deficits<sup>1</sup>**

Children with auditory processing deficits typically demonstrate one or more of the following problems:

- Poor auditory attending skills
- Deficits in foreground/background discrimination
- Limitations in auditory memory and retrieval
- Delays in receptive auditory language development

These guidelines are based on strategies designed to minimize the impact of such problems upon academic achievement.

1. **Classroom Placement.** Determine the available options for classroom placement. Consider such critical factors as: the acoustics of the classroom relative to noise level and reverberation, the amount of structure within the classroom and teacher's communication style. In general, a self-contained structured situation is more effective for children with auditory deficits than an open, unstructured teaching environment.
2. **Look and Listen.** Children with even mild auditory problems function much better in the classroom if they can both look and listen. Therefore, preferential seating is a major consideration in managing such children.
3. **Classroom Seating.** Children with auditory deficits should be assigned seats away from hall or street noise and not more than 10 feet from the teacher. Such seating allows the child to better utilize hearing and visual cues. Flexibility in seating better enables the child to attend and actively participate in class activities.

In some cases, central auditory testing by the audiologist will reveal a significant difference in processing skills between the child's two ears. In such an instance, preferential classroom seating so the child can favor the better ear is recommended.

Some audiologists also will recommend plugging the poorer ear with a custom earplug or earmuff as a means for improving the child's auditory function. At present there is no significant research either to support or refute this practice.

4. **Gain Attention.** Always gain the child's attention before giving directions or initiating class instruction. Calling the child by name or a gentle touch will serve to alert the child and to focus attention upon the classroom activity.
5. **Check Comprehension.** Ask children with an auditory deficit questions related to the subject under discussion to make certain that they are following and understanding the discussion.
6. **Rephrase and Restate.** Encourage children with auditory processing problems to indicate then they do not understand what has been said. Rephrase the question or statement since certain words contain sounds or blends that are not easily discriminated. Also, most children with auditory problems have some delay in language development and may not be familiar with key words. by substituting those words and simplifying the grammar, the intended meaning may be more readily conveyed.

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<sup>1</sup> Adapted from: Noel D, Matkin, Ph.D. Director, Children's Hearing Clinic, University of Arizona

7. **Use Brief Instructions.** Keep instructions relatively short; otherwise, the child with a limited auditory memory span will be lost.
8. **Pre-tutor Child.** Have Auditorially-impaired children read ahead on a subject to be discussed in class so they are familiar with new vocabulary and concepts, and thus can more easily follow and participate in classroom discussion. Such pre-tutoring is an important activity that the parents can undertake.
9. **List Key Vocabulary.** Before discussing new material, list key vocabulary on the blackboard. Then try to build the discussion around this key vocabulary.
10. **Visual Aids.** Visual aids help children with limited auditory skills by capitalizing upon strengths in visual processing and thus providing the auditory/visual association often necessary for learning new concepts and language.
11. **Individual Help.** The child with auditory deficits needs individual attention. Whenever possible, provide individual help in order to fill gaps in language and understanding stemming from the child's auditory problems.

One controversial practice is to attempt to develop specific auditory skills such as closure or memory span through direct training. Again, research is lacking to support this practice.

12. **Quiet Study Areas.** Provide an individual study area relatively free from auditory and visual distractions. Such an area helps minimize the child's problem in foreground/background discrimination.
13. **Involve Resource Personnel.** Inform resource personnel of planned vocabulary and language topics to be covered in the classroom so that pre-tutoring can supplement classroom activities during the individual therapy.
14. **Write instructions.** Children with auditory problems may not follow verbal instructions accurately. Help them by writing assignments on the board so they can copy them in a notebook. Also, use a "buddy system" by giving a classmate the responsibility for making certain the child is aware of the assignments made during the day.
15. **Encourage Participation.** Encourage participation in expressive language activities such as reading, conversation, story telling and creative dramatics. Reading is especially important, since information and knowledge gained through reading help compensate for what may be missed because of auditory deficits. Again, parents can assist the child through the participation in local library reading programs and carry over activities in the home.
16. **Monitor Efforts.** Remember that children with impaired auditory function become fatigued more readily than other children. Subsequently, they do not attend because of the continuous strain resulting from efforts to keep up and to compete in classroom activities. Therefore, provide short intensive periods of instruction with breaks during which the child can move around.
17. **Inform Parents.** Provide parents with consistent input so that they understand the child's successes and difficulties, as well as the need for individual tutoring at home.
18. **Evaluate Progress.** Don't assume a program is working. Instead, evaluate the child's progress on a systematic schedule. It is far better to modify a program than to wait until a child has encountered yet another failure.

**S-P-E-E-CH.** The following mnemonic device entitled "SPEECH" has been found helpful by teachers and parents over the past few years when communicating with hearing-impaired children. More recently teachers working with children having auditory deficits have reported the same mnemonic to be helpful in

classroom management. An analysis of "SPEECH" highlights basic strategies for dealing with attending, memory and receptive language deficits, while capitalizing upon strengths in visual processing.

- S = State the topic to be discussed
- P = Pace your conversation at a moderate speed with occasional pauses 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.  
(Adapted from R. Peddicord, Ph.D.)

## Appendix D-2

**General Intervention Strategies for Children with APD  
Suggestions for School and Home<sup>1</sup>**

1. When giving verbal instructions or directions, make certain you have the child's attention.
2. Eliminate noise sources and visual distractions whenever possible:
  - provide preferential classroom seating, away from heavy traffic areas
  - consider sound attenuating ear muffs or ear plugs to help the child deal with noisy areas such as the cafeteria
  - be sensitive to the noise level in a car with windows open and a radio playing. (do not give important verbal information in that situation)
  - homework should be done in a quiet room; turn off the TV and stereo.
3. When talking to the child, use familiar language. Do not use long words when short words will do. Also, use short sentences with only one idea at a time.
4. Structure activities to avoid confusion. The formation of daily routines and schedules will help the child to achieve some measure of success - something every child needs to maintain self esteem.
5. Periodic feedback from the child will give the parent/teacher and the child the opportunity to monitor what has been heard. It is better to train the child to routinely rephrase than to regularly ask if he/she understands. For the child with an auditory memory problem, there is often no realization that he/she is missing information.
6. Encourage older children to use a tape recorder. Instructions or directions can then be played back for review and reinforcement.
7. The older child should learn to carry a note pad for homework assignments and other reminders. Learning to make lists and checking items which have been completed is a good beginning to self-organization.
8. Teaching, or the delivery of instructions or directions, should use more than one sensory modality, whenever possible. Verbal information can be reinforced with the addition of written instructions, modeling the activity, gestures, etc.
9. Teaching should proceed from what is known and familiar to what is novel and new. This will help to build confidence and insure success.
10. Break new information into small steps. Be generous with praise--and specific about what behaviors are being praised--for each accomplishment.
11. Interweave difficult activities with those with which the child has had success. Find some things the child does well, and give him/her some regular time to do them. Do not ever withhold these activities as a punishment. Success in non-academic activities is still success.
12. Be creative in developing new materials and activities to develop and train specific skills. For example, auditory memory training can be accomplished using focusing, listening with visual cues and retelling using those visual cues, games which involve repetition. Each of these will seem likely a new activity to the child. It is very important to maintain interest and motivation. The keys to learning are fun and a sense of success.

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## Appendix E

**Assessment Materials and Test Constructs****Part I. Auditory****AUDITORY OBSERVATION PROCEDURES****Fisher's Auditory Problems Checklist**

Educational Audiology Association, 4319 Ehrlich Rd., Tampa, FL 33624, 1-800-460-7322

This checklist is used by educators and other school support personnel to aid in classifying classroom performance and related behaviors which characterize children as at risk for APD. It includes many components of auditory processing, including attention, auditory-visual integration, comprehension, figure-ground, memory, etc. 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.

**Children's Auditory Processing Performance Scale (CHAPPS)**

Smoski, W. 1990). Use of CHAPPS is a children's audiology clinic. *Ear and Hearing*, 11 (Suppl.) pp 53-56.

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.

**Observational Profile of Classroom Communication**

Sanger, D. (1988). Observational profile of classroom communication. *Clinical Connection* (2), pp 11-13.

This checklist assists teachers in observing functional communication variables. It is suggested that a student be observed for two weeks prior to completing the checklist which examines classroom communication in terms of signal and presentation, environment, response, strategies and behaviors. There are 4 to 11 statements per category; the evaluator is requested to indicate "yes" if the statement appears to be true to a degree that it affects the student's learning.

**AUDITORY SCREENING AND PRELIMINARY ASSESSMENT PROCEDURES****SCAN: A Screening Test for Auditory Processing Disorders**

Keith, R.(1986). The Psychological Corporation, 555 Academic Court, San Antonio, TX 78204; 1-800-228-0752.

SCAN is used to identify children who have auditory processing disorders and who may benefit from intervention. The test is administered to children ages 3 to 11 in approximately 20 minutes. Three subtests include low pass filtered words, auditory figure ground and competing words. The **SCAN A: A Test for Auditory Processing Disorders in Adolescents and Adults** was designed for individuals over 11 years. This instrument includes an additional subtest using competing sentences as stimuli.

**Test of Auditory-Perceptual Skills (TAPS)**

Gardner, M.F. (1985). Psychological and Educational Publications, Inc. Burlingame, CA.

**TAPS** was developed to measure a child's auditory perception functioning. The subtests measure six areas of auditory skills, which include auditory number memory, sentence memory, work memory, interpretation of directions, word discrimination and auditory processing (thinking and reasoning).

Normative data is available for children ages 4 to 12 years. This battery of subtests can be administered in 15 to 25 minutes and can be scored in ten minutes.

### **Selective Auditory Attention Test**

Cherry, 1980. AUDITEC of St. Louis

A selective attention listening score is derived from a comparison between two listening conditions. A speech recognition score is obtained from lists of 25 monosyllabic words prerecorded in quiet. Two equivalent lists of words are recorded with a semantic distractor in the background. Norms are available for children ages 4 to 9 years. The administration time for this test is approximately eight minutes.

### **Auditory Continuous Performance Test**

Keith, R.(1994). The Psychological Corporation, 555 Academic Court, San Antonio, TX 78204; 1-800-228-0752.

A test which considers inattention, impulsivity, and hyperactivity. The student simply signals when the test stimuli (the word "dog") is heard in the context of other words. The ACPT is useful when trying to separate APD and ADD problems.

### **Pediatric Speech Intelligibility Test**

Jerger and Jerger, 1984. AUDITEC of St. Louis

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 appropriate pictures while the stimuli is presented either in quiet or with competing messages. Performance-intensity functions are obtained at different intensity levels in quiet and in noise. This test is appropriate for children ages 3 to 6 years.

## **AUDITORY DIAGNOSTIC ASSESSMENT PROCEDURES**

Test Presentation types:

1. Monaural - presentation of speech signal(s) to only one ear
2. Binaural - presentation of speech signal(s) to both ears
3. Dichotic- presentation of two different signals to separate ears of the listener

### **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 or binaural separation (listener is required to direct attention to one ear and repeat or indicate what is heard in only that ear).*

A. Linguistically loaded dichotic tests include:

#### **SSW - Staggered Spondaic Word Test**

Katz, 1986; Available from Precision Acoustics, Vancouver, Washington

Assesses: Binaural Integration  
 Sensitive to: Brainstem and cortical lesions  
 Norms: Relatively resistant to peripheral hearing loss,  
 simple enough for use on a variety of ages

Test uses staggered presentation of spondees in such a manner that the second syllable of the spondee presented to one ear overlaps the first syllable of the spondee presented to the other ear. The listener is required to repeat the words heard.

**Competing Sentences Test (CST)**

Willeford, 1968; Willeford and Burleigh, 1994; adapted & modified by Carver, available from AUDiTEC of St. Louis

Assesses: Binaural separation  
 Sensitive to: Neuromaturation and language processing  
 Norms: Willeford, ages 5- adult  
 Musiek and Bellis, ages 8-8 - adult

Simple sentences are presented dichotically. The target sentence is presented to one ear at a quieter level than the competing sentence is presented to the other ear. the listener is instructed to repeat the target sentence and ignore the competing sentence, which assesses the binaural separation of auditory information.

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

Jerger and Jerger 1994-5, available from AUDiTEC of St. Louis

Assesses: Binaural separation  
 Sensitive to: Brainstem vs. cortical lesions  
 Norms:

Recommended for listeners with normal hearing sensitivity at 500, 1000 and 2000 Hz. The ten sentences consist of third order approximations of English sentences which resembling nonsense sentences. Sentences are resented to target ear while competing message of continuous discourse is presented to the contralateral ear. Listener is required to choose which sentence was heard from a printed list.

**Dichotic Sentence Identification Test (DSI)**

Fifer, Jerger, Berlin, Tobey and Campbell, 1983, available from AUDiTEC of St. Louis

Assesses: Binaural integration  
 Sensitive to: Brainstem and cortical lesions  
 Norms: Minimally affected by peripheral hearing loss (recommended that listener's PTA be no poorer than 50 dB)

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.

**Competing Words subtest of the SCAN (Screening Test for Auditory Processing Disorders)**

Keith, 1986, The Psychological Corporation

Assesses: Binaural integration  
 Sensitive to: neuromaturation  
 Norms: 3-11 yr.

Words presented dichotically, and listener is required to repeat both words. On the first list, s/he 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.

B. Non-linguistically loaded dichotic tests include:

**Dichotic Digits Test (DDT)** Revised version

Developed by Musiek, recorded by AUDiTEC of St. Louis

Assesses: Binaural integration  
 Sensitive to: Brainstem, cortical, and corpus callosum lesions  
 Norms: Ages 7-7 to adult

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 Consonant-Vowel (CV) Test**

Berlin et al., 1972, available from AUDiTEC of St. Louis

Assesses: Binaural integration  
 Sensitive to: Cortical lesions  
 Norms: ages 7 years to adult with normal hearing;  
 variability is high in school-aged populations; test is often too difficult for young children

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, 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 Rhyme Test (DRT)**

Introduced by Wexler and Hawles (1983); modified by Musiek, Kurdziel-Schwan, Kibbe, Gollegly, Baran and Rintelmann (1989)

Assesses: Binaural integration  
 Sensitive to: Interhemispheric transfer of information  
 Norms: ages 8 to adult  
 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.

## **2. Low Redundancy Monaural Speech Tests**

*Low redundancy monaural 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. These tests assess auditory closure, or the ability to fill in the missing components. They are sensitive to a variety of disorders, including brainstem and cortical dysfunction, but cannot determine a site-of lesion. There are three types of monaural low-redundancy speech tests: low-pass filtering, time compression, and the addition of reverberation.*

### A. Low-Pass Filtered Speech

#### **Ivey Filtered Speech Test (Willeford Central Test Battery)**

Ivey, 1969; adapted by Carver, available from AUDiTEC of St. Louis

Test consists of two 50-item lists of Michigan CVC words with a 500 Hz cut off and an 18 dB/octave filter

#### **Northwestern University Auditory Test Number 6 (NU-6)**

AUDiTEC of St. Louis

Low pass versions of the test includes cut offs at 500, 700, 1000 and 1500 Hz.  
 Norms: 500 Hz. cutoff is difficult for normal listeners

### B. Time-compressed speech

#### **Time Compressed Northwestern Auditory Test Number 6 (NU-6)**

AUDiTEC of St. Louis

30-70% compression ratios

Normal listeners show decreased word recognition scores as compression increases, with marked deterioration at 70% compression.

### C. Reverberation

#### **Tonal and Speech Materials for Auditory Perceptual Assessment** (compact disc)

Veteran's Administration(1992); available from Eastern Tennessee State University Foundation, Attention: Richard Wilson (423-926-1171 x7533)

Reverberation is the persistence of an acoustic signal (echo) defined by the time required for a signal to decay 60 dB following offset of the signal. It is most often used in conjunction with other low-redundancy tests to increase the degree of difficulty in the test procedure (multiplicative effect). Test consists of 45% and 65% time pressed NU-6 word lists with reverberation added. 65% compression is difficult for normal listeners; 45% may be more appropriate for clinical use.

### 3. Temporal Processing Tests

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

#### **Pitch Pattern Sequence Test (PPST)**

(Pinheiro and Ptacek, 1971); Available through AUDiTEC of St. Louis

Assess: Frequency discrimination, temporal ordering, linguistic labeling  
 Sensitive to: Cerebral hemisphere lesions, interhemispheric transfer (corpus callosum function); (May also be sensitive to neuromaturation in the child with a learning disability by indicating the degree of myelination of the corpus callosum.)  
 Norms: Ages 8- adult recommended (Norms are available for ages 7-adult, but there is a high degree of variability in children 7 years and younger)

The test is composed of 120 pattern sequences consisting of three tone bursts, two of one frequency and one of another. 1122Hz and 880 Hz are used with six possible patterns. The listener is instructed to verbally report each of the thirty patterns heard in each ear. One modification of test procedure is to have patients hum the response rather than report verbally. Listeners with interhemispheric transfer of information show improved performance when the need for linguistic labeling is removed.

#### **Duration Pattern Test (DPT).**

Pinheiro and Musiek (1985); Available on Tonal Speech Material for Auditory Perceptual Assessment (compact disc), Eastern Tennessee State University Foundation, Richard Wilson (423-926-1171 x7533)

Assesses: Duration discrimination, temporal ordering, linguistic labeling  
 Sensitive to: Cerebral hemisphere lesions, interhemispheric transfer (corpus callosum function)  
 Norms: Ages 8-adult recommended (Norms are available for ages 7- adult, but there is a high degree of variability in children 7 years and younger)

As long as the stimuli can be presented at a frequency and intensity that the listener can perceive, the test is unaffected by peripheral hearing loss. Test is composed of three 1000 Hz. tone bursts of differing duration, two of one duration and a third of a differing duration. Short (250 msec) and long (500 msec) tone bursts are used. The listener is asked to verbally report the pattern heard.

#### **Psychoacoustic Pattern Discrimination Test (PPDT)**

Blaettner et al. 1989

Assesses: Temporal discrimination  
 Sensitive to: Cerebral hemisphere lesions, including auditory association areas  
 Norms: Not available in standardized format for clinical use at this time  
 Test uses dichotically presented sequences of noise bursts or click trains, and requires the listener to push a button indicating that s/he has discriminated a monaural change in the pattern.

#### 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 nonsimultaneous, 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. There are several types of binaural interaction tests, including rapidly alternating speech perception, binaural fusion tests, interaural difference limen tests (clinical utility is questionable, protocols and norms are currently being developed), and Masking Level Differences. All are sensitive to brainstem pathology and assess binaural fusion. There are few available for clinical use with available norms.*

##### A. Rapidly alternating speech

###### **Rapidly alternating speech perception (RASP)**

Developed by Willeford, adapted by Carver, available through AUDiTEC of St. Louis

Sentence material is switched rapidly between ears at periodic intervals, resulting in the alternating presentation of unintelligible sequential bursts of information.

Norms: Easy even for young children  
 Clinical utility questionable with the advent of ABR and MLD

##### B. Binaural Fusion Tests

*Different portions of the speech stimulus are presented to each ear, and the listener is required to integrate the information.*

- *Band-pass Binaural Fusion: the high frequency portion of the information is presented to one ear, and the low frequency portion is presented to the other ear.*
- *CVC Binaural Fusion: Consonants are presented to one ear and vowels to the other in a sequential manner*

###### **Ivey Binaural Fusion Test (1969)**

Adapted from the Matzker Binaural Fusion Test(1959); available in the Willeford Central Test Battery (Willeford)

Norms: Ages 6- Adult

Test uses two twenty-word spondee lists with a low-pass band to one ear and a high-pass band presented to the other presented at 25-30 dB SL. The listener repeats the words heard and score is based on number of correct answers.

###### **Northwestern University Auditory Test Number 6 (NU-6)**

AUDiTEC; also available on Tonal and Speech Materials for Auditory Perceptual Assessment compact disc (1992), Eastern Tennessee State University Foundation, Richard Wilson (423-926-1171 x 7533)

Norms: not well defined for children at this time

Monosyllabic words are presented with a low-pass band to one ear and a high-pass band to the other ear at a comfortable listening level. The listener repeats the words and score is based on number of correct answers.

**CVC Fusion Test**

Tonal and Speech Materials for Auditory Perceptual Assessment compact disc (1992), Eastern Tennessee State University Foundation, Richard Wilson (423-926-1171 x 7533)

Norms: Although relatively resistant to peripheral hearing loss, clear-cut norms for all populations are being developed at this time.

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. CVC binaural fusion tests by their nature have acoustic problems.

## C. Masking Level Differences

**Masking Level Differences(MLD)Test**

(Wilson, Zizz and Sperry, 1994); on Tonal and Speech Materials for Auditory Perceptual Assessment (compact disc) ; (1992); Veterans Administration; available through Eastern Tennessee State University Foundation, Richard Wilson (423-926-1171 x 7533)

Norms: Not fully developed at this time: the clinical utility of this test is questionable, since it is difficult to administer, and the need for additional behavioral tests of brainstem integrity is not high.

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.

**5. Speech-In-Noise Tests**

*Speech-In-Noise tests reduce the redundancy of the speech signal by adding background noise to the signal. They have been shown to be marginally sensitive to central auditory processing disorders, and appear to be the most misused test of central auditory function (Mueller and Bright, 1994). All authors caution that tests of speech in noise should understand that there is a high degree of variability in these tests and they should be standardized in each clinic.*

**Synthetic Sentence Identification test with Ipsilateral Competing Message (SSI-ICM),**

AUDiTEC of St. Louis

Norms:

Assesses: Auditory closure

Sensitive to: Low brainstem lesion

Recommended for listeners with normal hearing sensitivity at 500, 1000 and 2000 Hz. Sentences are 10 third order approximations of English sentences, resembling nonsense sentences. Presented to target ear while competing message of continuous discourse is presented to the same ear at premixed signal/noise ratios. Listener is required to choose which sentence was heard from a printed list.

Other speech-in-noise tests which have been available as part of speech-language diagnostic protocols include:

**Goldman-Fristoe-Woodcock (GFW)** Auditory Discrimination subtests

Norms: 3 yr. - 8 yr. 11 mo.

**Flowers-Costello Test of Central Auditory Abilities Low-Pass Filtered Speech and Competing Messages subtest**

Norms:

**Northwestern University Auditory Test Number 6 (NU-6)**

AUDiTEC of St. Louis

This test is used with varying degrees and types of background noise, and needs to be normed at each clinic.

### **AUDITORY: ADDITIONAL DIAGNOSTIC PROCEDURES**

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 for. These measure 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 appropriate for schools to provide these assessments at this time. They are:

- Auditory Brainstem Response (ABR)
- Middle Latency Response (MLR)
- Late Evoked Potentials (LEPs)
- P300
- Mismatched Negativity (MMN)

## **Part II. Language**

### **LANGUAGE OBSERVATION PROCEDURES**

#### **Loban's Oral Language Scale**

Observation checklist for teachers on attributes of spoken language. A five point continuum is used to rate the language skills of elementary students.

#### **The Classroom Communication Skills Inventory**

Psychological Corporation

### **LANGUAGE SCREENING AND PRELIMINARY ASSESSMENT PROCEDURES**

#### **Screening Test of Adolescent Language (STAL)**

University of Washington Press, 1980

Test taps four areas as provides minimum passing scores for grades 6 to 8 and 9 to 12.

Tests: Vocabulary (word finding/retrieval competencies)

Auditory Memory- examines memory with related semantic/ syntactic stimuli

Language Processing- decode and use language for reasoning and problem solving

Verbal (proverb) Explanation- paraphrasing and cognitive skills needed for verbal clarity

#### **Clinical Evaluation of Language Functions (CELF)**

Screening for Elementary and Advanced Levels, Charles E. Merrill Publishing Co., 1980

Designed to screen for significant delays and potential deficits in aspects of language processing related to perception, recognition, recall, and interpretation of spoken language through:

1. Accuracy in phoneme discrimination
2. Sentence formation rules (morphology and syntax)
3. Interpretation of words and logical relationships among sentence components and linguistic concepts
4. Retention and recall of word and action sequences

### **LANGUAGE DIAGNOSTIC ASSESSMENT PROCEDURES**

#### **Test of Language Development-2 (TOLD)**

Primary, 1991 (TOLDP:2) and Intermediate, 1988 (TOLDI:2)

Reveals a profile of children's specific abilities and disabilities in three main linguistic features (semantics, syntax, phonology) across listening and speaking tasks.

### **Lindamood Auditory Conceptualization Test (LAC)**

Teaching Resources, 1971.

It is a measure of auditory perception free from complicating factors such as need for knowledge of sound/symbol association or need for uniform level of language development. It assesses conceptualization of isolated phonemic units and conceptualization of contrasts within and between syllables, in respect to identity and sequences. It consists of a series of encoding tasks similar to those inherent in reading and spelling. Preschool to adult.

### **Expressive One Word Vocabulary Test (EOWVT)**

Academic Therapy Publications, 1983

Tests vocabulary through naming of pictures to obtain an estimate of verbal intelligence by means of child's acquired one word picture vocabulary and indicates how well child articulates words; was developed as a measure of how child thinks, since he must identify a single object or groups of objects on the basis of a single concept (i.e., general common concepts, plurals, abstract concepts, descriptive concepts). Ages 2 to 11-11.

### **Peabody Picture Vocabulary Test-Revised (PPVT-R)**

American Guidance Service, 1981

Designed to measure receptive (hearing) vocabulary for Standard American English; an achievement test; to provide a quick estimate of one major aspect of verbal ability. Ages 2 to 60

### **The Word-R Test**

A diagnostic test of expressive vocabulary and semantics; assesses ability to recognize and express critical semantic attributes of the lexicon. Ages 7 to 11-11.

Tasks: Associations, Synonyms, Semantic Absurdities, Antonyms, Definitions, Multiple Definitions

### **Test of Word Knowledge**

The Psychological Corporation, 1992

Assesses skill in the reception and expression of semantics.

Level 1 - Ages 5 to 8 - Referential and Relational Aspects

- Expressive Vocabulary
- Receptive Vocabulary
- Word Opposites
- Word Definitions
- Synonyms (Supplemental)

Level 2 - Ages 8 to 17 - Relational and Metalinguistic Aspects

- Word Definitions
- Synonyms
- Multiple Contexts
- Figurative Usage
- Expressive Vocabulary (Supplemental)
- Receptive Vocabulary (S)

Word Opposites (S)  
 Conjunctions and Transition words (S)

**Clinical Evaluation of Language Functions (CELF-R),**

The Psychological Corporation, 1986

Designed to identify children K-12 who lack the basic foundations of form and content that characterize mature language use: word meanings, word and sentence structure, and recall and retrieval.

11 subtests: Linguistic Concepts, Word Structure, Sentence Structure, Oral Directions, Formulated Sentences, Recalling Sentences, Word Classes, Sentence Assembly, Semantic Relationships, Word Association, Listening to Paragraphs

**Detroit Test of Learning Aptitude-2,** Primary or Intermediate

Pro-ED

Designed to measure intellectual abilities. The Primary is for children 3 to 9 years, the DTLA-2 is for children 6 to 18 years.

Four domains are assessed across eight subtests:

1. Linguistic - Verbal and Nonverbal Aptitude
2. Cognitive - Conceptual and Structural Aptitude
3. Attentional - Enhanced and Reduced Aptitude
4. Motoric - Enhanced and Reduced Aptitude

**Woodcock Language Proficiency Battery,**

Teaching Resources, 1980.

Eight subtests measure oral language, reading, and written language

Subtests: Picture Vocabulary, Antonyms-Synonyms, Analogies, Letter-Word Identification, Word Attack, Passage Comprehension, Dictation, Proofing (and Punctuation and Capitalization, Spelling, Usage).

Ages 3 to 80.

**Test of Word Finding**

Teaching Resources, 1986

Assesses children's (Ages 6:6 to 12:11) word-finding skills through several tasks:

- Picture Naming: Nouns
- Sentence Completion Nouns
- Description Naming
- Picture Naming: Verbs
- Picture Naming: Categories
- Comprehension Assessment

**Test of Adolescent Language (TOAL-2)**

Pro Ed, 1987

Assesses language across its forms (spoken and written), its systems (receptive and expressive), and its features (vocabulary and grammar) Ages 12:0 to 18:5

**The Fullerton Language Test for Adolescents**

Consulting Psychologists Press, 1980

To assist in determining the deficiencies in linguistic processing skills and language usage of the adolescent. Ages 11 to 18 Subtests include:

- Auditory Synthesis
- Morphology Competency

Oral Commands  
 Convergent Production  
 Divergent Production  
 Syllabication  
 Grammatical Competency  
 Idioms

**Analysis of the Language of Learning: The Practical Test of Metalinguistics** LinguiSystems, Inc.,  
 1987

A receptive and expressive test designed to assess a child's level of awareness of the structural aspects of language. Ages 4:0 to 9:11. Seven Subtests include:

Defining Concepts  
 Generating Concept Examples  
 Recognizing Concepts  
 Segmenting Sentences  
 Generating Words  
 Segmenting Words  
 Repairing Sentences

**Test of Problem Solving-Revised**

LinguaSystems

**TOPS-R Elementary** Ages 6-12

Evaluates how students process language through their ability to answer questions about pictures. Skills tested include verbal problem solving, predicting outcomes, determining solutions, using context clues, drawing inferences, and understanding questions.

**TOPS Adolescent** Ages 12-18

Evaluates how adolescents process language through their ability to answer about short paragraphs presented orally. Questions include those which address clarifying, evaluating, fair-mindedness, analyzing thinking independently and affect.

**LANGUAGE: ADDITIONAL DIAGNOSTIC PROCEDURES**

**Boston Naming Test**

1983, Lea & Febiger 600 S. Washington Square, Philadelphia, PA 19106

Provisional Norms - ages 5.5 to 10.5 (children), 18 to 59 (adults, aphasics); wide-range naming vocabulary test which names single words from, picture cues; scoring for stimulus or phonemic cueing, latency, & correctness.

**Part III. Psychological**

The main reason to test children psychologically when attempting to diagnose APD is to rule out a number of alternative hypotheses regarding the etiology of the behavioral or cognitive problems observed in the classroom. As the symptoms of APD often overlap with those of other disorders (e.g. Specific Language Impairment, Dyslexia, ADHD, Depression, Pervasive Developmental Delay, Oppositional Defiant Disorder), it is important to rule out these disorders before diagnosing APD. If this were not done, misdiagnosis could result, often hindering the treatment process and efficacy. One of the main questions that the psychologist should keep in mind is whether the symptoms observed in the child are specific to the auditory modality or are more pervasive in the child's overall functioning. If the latter is true, there is the possibility that a more generalized cognitive impairment or emotional/psychological factor is the reason for the child's difficulties.

There is controversy in the literature regarding the underlying deficit of reading disability and language disorders. Central auditory processing deficits have been posited as possible areas of dysfunction in

children with these learning disabilities. The evidence appears to be stronger for AP deficits being involved in language delays and articulatory disorders; the evidence is weaker for lower level auditory processing deficits in dyslexic children (as opposed to higher order phonological segmentation and phoneme awareness deficits). In order to ascertain the most parsimonious diagnosis for a particular child, a comprehensive testing battery should include tests designed to elucidate whether deficits are purely auditory/linguistic, cognitive, or emotional. A word of caution is necessary, since it is rarely the case that behavioral symptoms or test results are clear and specific; the multidisciplinary team should keep in mind the high rate of comorbidity among these disorders, making it plausible that a child may in fact have more than one processing, cognitive or emotional deficit.

## **PSYCHOLOGICAL OBSERVATION PROCEDURES**

### **Connor's Behavior Rating Scale**

Teacher or parent rating scale of child behaviors, including those associated with ADHD, Depression and ODD.

### **Behavior Assessment for School Age Children (BASC)**

#### **ACTeRs**

Teacher or parent report of inattentive, hyperactive or oppositional behaviors that may be related to ADHD or ODD.

## **PSYCHOLOGICAL SCREENING & PRELIMINARY ASSESSMENT PROCEDURES**

### **Achenbach Child Behavior Checklist**

Comprehensive self report, teacher report or parent report behavior rating scale. Normed by gender and age. Has externalizing and internalizing factors as well as subscales measuring depression, attention, social problems, thought disorder, aggression and delinquency.

### **Child Depression Inventory**

A depression self report rating scale, normed by gender and age.

### **SNAP IV Rating Scale**

Teacher or parent behavioral Likert rating scale, comprised of DSM-IV criteria as items for a variety of disorders, including Depression, Bipolar, ADHD (both types), Oppositional Defiant Disorder, and Conduct Disorder.

### **Beery Visual Motor Integration test**

A test measuring fine visual motor and spatial skills. Normed by age.

### **Beck Depression Inventory**

A depression self report rating scale, normed by age.

### **Clinical Interview and Developmental/Family History**

## **PSYCHOLOGICAL DIAGNOSTIC ASSESSMENT PROCEDURES**

These measures are to be used in conjunction with information gathered from instruments listed in the first two levels.

### **WISC-III**

Comprehensive cognitive ability test, normed by age, resulting in verbal, performance and general cognitive ability score.

### **Stanford Binet IV**

Comprehensive cognitive ability test, normed by age, can be given to adults.

### **Differential Abilities Scale**

New cognitive ability scale, normed by age. Also has additional processing and achievement subtests for direct intra-test comparison. General Cognitive Ability score broken down into Verbal, Spatial and Non-verbal Reasoning clusters.

### **Kaufman ABC**

Cognitive Battery, often given to younger delayed children.

### **Woodcock Johnson-Revised Cognitive Battery**

Part of the Woodcock Johnson assessment series. Normed by age. Can compare with WJ-R Achievement test results. Has good supplemental auditory and visual processing subtests.

### **Detroit Test of Learning Aptitude-III**

Another general cognitive ability test. Has processing subtests useful for measuring language processing.

### **Ravens Coloured or Progressive Matrices**

A non-verbal fluid reasoning test, strongly correlated with Performance IQ score on the WISC-III. Given internationally, can be administered to children who are multilingual/multicultural or who are deaf/hard of hearing.

### **Matrix Analogies Test (MAT)**

### **Visual Continuous Performance Test**

Mainly appropriate for ages 5-10. A variety of these types of tests are available (Gordon Diagnostic System, TOVA. They measure sustained inattention, impulsivity and distractibility. The Gordon now has an experimental auditory module that allows comparison of scores with stimuli presented auditorily versus visually.

### **Behavioral Observations/Clinical Interview**

### **Projective Assessment (DAP, KFD, TED, CAT stories)**

A number of projective techniques, used clinically to derive hypotheses regarding important emotional issues and psychopathology.

## **PSYCHOLOGICAL: ADDITIONAL DIAGNOSTIC PROCEDURES**

### **Comprehensive Neuropsychological Battery**

Consult with appropriately trained clinical neuropsychologist.

There is no particular pattern that is consistently found on these tests that will determine a diagnosis of APD. However, the psychologist, once having ruled out other disorders, will most likely see lower scores on verbal tasks or subtests that require rote, decontextualized or fast auditory processing of stimuli. Context will usually aide the APD child. In addition, visual processing will usually not be affected, unless the child has both APD and other cognitive (visual-spatial) deficits. A neuropsychological battery can sometimes be more specific in demonstrating circumscribed auditory processing deficits; however, explanation of such tests and profiles is beyond the scope of these guidelines.

## **Part IV. Educational**

### **EDUCATIONAL OBSERVATION PROCEDURES**

#### **Record Review**

- classwork
- report cards
- district assessments such as tests of achievement

## **EDUCATIONAL SCREENING & PRELIMINARY ASSESSMENT PROCEDURES**

Achievement tests are used to assess the attainment of basic educational skills necessary for academic success. They can be used to obtain information about students' level of educational development in comparison to other students in the school system and/or nationwide. They are typically multilevel batteries designed for use across many grade levels. They also tend to be constructed in a similar fashion and to measure the same set of basic educational skills. They can be administered to large groups or to an individual from grades K-12. Criterion referenced interpretations are available. The following are a few of the most typically used achievement tests:

### **IOWA (Iowa Test of Basic Skills)**

The Riverside Publishing Company, 1985, 1-800-323-9540.

Subtests: listening, vocabulary, reading comprehension, language, work- study, math, social studies, science.

### **MAT (Metropolitan Achievement Test)**

The Psychological Corporation, 1978; 1-800-228-0752.

Subtests: reading comprehension, math, language; this basic skills test can be supplemented with more specific tests in core subject areas.

### **SAT (Stanford Achievement Test)**

The Psychological Corporation, 1982; 1-800-228-0752.

Subtests: word-study skills, reading comprehension, vocabulary, listening, comprehension, spelling, language, math, social studies, science.

## **EDUCATIONAL DIAGNOSTIC PROCEDURES**

### **Wechsler Individual Achievement Test (WIAT)**

The Psychological Corporation

Normed for ages 5 - 19

Contains eight subtests measuring reading, math, written expression, oral expression, and listening comprehension. The screening form is not recommended.

### **Woodcock Johnson Achievement Battery**

DLM Teaching Resources, 1-800-527-4747.

The Woodcock Johnson Achievement Battery will provide information in the broad academic areas of reading, written language, math and knowledge. It allows for evaluation of basic skills as well as higher level skills needed to be successful in reading, written language and math. Results are reported in raw scores, age and grade equivalents, standard scores, percentile ranks and a Relative Mastery Index. It is normed for ages 2-90 years.

### **Informal Reading Inventories,**

published by a variety of sources

Informal Reading Inventories typically consist of graded passages consisting of 100-150 words each and ranging from preprimer to eighth grade levels. The passages are selected from non familiar material. Errors in word recognition and word analysis are recorded in order to determine error patterns. At the

end of each passage, the student is asked comprehension questions. Specific criteria are applied to each of the reading levels to determine where the student is functioning:

- \*independently-comprehension score of 90%
- \*at an instructional level-comprehension score of 75%
- \*at frustration level-comprehension score >50%
- \*at hearing comprehension level-comprehends 75% of material read aloud

The IRI can also determine a student's reading strengths and weaknesses and can serve as an evaluator of progress.

**Gray Oral Reading Test**, 1967.

The Gray Oral Reading Test consists of thirteen reading passages which are arranged in order of increasing difficulty. Passages are chosen according to the student's grade level from 1-13. The total number of oral reading errors and the time in seconds the student uses to read each passage determines the grade equivalent. Separate norms are available for males and females. Suggestions are given for detecting error patterns.

### **Woodcock Reading Mastery Test**

American Guidance Service, Inc., 1972;1-800-328-2560.

The Woodcock Reading Mastery consists of five reading tests to be used with grade K-12: letter identification, word identification, word attack, word comprehension, passage comprehension. Results from these tests are combined to provide a composite index of the student's overall reading skill. Raw scores can be converted to age and grade equivalents, percentiles, and combination of norm referenced criterion referenced mastery levels. Separate norms are provided for males and females and several categories of socioeconomic status.

### **Wide Range Achievement Test-Revised**

Jastak Assessment Systems, 1984;1-800-221-9278.

The Wide Range Achievement Test-Revised (WRAT-R) is a screening tool to measure achievement of reading, spelling and math skills. It is intended for individual administration but some subtests can be administered to small groups. Results are reported in raw scores and can be converted to grade equivalents and/or standard scores. Grade equivalents are considered to be the most valuable and valid indicator of test performance. There are two levels available for ages 5-11 and 12-adult.

### **Classroom Communication Skills Inventory**

The Psychological Corporation, 1993;1-800-228-0752.

A method to measure students' listening and speaking abilities to supplement classroom assessments and standard achievement tests. It covers a variety of areas: basic speech and hearing processes, classroom communication, classroom participation, language content and structure, organization of language, interpersonal classroom communication. It is based on a rating scale of 0-3 scored by the observer. Suggestions for improvement are provided.

### **Diagnostic Achievement Battery -2 (DAB-2)**

Pro-Ed

Normed for ages 6.0-14.11

Provides two subtests that examine reading abilities, two subtests for math achievement, and four subtests for written language including a writing sample.



## Appendix G

**Characteristics of the Four Subprofiles of APD<sup>1</sup>**

<b>Type</b>	<b>Primary Sequelae</b>	<b>Central Test Findings</b>	<b>Management</b>
Auditory Decoding Deficit	Sound recognition, blending, reading, and writing skills adversely affected. Poor auditory closure abilities.	Poor performance on monaural low redundancy speech tests and speech in-noise. Site of dysfunction: primary auditory cortex.	Phoneme training, preteach new information, improve acoustic clarity of signal.
Integration Deficit	Difficulty in multimodality tasks, reading, spelling, writing and use of symbolic language and prosody. Poor music skills.	Left ear deficit on dichotic speech tasks combined with bilateral deficit on tests of temporal patterning requiring verbal report. Site of dysfunction: corpus callosum.	Inter hemispheric exercises, reduce use of multimodality cues, prosody training, key word extraction, music training.
Associative Deficit	Receptive language deficits, pragmatic skills may be poor. Academic difficulties may not become apparent until the 3rd grade.	Bilateral deficit on dichotic speech tasks, poor word recognition's skills. Site of dysfunction: primary and associative cortical regions.	Language intervention combined with compensatory strategies.
Output-Organization Deficit	Deficit in sequencing, planning, and organizing responses. Poor organizational skills, reversals, poor recall and sequencing abilities. Motor skills often affected.	Difficulty on any task requiring report of more than two critical elements. Site of dysfunction: efferent system.	Similar to associative deficit, including training of organizational skills and language intervention.

<sup>1</sup> Bellis, T.J. (1996) *Central Auditory Processing Disorders*. San Diego: Singular Publishing Group, Inc. p 193, permission pending.

## Appendix H

**INTERVENTION RECOMMENDATIONS****I. Classroom Management**

All students with central auditory processing disorders require an optimum listening environment, as well as one which incorporates bi-sensory (auditory and visual) presentation of materials. Classroom management includes environmental accommodations to help the student access information more directly. Primary considerations include the building/classroom design and the characteristics of the teacher-student interactions.

Physical Considerations

Physical considerations of the classroom design must accommodate for noise and reverberation (see reverberation time worksheet below). Basic features should include:

- Classroom placement within the building - away from high-noise areas such as cafeterias, gym, music-room)
- Window placement - away from busy streets, playground areas
- Ventilation/heating systems - noise levels should not exceed 35dB
- Walls - should be permanent walls with non-moveable partitions
- Room shape - avoid long disproportionately-shaped or circular rooms

Adaptations to improve the classroom design for acoustics include:

- carpet
- rubber tips on chair legs or desk if carpet not available
- drapes for windows/walls
- cork board for bulletin boards
- bookshelves as room dividers for quiet classroom area
- cushions for chairs
- position mobile bulletin boards at angle (not parallel) to walls to reduce reverberation
- creative landscaping to reduce outside noise (trees, bushes)
- louvered shutters for outside window covers
- close door to hallway noise
- suspended acoustic tile
- visual features of the classroom which should also be considered include adequate lighting and reduction of reflective surfaces

Teacher - Student Considerations

Many classroom teachers' management styles naturally incorporate the strategies identified below. The most critical aspect of these strategies is to promote student access to information.

<b>STRATEGY</b>	<b>BENEFIT</b>
Special seating near teacher or speaker with full face to fact view	<ul style="list-style-type: none"> <li>• provides louder, less reverberent signal</li> <li>• provides advantage of visual instruction aides</li> <li>• provides access to visual spoken language</li> <li>• helps maintain attention and interest to task</li> </ul>
Obtain student's attention through touch or verbal use of name	<ul style="list-style-type: none"> <li>• prepares child for listening</li> </ul>

- |  |   |
|--|---|
| Train students to “look and listen”  | <ul style="list-style-type: none"> <li>• student will usually comprehend better if watching person who is speaking</li> </ul>   |
| Check student’s comprehension of verbal information  | <ul style="list-style-type: none"> <li>• determines student’s level of understanding information</li> <li>• identifies information that needs to be restated</li> <li>• verifies when student is ready to move into new material</li> </ul> |
| Earmuffs should be available and utilized as appropriate to reduce auditory distractions; quiet study areas that are also free from visual distractions should also be utilized  | <ul style="list-style-type: none"> <li>• helps to minimize problems with auditory and visual distractions, improving concentration and productivity</li> </ul>  |
| Monitor student for fatigue and length of attending time, providing breaks when necessary  | <ul style="list-style-type: none"> <li>• permits student to have “downtime” and then redirection of attention</li> </ul>  |
| <p>S = state the topic to be discussed</p> <p>P = pace your conversation at a moderate speed with occasional pauses to permit comprehension</p> <p>E = enunciate clearly, without exaggerated lip movements</p> <p>E = enthusiastically communicate, using body language and natural gestures</p> <p>CH = check comprehension before changing topics</p> | <ul style="list-style-type: none"> <li>• mnemonic device highlighting basic strategies for dealing with attending, memory, and receptive language deficits</li> </ul>   |

## **II. Instructional Modifications and Accommodations**

Instructional modifications and accommodations consist of purposeful adaptations made by the teacher to improve the child’s opportunity to learn. Use the Central Auditory Processing Disorders Checklist for identifying appropriate individual adaptations for students.

Accommodations are changes made in the learning process in order to provide students with access to information and an equal opportunity to demonstrate knowledge and skills without effecting learning outcomes. Examples include use of a notetaker, visual supplements, study guides and pre-teaching, peer partners, adjusted pace of instruction, repetition of ideas, and reduced language level.

Modifications are changes made in the instructional level, content, or performance criteria. Examples include reducing the difficulty of the material, shorten assignments, alternative assignments, and a alternative grading system.

## CENTRAL AUDITORY PROCESSING DISORDERS CHECKLIST: MODIFICATIONS AND ACCOMMODATIONS

STUDENT \_\_\_\_\_ DATE \_\_\_\_\_ COMPLETED BY \_\_\_\_\_

The following adaptations are appropriate and necessary for this student. Check all that apply. Accommodations are in regular print; *modifications are italicized*

### ENVIRONMENT

- Quiet-acoustically appropriate classroom  
 Reduce/minimize distractions:  
     Visual \_\_\_\_\_ Spatial \_\_\_\_\_  
     Auditory \_\_\_\_\_ Movement \_\_\_\_\_  
 Alter physical room arrangement  
 Special seating: classroom(s) \_\_\_\_\_  
 Lunchroom \_\_\_\_\_ Bus \_\_\_\_\_  
 Auditorium \_\_\_\_\_ Gym \_\_\_\_\_

### PACING

- Decrease rate of speaking & delivery of instructions; use pauses before & after important points  
 Extend time requirements for processing & responding & task completion  
 Allow breaks  
 Send school texts, materials home for preview/review

### PRESENTATION OF MATERIAL

- Obtain student's attention prior to delivery of information  
 Monitor student for fatigue/length of attending time; provide breaks if necessary  
 Provide teacher notes  
 Use NCR paper for peer to provide notes  
 Use functional application of academic skills  
 Present demonstrations (model)  
 Utilize manipulatives  
 Emphasize critical information  
 Pre-teach vocabulary  
 Make/use vocabulary files  
 Share activities  
 Use visual sequences  
 Use outlines, overheads, graphic highlighting, organizers  
 *Reduce language level or reading level of assignments*  
 *Vary content (amount to be learned & conceptual level)*

### MATERIALS

- Use highlighted texts/study guides  
 Use supplementary materials  
 Provide note taking assistance: carbonless of Xerox copy of notes of regular students  
 Type teacher material  
 *Vary type of materials*

### ASSIGNMENTS

- Give directions in small, distinct steps  
 Use written back-up for oral directions  
 Use pictorial directions  
 Give extra cues or prompts  
 *Vary amount to be practiced*  
 *Reduce paper-pencil tasks*  
 *Adapt worksheets, packets*  
 *Utilize compensatory procedures by providing alternate assignment/strategy when demands of class conflict with student capabilities*  
 *Vary grading system (homework, class discussions, special projects); avoid penalizing for spelling errors or penmanship*

### SELF-MANAGEMENT/FOLLOW THROUGH

- Use visual daily schedule and calendars  
 Train students to "look and listen"  
 Check often for understanding/review  
 Request parent reinforcement  
 Have student repeat directions  
 Teach study skills  
 Use study sheets to organize material  
 Design/write/use long term assignment timelines  
 Review and practice in real situations  
 Plan for generalizations  
 Organize long-term assignments  
 *Vary type of response (copying, recognition, recall with cues, recall)*

### TESTING ADAPTATIONS

- Taped (high quality headphones necessary)  
 Pictures  
 Read test to student  
 Paraphrase instructions and test items  
 Preview language of test questions  
 Test administration by resource person  
 Extend time frame  
 *Vary amount to be tested*  
 *Vary grading system*  
 *Vary response expectations - provide guides with cues*

### SOCIAL INTERACTION SUPPORT

- Peer partners  
 Cooperative learning groups  
 Home-school communication notebook

### III. Therapy

Therapy includes management and direct intervention. These strategies and activities are based upon specific, individual deficits and needs determined through the APD assessment process with the purpose of improving skills in deficit areas and providing teaching techniques for learning compensatory strategies.

#### Management of Central Auditory Processing Disorders

Functional deficits are listed with corresponding strategies and techniques below. This model represents an integrated approach that special education educators and regular classroom teachers can use in collaboration.

#### MANAGEMENT OF CENTRAL AUDITORY PROCESSING DISORDERS<sup>4</sup>

Functional Deficit	Strategies	Techniques
Distractibility/inattention	Increase signal-to-noise ratio	ALD/FM system; acoustic modifications; preferential seating
Poor memory	Metalanguage Right hemisphere activation External aids	Chunking, verbal chaining, mnemonics, rehearsal, paraphrasing, summarizing Imagery, drawing Notebooks, calendars
Restricted vocabulary	Improve closure	Contextual derivation of word meaning
Cognitive inflexibility (predominantly analytic or predominantly conceptual)	Diversify cognitive style	Top-down (deductive) and bottom-up (inductive) processing, inferential reasoning, questioning, critical thinking
Poor listening comprehension	Induce formal schema to aid organization, integration, and prediction Maximize visual and auditory summation	Recognize and explain connectives (additives; causal; adversative; temporal) and patterns of parallelism and correlative pairs (not only, but also; neither/nor) Substitutes for notetaking
Reading, spelling, and listening problems	Enhance multisensory integration	Phonemic analysis and segmentation
Maladaptive behaviors (passive, hyperactive, impulsive)	Assertiveness and cognitive behavior modification	Self-control, self-monitoring, self-evaluation, self-instruction, problem solving
Poor motivation	Attribution retraining, internal locus of control	

<sup>4</sup> Source: From "Managing central auditory processing disorders in children and youth" by G. Chermack & F. Musiek, 1992, p. 63. *American Journal of Audiology*, 1(3).

### Specific Auditory Skill-based Interventions

While treatment efficacy data is scant, recent research on neuroplasticity and neuromaturation suggest that stimulation of certain auditory functions may change neurological function and therefore improve central auditory abilities (see Bellis, 1996, Chapter 3, for review of neuromaturation and neuroplasticity of the auditory system). Bellis (1996) provided a general overview of remediation activities which are presented below.

#### **OVERVIEW OF REMEDIATION ACTIVITIES FOR APD**

<b>Activity</b>	<b>Purpose</b>
Auditory Closure Activities	To assist the child in learning to fill in missing components of a message in order to arrive at a meaningful whole
Phoneme Training	To help the child develop accurate phonemic representation and speech-to-print skills
Prosody Training	To help the child learn to recognize and use prosodic aspects of speech (e.g. rhythm, stress, and intonation)
Temporal Patterning Training	To train the child to discriminate differences in, analyze, and imitate rhythmic patterns of auditory stimuli
Interhemispheric Exercises	To stimulate the corpus callosum in order to improve inter hemispheric transfer of information

Pertinent, specific, auditory skills are identified below. The reader is referred to Gillet (1993) and Sloan (1991) for complete descriptions, techniques, and remedial activities for these skills.

- Auditory Discrimination
- Auditory Memory
- Auditory Perception
- Auditory - Vocal Association
- Auditory Syntheses
- Auditory - Vocal Automaticity
- Auditory - Figure - Ground

### Treatment References

- Bellis, T. (1996). *Central Auditory Processing Disorders in the Education Setting*. San Diego: Singular Publishing Group, Inc.
- Gillet, P. (1993). *Auditory Processes*. Novato, CA: Academic Therapy Publications, Inc.
- Sloan, C. (1991). *Treating Auditory Processing Difficulties in Children*. San Diego: Singular Publishing Group, Inc.

#### IV. Assistive Listening Devices

Assistive listening devices (ALDs) in the form of auditory trainers, personal (FM) systems and classroom amplification have been standard equipment for students with hearing impairment in the school setting. The use of this equipment can significantly improve listening conditions for non-hearing impaired students as well. Assistive listening devices can improve signal-to-noise ratios, minimize distance and reverberation factors, improve attention, reduce distractibility and improve sound awareness and speech understanding. To insure proper consideration and use of assistive listening devices on students with normal peripheral hearing, the following guidelines are recommended.

##### General Amplification Guidelines

1. The recommendation for use of individual or classroom ALDs must be made by the IEP or 504 planning teams which include a CDE licensed audiologist.
2. All ALDs are selected and managed by an audiologist (to include fitting, installation, in-service training and equipment monitoring).
3. A 30 - 60 day trial period with the ALD is advised to demonstrate and appropriately document its effectiveness for any student who has normal peripheral hearing.
4. A baseline audiogram is obtained prior to the trial period for any student using a personal ALD and hearing levels are monitored at least annually.

##### Candidates

Typically students who exhibit auditory figure-ground and attention/distractibility problems are the most appropriate candidates for amplification.

##### Documentation

The use of pre and post-listening evaluations are recommended to substantiate benefit from amplification during the trial period. The trial period is critical to allow sufficient time for the student to demonstrate benefit as well as sustained use of the device.

##### Assistive Listening Device Options

Personal FM systems provide a direct wireless signal from the teacher, or individual wearing the transmitter, to the individual student wearing the receiver. The transmitter coupling and output options provide considerable flexibility for a variety of situations and individual student needs.

Soundfield systems provide a direct wireless signal from the teacher, or individual wearing the transmitter, to an amplifier which sends the signal to speakers strategically placed in the classroom. The advantage to this arrangement is that there is no equipment for the student to wear.

## Appendix I-1

**Information for Parents****CENTRAL AUDITORY PROCESSING TIPS FOR PARENTS<sup>1</sup>**

1. Set aside specific times during the day to work with your child. Let these times be for you and your child alone.
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. Make commands or directions short and simple.
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.

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<sup>1</sup> D'Antonl, et.al., (1978) *A Parent's Guide to Learning Disabilities: Understanding and Helping Your Child*. Continental Press, 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 hit 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 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 your 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."

# Let's Talk

... for people with special communication needs

No. 20

## What Are Central Auditory Processing Problems in Children?

"Okay, class, before you open your science book to page 95 for the next lesson, get out your homework from yesterday, and put it in the right-hand corner of your desk for me to view; then we'll be ready to start."

Ron takes out his social studies book and stares into space.

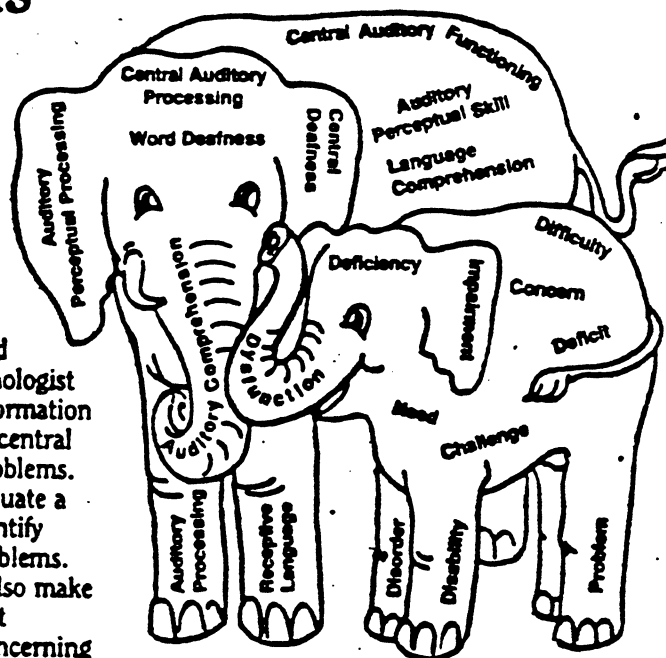
Why didn't Ron follow the teacher's directions? Not listening? Distracted? Not paying attention? Poor conduct? Hearing loss? Any of these explanations is possible. Or maybe Ron hears the sound, but has a problem processing or understanding what is said to him—particularly when the language used is complex, spoken rapidly, or is lengthy, and when there's a lot to look at and lots of noise around him. The inability to understand spoken language in a meaningful way in the absence of what is commonly considered a hearing loss is called a central auditory processing problem. Other terms that have been used interchangeably include: auditory comprehension deficit, central deafness, word deafness, and auditory perceptual processing dysfunction. Frank

Wiek, audiologist and researcher in this area, has described central auditory processing as, "How well the ear talks to the brain, and how

well the brain understands what the ear tells it."

Evaluation by both an audiologist and a speech-language pathologist provides important information about the person with central auditory processing problems. An audiologist will evaluate a child's hearing and identify possible processing problems. This professional will also make recommendations about treatment strategies concerning improving the listening environment and monitoring any changes in hearing status. A speech-language pathologist can evaluate a child's perception of speech and his/her receptive (understanding) and expressive (production) language use. These professionals and a child's teacher and parents can work together to determine the scope of the problem and the most effective treatment techniques.

Two general treatment approaches have been used for central auditory processing problems. One approach focuses on training certain auditory and listening skills such as auditory discrimination (e.g., telling the difference between *peas* and *bees*), localization of sound, sequencing sounds, or identifying a target sound



Your view depends on which part of the elephant you touch.

in a noisy background.

Training these skills in isolation, however, may not help a child to understand complex language, such as a teacher's instructions. Therefore, another approach concentrates on teaching more functional language skills (e.g., vocabulary, grammar, conversational skills) and uses strategies (e.g., visual aids and repeating directions) to facilitate the processing of language.

Changes can also be encouraged at home and in the classroom to help a child with

*continued on back*

central auditory processing problems:

### 1. *Seating*

- Select seating for the child away from auditory and visual distractions to help focus and maintain attention. A seat close to the teacher and the blackboard and away from the window and the door may be helpful.

### 2. *Setting*

- Reduce external visual and auditory distractions. A large display of posters or cluttered bulletin boards can be distracting. A study carrel in the room may help. Ear plugs *may* be useful for distracting noise from a heater or air conditioner, the pencil sharpener, or talking in the hallways. Check with an audiologist to find out if ear plugs are appropriate and which kind to use. Placing mats and cloth poster boards on classroom walls has been shown to decrease the reverberation of noise. A structured classroom setting may be more beneficial than an open classroom situation.

- To improve the listening environment, an audiologist may recommend the use of a device that transmits the teacher's voice directly to the student's ear while blocking out background noise. The audiologist can provide recommendations on the potential benefit of available options based on the child's individual needs.

### 3. *Speaking*

- Gain the child's attention

before giving directions.

- Speak slowly and clearly, but do not overexaggerate speech.

- Use simple, brief directions.

- Give directions in a logical, time-ordered sequence. Use words that make the sequence clear, such as *first, next, finally*.

- Use visual aids and write instructions to supplement spoken information.

- Emphasize key words when speaking or writing especially when presenting new information. Pre-instruction with emphasis on the main ideas to be presented may also be effective.

- Use gestures that will clarify information.

- Vary loudness to increase attention.

- Check comprehension by asking the child questions or asking for a brief summary after key ideas have been presented to be sure the child understands.

- Paraphrase instructions and information in shorter and simpler sentences rather than by only repeating.

- Encourage the child to ask

questions for further clarification.

- Make instructional transitions clear.

- Review previously learned material.

- Recognize periods of fatigue and give breaks as necessary.

- Avoid showing frustration when the child misunderstands a message.

- Avoid asking the child to listen and write at the same time. For children with severe central auditory processing problems, ask a buddy to take notes, or ask the teacher to provide notes. Tape recording classes is another effective strategy.

Central auditory processing problems can affect learning particularly in areas like spelling and reading. It is important to identify problems early and help the child acquire adaptive strategies to compensate. If your child is a "poor" listener, frequently misunderstands speech, and has difficulty following directions, consult an audiologist or speech language pathologist to determine if problems exist.

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