

Navigating the Complexity of Listening Difficulties with the CCHMC Auditory Neurodevelopmental Clinic Questionnaire (ANCQ)

Lisa Hilbert, Au.D.
Cincinnati Children's Hospital Medical Center

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What I do

- Clinical Program Manager
 - Access to care
 - Outreach
 - Community Health
- Craniofacial Team
- Auditory Processing Team (Auditory Neurodevelopmental Team)



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About me

- Ohio University 
- CFY @ Holzer Clinic
- Pediatric Audiologist @ CCHMC
- AuD in 2009 from A.T. Still



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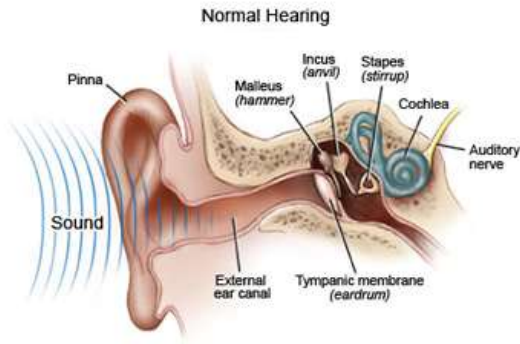
Perks of a large medical center

- So many specialists!
- Electronic Medical Record
- Opportunities & support for development



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How Do We Hear?



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Development of a multi-disciplinary team at CCHMC



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How Do We Listen???

- “Listening is the learned process of receiving, interpreting, recalling, evaluating, and responding to verbal and nonverbal messages.”
- “Listening can be thought of as applying meaning to sound, allowing the brain to organize, establish vocabulary, develop receptive and expressive language, learn and internalize – indeed, **listening is where hearing meets the brain**” -Doug Beck



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The Players

- Who are the specialists?
 - Core Team
 - Internal Practitioners
 - External Resources



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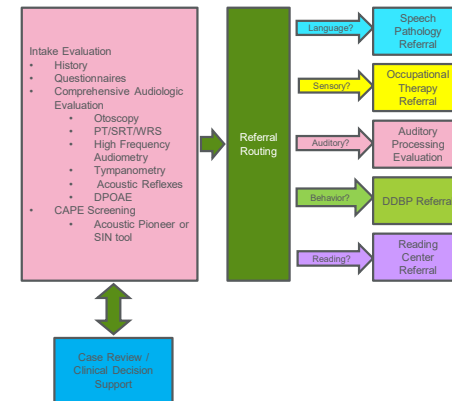
CCHMC Auditory Neurodevelopmental Team

- Audiology
- Speech Pathology
- Developmental & Behavioral Pediatrics
- Reading & Literacy Discovery Center
- Center for Professional Excellence Research & EBP
- Occupational Therapy
- Center for ADHD



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Referrals to Audiology



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Aim

- Determine root cause of listening difficulty
- Ensure that children receive evaluations that they need without spending time and resources on those that they do not.
- Provide exceptional care using innovative solutions and evidence-based practice.



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Development of ANC Questionnaire

- Processing Disorders handout



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Introduction to Processing Disorders

"What does that mean?"

Many of the symptoms and behaviors are the same for different processing disorders. It is often hard for parents to know where to begin.

This brochure will review:

- different processing disorders
- the common behaviors found with the disorder
- evaluation process
- contact information

Talk to your pediatrician about where to start with your child's evaluation.

Have them contact Cincinnati Children's to make the appropriate referral.

513-636-3200

Psychology: ADHD Behavioral Regulation Processing Disorder

Refers to your child's ability to focus on and thoughtfully respond to messages given to him/her.

What to look for:
Your child may have problems:

- listening and following directions
- organizing and finishing tasks
- focusing on a task for a long period of time and may miss details

Your child may also be:


- overly active
- impulsive
- moody

Testing
Children of all ages can be tested. Testing includes an evaluation to:

- measure attention level in different settings
- determine your child's current level of intelligence
- rule out other reasons for his/her over activity or poor attention span.

Processing Disorders: Who Can Help?

Knowing Notes



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Development of ANC Questionnaire

- Processing Disorders handout
- Behaviors rated by parent/caregiver
- Easy to interpret
- Provide guidance for evaluations
- Counseling tool for parents/caregivers

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Speech Pathology: Language Processing Disorder

Refers to your child's ability to understand the message.

What to look for:

- Problems with following directions
- Problems understanding stories or basic concepts
- Trouble "getting to the point" or answering questions with the appropriate information
- Difficulty naming objects or people
- Difficulty knowing what to expect based on information they are given

Your child may also:

- Use slow or "choppy speech"
- Speak in a monotone voice or too loud
- Avoid talking
- Mispronounce words that sound the same
- Use hands or body language when talking
- Avoid reading books

Testing
Children of all ages can be tested. The evaluation includes testing your child's ability to:

- Understand what is heard and read
- Speak

Audiology: (Central) Auditory Processing Disorder

Refers to your child's ability to hear the message.

What to look for:

- Family or teacher is concerned about your child's hearing.
- Poor reading and spelling skills
- Child mishears information (i.e. "hot" for "hop")
- Difficulty hearing in noisy environments

Testing
Testing can be done on children who are at least 8 years of age and have:

- normal hearing (no hearing aids)
- speech that is easily understood by an unfamiliar listener
- ability to wear earphones for at least 1 hour

The hearing test takes 60-90 minutes and includes:

- Listening for soft sounds
- Repeating words in noisy conditions

Occupational Therapy: Sensory Processing Disorders

Refers to your child's ability to use information from all senses.

What to look for:

- Poor coordination
- Difficulty with routine activities
- Short attention span, difficulty focusing
- Constant movement, cannot sit or stand still
- Does not like to be touched
- Poor reaction to sound
- Does not like to be in places with a lot of activity or noise

Testing
Children of all ages can be tested. The evaluation lasts up to 60 minutes and includes:

- Interview with the parent/guardian
- Watching your child's behaviors during a series of activities

"I hate it when it's loud and there is so much going on around me!"

"Did she say page 15 or page 50?"

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Questionnaire Instructions

The purpose of this questionnaire is to identify areas of concern that may be contributing to a child's listening difficulty. Often, children appear to have difficulty hearing or understanding what is said to them because of factors other than hearing loss. These factors include, but are not limited to, auditory processing, cognitive delays, developmental/behavioral issues such as ADHD, anxiety or autism, sensory integration disorder and language processing problems. Our goal in developing this questionnaire is to guide children to evaluations that can provide an answer to their concerns in the most efficient manner. Peripheral hearing loss should always be ruled out prior to investigating these other areas.

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Audiology Domain

Date: _____

Behaviors/Concerns: **"How often does your child..."**

	Always (80-100%)	Sometimes (51-79%)	Rarely (21-50%)	Never (0-20%)
1. Have difficulty hearing in noisy environments				
2. Not respond from a distance (other room)				
3. Mishear words ("hot" for "hop")				
4. Become confused about where to look when there is a sudden sound				
5. Teacher/parent expresses concern that child cannot hear				




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Developmental/Behavioral Domain

Date: _____

Behaviors/Concerns: **"How often does your child..."**

	Always (80-100%)	Sometimes (51-79%)	Rarely (21-50%)	Never (0-20%)
11. Have difficulty organizing and finishing tasks, miss details				
12. Have difficulty focusing on a task for a long period of time (outside area of interest)				
13. Act overly active/impulsive				
14. Develop skills later than their peers				
15. Appear not to hear when involved in another activity				




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Speech/Language Domain

Date: _____

Behaviors/Concerns: **"How often does your child..."**

	Always (80-100%)	Sometimes (51-79%)	Rarely (21-50%)	Never (0-20%)
6. Have problems understanding stories or basic concepts				
7. Have difficulty naming objects or people				
8. Have difficulty knowing what to expect based on information they are given				
9. Have trouble getting to the point or answering questions with the appropriate information				
10. Have problems following directions				




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OT/Sensory Domain

Date: _____

Behaviors/Concerns: **"How often does your child..."**

	Always (80-100%)	Sometimes (51-79%)	Rarely (21-50%)	Never (0-20%)
16. Have poor coordination				
17. Not like to be touched				
18. Not like to be in places with a lot of activity or noise				
19. Show an aversion to certain sounds, textures, clothing, etc.				
20. Have constant movement, cannot sit or stand still				



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Learning & Literacy Domain

Date: _____
Behaviors/Concerns: "How often does your child..." Always Sometimes Rarely Never (80-100%) (51-79%) (21-50%) (0-20%)

- 21. Have difficulty recalling the alphabet, remembering letter names, or letter sounds
- 22. Have difficulty rhyming words
- 23. Have inconsistent recall when reading or spelling familiar words
- 24. Have difficulty understanding what was read (comprehension)
- 25. Family history of reading problems or learning disabilities



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KEY

Auditory Neurodevelopmental Clinic Questionnaire		KEY				
Behaviors/Concerns	Always (80-100%)	Sometimes (51-79%)	Rarely (21-50%)	Never (0-20%)	Domain	
1. "How often does your child..."						
1. Have difficulty hearing in noisy environments					Auditory	
2. Not respond from a distance (other room)						
3. Mishear words ("hot" for "top")						
4. Become confused about where to look when there is a sudden sound						
5. Teacher/parent expresses concern that child cannot hear					Speech/Reading	
6. Have problems understanding stories or basic concepts						
7. Have difficulty naming objects or people						
8. Have difficulty knowing what to expect based on information they are given						
9. Have trouble getting to the point or answering questions with the appropriate information					ADHD	
10. Have problems following directions						
11. Have difficulty organizing and finishing tasks, miss details						
12. Have difficulty focusing on a task for a long period of time (outside area of interest)						
13. Act overly active/impulsive					Attention/Thinking	
14. Develop skills later than their peers						
15. Appear not to hear when involved in another activity						
16. Have poor coordination						
17. Not like to be touched					Sensory/Thinking	
18. Not like to be in places with a lot of activity or noise						
19. Show an aversion to certain sounds, textures, clothing, etc.						
20. Have constant movement, cannot sit or stand still						
21. Have difficulty recalling the alphabet, remembering letter names, or letter sounds					Reading/Writing	
22. Have difficulty rhyming words						
23. Have inconsistent recall when reading or spelling familiar words						
24. Have difficulty understanding what was read (comprehension)						
25. Family history of reading problems or learning disabilities	YES			NO		



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Auditory Neurodevelopmental Clinic Questionnaire

Cincinnati Children's Audiology Auditory Neurodevelopmental Clinic Questionnaire

Name: _____ DOB: _____
MRN: _____

The purpose of this questionnaire is to identify areas of concern that may be contributing to a child's listening difficulty. Often, children appear to have difficulty hearing or understanding what is said to them because of factors other than hearing loss. These factors include, but are not limited to, auditory processing, cognitive delays, developmental/behavioral issues such as ADHD, anxiety or autism, sensory integration disorder and language processing problems. Our goal in developing this questionnaire is to guide children to evaluations that can provide an answer to their concerns in the most efficient manner. Peripheral hearing loss should always be ruled out prior to investigating these other areas.

Behaviors/Concerns: "How often does your child..."	Always (80-100%)	Sometimes (51-79%)	Rarely (21-50%)	Never (0-20%)
1. Have difficulty hearing in noisy environments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Not respond from a distance (other room)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Mishear words ("hot" for "top")	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Become confused about where to look when there is a sudden sound	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Teacher/parent expresses concern that child cannot hear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Have problems understanding stories or basic concepts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Have difficulty naming objects or people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Have difficulty knowing what to expect based on information they are given	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Have trouble getting to the point or answering questions with the appropriate information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Have problems following directions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Have difficulty organizing and finishing tasks, miss details	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Have difficulty focusing on a task for a long period of time (outside area of interest)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Act overly active/impulsive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Develop skills later than their peers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Appear not to hear when involved in another activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Have poor coordination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Not like to be touched	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Not like to be in places with a lot of activity or noise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Show an aversion to certain sounds, textures, clothing, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Have constant movement, cannot sit or stand still	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Have difficulty recalling the alphabet, remembering letter names, or letter sounds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Have difficulty rhyming words	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Have inconsistent recall when reading or spelling familiar words	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Have difficulty understanding what was read (comprehension)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Family history of reading problems or learning disabilities	<input type="checkbox"/> YES	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> NO



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Instructions

Auditory Neurodevelopmental Clinic (ANC) Questionnaire

The purpose of this questionnaire is to identify areas of concern that may be contributing to a child's listening difficulty. Often, children appear to have difficulty hearing or understanding what is said to them because of factors other than hearing loss. These factors include, but are not limited to, auditory processing, cognitive delays, developmental/behavioral issues such as ADHD, anxiety or autism, sensory integration disorder and language processing problems. Our goal in developing this questionnaire is to guide children to evaluations that can provide an answer to their concerns in the most efficient manner. Peripheral hearing loss should always be ruled out prior to investigating these other areas.

This questionnaire is not meant to be a diagnostic tool. It provides information to the referring providers about the caregiver's concerns. This information can be used to guide the referral pathway.

Instructions for use:

1. Have the parent/guardian/caregiver complete the questionnaire based on the frequency of the behaviors described.
2. Use the KEY to find the sum for each domain. Behaviors that are marked as "Always" are worth 3 points. Behaviors that are marked as "Sometimes" are worth 2 points. Behaviors that are marked as "Rarely" are worth 1 point. Behaviors that are marked as "Never" or left blank are worth 0 points. Each domain is represented by 5 behaviors as indicated by the key. For example, 1 through 5 represent the Audiology domain. Behaviors that are described in these 5 lines are auditory-based and can be used as indicators of concern in this area.
3. Once the sum of each domain is determined, identify the area(s) of greatest concern. There is no set number that is indicative of a disorder in one of these domains. Generally, the higher the sum, the greater the concern in that area. Providers should consider referring to professionals in the areas with the greatest concern.

Here is an example:

Behaviors/Concerns	Always	Sometimes	Rarely	Never	Domain
1. "How often does your child..."					
1. Have difficulty hearing in noisy environments					Audiology
2. Not respond from a distance (other room)					
3. Mishear words ("hot" for "top")					
4. Become confused about where to look when there is a sudden sound					
5. Teacher/parent expresses concern that child cannot hear					Speech/Reading
6. Have problems understanding stories or basic concepts					
7. Have difficulty naming objects or people					
8. Have difficulty knowing what to expect based on information they are given					
9. Have trouble getting to the point or answering questions with the appropriate information					ADHD
10. Have problems following directions					
11. Have difficulty organizing and finishing tasks, miss details					
12. Have difficulty focusing on a task for a long period of time (outside area of interest)					
13. Act overly active/impulsive					Attention/Thinking
14. Develop skills later than their peers					
15. Appear not to hear when involved in another activity					
16. Have poor coordination					
17. Not like to be touched					Sensory/Thinking
18. Not like to be in places with a lot of activity or noise					
19. Show an aversion to certain sounds, textures, clothing, etc.					
20. Have constant movement, cannot sit or stand still					
21. Have difficulty recalling the alphabet, remembering letter names, or letter sounds					Reading/Writing
22. Have difficulty rhyming words					
23. Have inconsistent recall when reading or spelling familiar words					
24. Have difficulty understanding what was read (comprehension)					
25. Family history of reading problems or learning disabilities	YES			NO	

It would be recommended to refer the child described by this questionnaire to the Reading & Literacy Discovery Center and Speech Pathology to rule out difficulties in these areas prior to referring for additional evaluations.

Please feel free to contact us with questions or comments. We would appreciate any feedback that you have to offer.

Lisa W. Hilbert, Au.D.
Pediatric Audiologist, Clinical Program Manager
Auditory Neurodevelopmental Clinic
Lisa.Hilbert@cchmc.org
(513) 636-1175



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Audiologic Evaluation+

- Incoming complaint of listening difficulties
- Peripheral hearing = normal



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Audiologic Evaluations

- Audiologic Evaluation+
- Auditory Processing Evaluation



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Audiologic Evaluation+

- Questionnaire
- Extended HF pure tones
- Word recognition in quiet
- Acoustic reflex testing
- DPOAEs
- BKB-SIN screening



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Sample score sheet

BKB-SIN™ Test

LIST PAIR 1				LIST PAIR 2			
List	Key Words	# Correct	SNR	List	Key Words	# Correct	SNR
List 1A	1. They are looking at the clock.	4	+21 dB	List 2A	1. The cat is sitting on the bed.	4	+21 dB
	2. The cat is sitting on the ground.	3	+18 dB		2. The dog is sitting on the bed.	3	+18 dB
	3. Children like strawberries.	3	+15 dB		3. The dog was jumping.	3	+15 dB
	4. They are looking into the boat.	3	+12 dB		4. They are watching the train.	3	+12 dB
	5. The ground between the road.	3	+9 dB		5. The dog played with a stick.	3	+9 dB
	6. The ground with the table.	3	+6 dB		6. The ground between the table.	3	+6 dB
	7. The dog fell to the ground.	3	+3 dB		7. The dog was in a boat.	3	+3 dB
	8. The dog sat on the ground.	3	0 dB		8. The dog is sitting on the bed.	3	0 dB
	9. The dog barked loudly.	3	-3 dB		9. The dog is sitting on the bed.	3	-3 dB
	10. The dog is sitting on the bed.	3	-6 dB		10. The dog barked for the table.	3	-6 dB
Total Key Words Correct _____				Total Key Words Correct _____			
SNR-50 = (23.5) - (# Correct) = _____ dB				SNR-50 = (23.5) - (# Correct) = _____ dB			
Average SNR-50, Lists 1A and 1B = _____ dB				Average SNR-50, Lists 2A and 2B = _____ dB			

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*have child wear transmitter while tester wears receiver



BKB-SIN Pass Criteria

- Use list pairs 1 – 8
- Complete both list A & B
- Average A & B scores (do not age correct) to obtain SNR-50

PASS CRITERIA (Pass Score ≤)

5-6 years ≤ +7.5 dB

7-10 years ≤ +3.9 dB

11-14 years ≤ +2.2 dB

15 years and older ≤ -0.9 dB



BKB-SIN (APD Screening)

- Use the raw score to compare to the Pass/Fail Criteria based upon age
- No need to age correct the score or determine Degree of SNR Loss
- Recent study (Magimairaj et al., 2018) revealed that working memory and language skills do not impact performance



Audiologic Evaluation+

- Questionnaire
- Standard & extended pure tones
- Speech audiometry
- Acoustic reflex testing
- DPOAEs
- BKB-SIN
- Acoustic Pioneer screen



Audiologic Evaluation+

- Acoustic Pioneer: Feather Squadron
 - Screening tool
 - Visual
 - iPad format/special equipment
 - Examiner removed
 - Provides dichotic, decoding and SIN information
 - Program for remediation



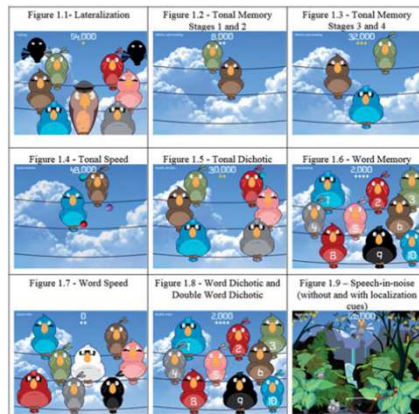
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Acoustic Pioneer

- Ages 5 and up
- 5 minute screening
- Speech in noise, dichotic listening, pitch pattern
- Pass or Refer
- <https://www.youtube.com/watch?v=GMd25ZMa6zM>



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Barker and Purdy; International Journal of Audiology 2015; Early Online: 1-11



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Audiologic Evaluation+

- Questionnaire
- Standard & extended pure tones
- Speech audiometry
- Acoustic reflex testing
- DPOAEs
- BKB-SIN (older kids)
- Acoustic Pioneer screen (younger kids)
- Referrals based on results



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Auditory Processing Evaluation



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Pre-test Materials

APD Definition/Auditory Concerns

Auditory Concern	Example(s)	Professional/Discipline for evaluation and treatment
Sensitivity to specific sounds or Overstimulation from sound	Avoids noisy environments, covers ears during fireworks or fire drills	Occupational Therapist specializing in Sensory processing difficulties
Hearing loss	Inconsistent responses to sound. Seems not to hear.	Audiologist for a standard hearing evaluation
Tinnitus/Hyperacusis	Ring or buzzing sensation in one or both ears. Abnormal sensation of loudness.	Audiologist specializing in Tinnitus & Hyperacusis
Misophonia	Specific sounds trigger irritation, anger, or aggression	Cognitive Behavioral Therapy with a therapist who specializes in this area may be helpful



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Scheduling

- Information Folder (pre-test materials)
- Dedicated Schedulers (Audiology Aides)
- Required Paperwork
 - ANC-Q
 - History form
 - IEP/ETR/Neuropsych/Speech if completed
- Appointment time
- Appointment instructions
- Audiologist Review



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Pre-test Materials - FAQ

- **My child used to have ear infections. They seem to have a hard time understanding. Could they have an auditory processing disorder?**

Scheduling a hearing test is the best place to start. Repeat ear infections or ear fluid can lead to hearing loss. Children that have times of hearing loss are more likely to develop an auditory processing disorder. They may also have speech or language delays. Our team will talk with you about your child's history and communication concerns. This will help us figure out the correct tests.

- **My child is scared of loud sounds and alarms. Do they have an auditory processing disorder?**

Being sensitive to loud sounds can be caused by sensory processing problems. If your child has other sensory processing problems, it would be a good idea to talk with their doctor. Other sensory processing problems may be a dislike of certain foods, trouble wearing certain types of clothes or not liking bright lights. Their doctor may refer them for an occupational therapy evaluation.



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Pre-test Materials - FAQ

- **My child seems fine at home, but their teacher says they don't follow directions in class. The school says they have an auditory processing disorder. Do I need to have them tested?**

An audiologist diagnoses auditory processing disorders. Many different disorders can cause the same behaviors. For example, children with a speech/language disorder will look like they have a tough time "hearing" direction because they do not understand the meaning of the words. Attention problems can also look like listening problems because the child's focus is on something else, and they may miss hearing directions or conversation. An auditory processing assessment will include a hearing test and several different auditory processing tests. It may consist of two appointments scheduled on different days. Testing will be conducted by an audiologist. You can talk about your listening concerns. We will ask you to fill out a form and give us any outside testing results. During this visit, the audiologist will help you figure out the next step.

- **What happens if my child is diagnosed with an auditory processing disorder?**

The audiologist testing your child will share results with you after testing is completed. They will also talk about any recommendations they have. You will be given a written report to share with the child's school and other health professionals.



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Pre-test Materials Candidacy

- Child's primary language must be English.
- APD testing is not valid for children with a moderate or greater language impairment (determined by a speech-language pathologist)
- APD testing is not valid for children with a known mild or greater cognitive deficit (IQ score of 70 or below).
- Child's speech must be intelligible to an unfamiliar listener. Children with verbal apraxia, selective mutism or moderate articulation substitutions are not candidates for formal testing due to the accurate verbal responses required for comprehensive testing.



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Pre-test Materials Candidacy

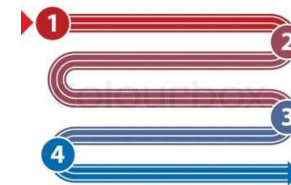
- Child must be 7 years of age or older for formal Auditory Processing Testing. There are very few tests with normative data for children under age 7.
- Child must have normal hearing sensitivity. If your child has any form of peripheral hearing loss, our audiology team can and will work with you on improving access to sound. We cannot process what we do not perceive.
- Child must be able to tolerate wearing headphones or insert phones and attend/sit for at least one hour.
- If a child takes ADHD medication; they must take medication the day of APD testing.



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Selection of Tests

- Where do we start?
- What will answer the question in the shortest amount of time with the greatest sensitivity?



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Test Material

- AP: Feather Squadron
- Scan 3 A/C
- MAPA 2
- BKB-SIN/Quick SIN
- LiSN-S
- Pitch Pattern Sequencing
- Gaps-In-Noise (GIN)
- SSW
- Dichotic Digits
- Competing Sentences
- Phonemic Synthesis


Overall skills/Screening

Speech-in-Noise

temporal

Binaural

Decoding



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Case Studies




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Diagnosis of APD


CAPD continuum.....

Weakness  Disorder

Diagnosis of Disorder if:

- 1) Scores ≥ 2 standard deviations below the mean on 2 tests.
- 2) Score ≥ 3 standard deviations below the mean on one test and accompanied by significant functional difficulty in auditory behaviors.

(Johnson & Seaton, 2012)




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GA History

12 yr. 6 mo.

- Ear infections and 1 set of PE tubes
- ADHD inattentive subtype diagnosis
 - No longer taking medication
- 6th grade – Grades mostly C's
- 504 for preferential seating, understanding checks, small group testing
- Reading at grade level. Does not read for pleasure.
- “Seems to have trouble processing information that is given to her”
- “Works on homework 3 – 4 hours each night. The concepts are explained to her multiple times and she cannot grasp the concepts. She cannot recall what was taught at school the same day and seems to struggle with auditory processing”



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GA ANC-Q

Behaviors/Concerns: "How often does your child..."	Always (80-100%)	Sometimes (51-79%)	Rarely (21-50%)	Never (0-20%)
1. Have difficulty hearing in noisy environments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Not respond from a distance (other room)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Mishear words ("hot" for "top")	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. Become confused about where to look when there is a sudden sound	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Teacher/parent expresses concern that child cannot hear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Have problems understanding stories or basic concepts	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Have difficulty naming objects or people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. Have difficulty knowing what to expect based on information they are given	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Have trouble getting to the point or answering questions with the appropriate information	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Have problems following directions	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Have difficulty organizing and finishing tasks, miss details	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12. Have difficulty focusing on a task for a long period of time (outside area of interest)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Act overly active/impulsive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
14. Develop skills later than their peers	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Appear not to hear when involved in another activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
16. Have poor coordination	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
17. Not like to be touched	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
18. Not like to be in places with a lot of activity or noise	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
19. Show an aversion to certain sounds, textures, clothing, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20. Have constant movement, cannot sit or stand still	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
21. Have difficulty recalling the alphabet, remembering letter names, or letter sounds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
22. Have difficulty rhyming words	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
23. Have inconsistent recall when reading or spelling familiar words	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
24. Have difficulty understanding what was read (comprehension)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
25. Family history of reading problems or learning disabilities	<input checked="" type="checkbox"/> YES	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> NO

Auditory: 0
Sp/Lang: 13
Dev/Beh: 11
OT/Sensory: 9
Read/Lit: 6




49

GA Test Battery

SCAN-3			
Subtest	Raw Score	Scaled Score	Percentile Rank
Auditory Figure Ground +8	39	12	Scaled score: 12, rank: 75
Filtered Words	36	13	Standard score: 13, rank: 84
Competing Words	46	11	Scaled score: 11, rank: 63
Competing Sentences	67	12	Scaled score: 12, rank: 75
Composite Test Score (Scan 3C)	48	115	84

SCAN-3 Supplemental Results			
Subtest	Raw Score	Scaled Score	Percentile Rank
Time Compressed Sentences	58	11	63




51

GA Test Battery

Peripheral Hearing Test

- Normal speech and tonal results
- Excellent word recognition in quiet
- Normal tympanograms
- Acoustic Reflexes present from 1K - 4000 Hz ipsi and contra
- Present DPOAEs in both ears from 2000-8000 Hz




50

GA Test Battery

Phonemic Synthesis Test	
Binaural Quantitative: 25	Adult: normal >= 23
Binaural Qualitative: 24	Adult: normal >= 22

Pitch Pattern Sequence Test (PPS)	
Binaural: 100 %	Adult: normal >= 80%

The Listening in Spatialized Noise - Sentences (LISN-S)			
Measure	Average Score for Age	Client's Score	Normal Limits (within vs outside)
Low-Cue SRT score:	-1.4 dB	-1.2 dB	within
High-Cue SRT score:	-12.3 dB	-9.8 dB	within
Talker Advantage:	6.8 dB	6.2 dB	within
Spatial Advantage:	10.5 dB	8.1 dB	within
Total Advantage:	11.3 dB	8.6 dB	within



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GA Recommendations

- Review results with school to determine need for educational testing
- Consider language processing evaluation
- Discuss ADHD treatment with PCP



53

SV ANC-Q

Behaviors/Concerns: "How often does your child..."	Always (03-10%)	Sometimes (01-70%)	Rarely (01-50%)	Never (0-20%)
1. Have difficulty hearing in noisy environments	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Not respond from a distance (other room)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Mishear words ("hot" for "hop")	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Become confused about where to look when there is a sudden sound	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Teacher/parent expresses concern that child cannot hear	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Have problems understanding stories or basic concepts	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Have difficulty naming objects or people	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Have difficulty knowing what to expect based on information they are given	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Have trouble getting to the point or answering questions with the appropriate information	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Have problems following directions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Have difficulty organizing and finishing tasks, miss details	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Have difficulty focusing on a task for a long period of time (outside area of interest)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Act overly active/impulsive	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Develop skills later than their peers	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Appear not to hear when involved in another activity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Have poor coordination	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Not like to be touched	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Not like to be in places with a lot of activity or noise	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Show an aversion to certain sounds, textures, clothing, etc.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Have constant movement, cannot sit or stand still	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Have difficulty recalling the alphabet, remembering letter names, or letter sounds	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Have difficulty rhyming words	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Have inconsistent recall when reading or spelling familiar words	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Have difficulty understanding what was read (comprehension)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Family history of reading problems or learning disabilities	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Auditory: 8

Sp/Lang: 12

Dev/Beh: 11

OT/Sensory: 8

Read/Lit: 15



55

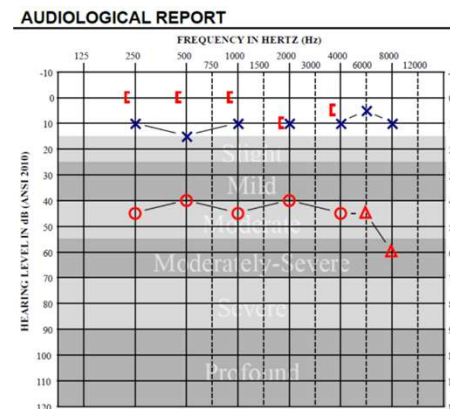
SV History 7 yr. 3 mo.

- 1st grade
- Ear infections and 1 set of PE tubes and T&A
- "Hard time following instruction even when paying attention"
- Phonological disorder & mixed expressive receptive language disorder – private and school therapy
- Poor fine motor/handwriting – OT private and school therapy
- Had 504, now on IEP for extended time and intervention/reading specialist support
- "Has always had trouble with comprehension. She really tries hard and pays attention but still seems to not know what is going on in classroom, during sports, and when asked questions about her birthdate, etc."



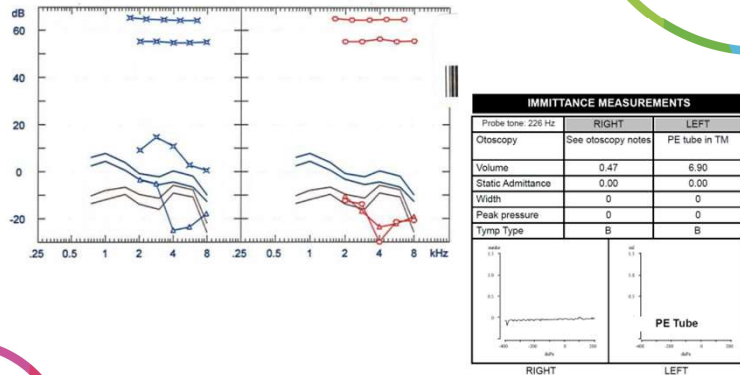
54

SV Test Battery



56

SV Test Battery



57

SV Recommendations

- Follow-up with ENT regarding conductive hearing loss
- Retest hearing when ears are clear
- Preferential Seating in the classroom at least until middle ear fluid has resolved.
- Language processing, cognitive, and attention deficits can appear similar to an auditory processing disorder in a child's academic performance. In-depth evaluation of her reading and literacy concerns would be recommended prior to auditory processing testing. Issues of inattentiveness should be investigated as well. Auditory processing testing may identify areas of weakness to help direct therapies/treatment but would not likely lead to a primary diagnosis in light of her ETR testing results.



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SV Recommendations

Parent emailed ETR after appointment

- Full scale IQ of 73
- She had a significant strength in Verbal Comprehension (SS 84).
- Fluid Reasoning & Working Memory were in the very low range (SS 79). It was noted that her levels of engagement and performance were varied during testing.
- Results on the DAS-II were in the 12th percentile for Verbal Ability, the 4th percentile for Nonverbal Reasoning and the 13th percentile for Spatial Ability.
- Higher scores in Verbal Ability and Spatial Ability with a lower score in Nonverbal Reasoning is not a typical pattern associated with auditory processing disorder
- Referral to Reading & Literacy Discovery Center



58

ER History 17 yr. 4 mo.

- Honor student
- Over past year new onset of difficulty hearing in background noise
- Difficulty hearing at school, during sports and social situations
- Unable to hear cell phone unless on speaker
- Ear infections and 1 set of PE tubes with T&A
- Peripheral hearing test was normal
- Acoustic reflex testing suggested a retrocochlear pathology
 - Referred to ENT – MRI ordered (normal)
- At 10 yrs old, had an orbital fracture and concussion with loss of consciousness
- No new medical issues in past year other than start of menses




60

ER ANC-Q

Auditory Neurodevelopmental Questionnaire	Score
The following questionnaire is intended for the PARENT or CAREGIVER only. Who is completing this questionnaire?	Patient
Have difficulty hearing in noisy environments	Always (80-100%)
Not respond from a distance (other room)	Sometimes (51-79%)
Mishear words (i.e. "hot" for "top")	Rarely (21-50%)
Become confused about where to look when there is a sudden sound	Never (0-20%)
Teacher/parent expresses concern that the patient cannot hear	Sometimes (51-79%)
Have problems understanding stories or basic concepts	Sometimes (51-79%)
Have difficulty naming objects or people	Never (0-20%)
Have difficulty knowing what to expect on information they are given	Never (0-20%)
Have trouble getting to the point or answering questions with the appropriate information	Rarely (21-50%)
Have problems following directions	Rarely (21-50%)
Have difficulty organizing and finishing tasks or missing details	Never (0-20%)
Have difficulty focusing on a task for a long period of time (outside area of interest)	Never (0-20%)
Act overly active/impulsive	Never (0-20%)
Develop skills later than their peers	Never (0-20%)
Appear not to hear when involved in another activity	Rarely (21-50%)
Have poor coordination	Never (0-20%)
Not like to be touched	Never (0-20%)
Not like to be in places with a lot of activity or noise	Never (0-20%)
Show an aversion to certain sounds, textures, clothing, etc.	Never (0-20%)
Have constant motion, cannot sit, or stand still	Never (0-20%)
Have difficulty recalling the alphabet, remembering letter names, or letter sounds	Never (0-20%)
Have difficulty rhyming words	Never (0-20%)
Have difficulty with inconsistent recall when reading or spelling familiar words	Never (0-20%)
Have difficulty understanding what was read (comprehension)	Never (0-20%)
Family History of reading problems or learning disabilities	No

Auditory: 8
Sp/Lang: 4
Dev/Beh: 1
OT/Sensory: 0
Read/Lit: 0

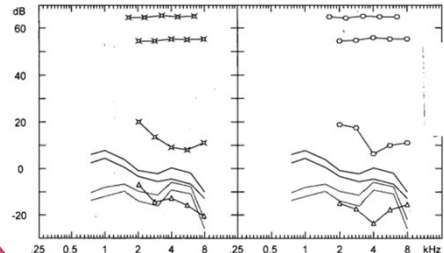


61

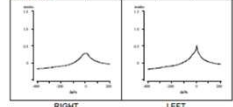
ER Test Battery

SPEECH AUDIOMETRY RESULTS							* masked value	
STM	SAT/ SPT	MCL	UCL	URS/L	ITEMS	HL	MATERIAL	MW/ REC
R	10			100	50		NU-6 LIST 1A	REC
L	10			100	50		NU-6 LIST 1A	REC
SF								
SONE R								
SONE L								


SRT/SAT MATERIAL: N RELIABILITY: Good



IMMITTANCE MEASUREMENTS		
Probe tone: 226 Hz	RIGHT	LEFT
Otoscopy	TM intact	TM intact
Volume	0.77	0.87
Static Admittance	0.31	0.54
Width	102	50
Peak pressure	-1	3
Temp Type	A	A



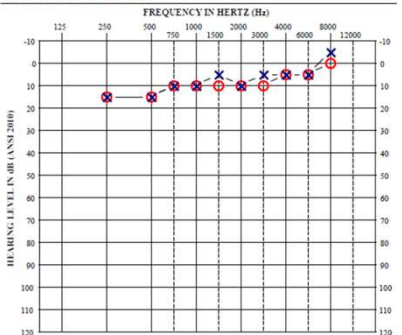
ACOUSTIC REFLEX TESTING					
Tone In	Probe In	500 Hz	1000 Hz	2000 Hz	4000 Hz
R	R	90	95	100	Abs
L	R	Abs	Abs	Abs	Abs
L	L	90	95	Abs	Abs
R	L	Abs	100	100	Abs




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ER Test Battery

AUDIOLOGICAL REPORT



ULTRA HIGH FREQUENCIES (Hz)							* masked value
	8K	10K	11.2K	12.5K	14K	16K	20K
RIGHT	10	-5	0	0	5	0	-10
LEFT	15	5	5	5	-5	-10	-5




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ER Test Battery

ER was a pleasure to work with today. She was able to separate from her mother with no anxiety or concern. She was able to demonstrate excellent motivation and attention for testing. Today's evaluation was thought to be an accurate representation of her auditory processing skills.

ER exhibited significant listening fatigue and her performance would decline with too many presentations in a row. Frequent breaks were taken between subtests. During the LISN-S test, she was given breaks during testing when her ability to participate was declining. For example, when she could not respond with an answer in far better listening environments than she had previously completed. Once she was able to take a listening break, her performance would improve to the previous level.



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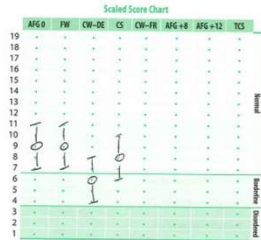
ER Test Battery

SUMMARY OF TEST BATTERY & CLINICAL FINDINGS:

Subtest	SCAN-3		
	Raw Score	Standard Score	Percentile Rank
Auditory Figure Ground II	30	9	37
Filtered Words	30	9	37
Competing Words	38	6	9
Competing Sentences	63	8	25
Composite Test Score	32	85	16

Atypical right ear advantage on dichotic tasks

Pitch Pattern Sequence Test (PPS)	
Binaural 100%	(normal > 80%)
Dichotic Digits (DD)	
Right 100%	(normal > 90%)
Left 89%	(normal > 90%)



The Listening in Spatialized Noise - Sentences (LISN-S)			
Measure	Average Score for Age	Client's Score	Normal Limits (within vs outside)
Low-Cue SRT score:	-1.5 dB	-0.4 dB	within
High-Cue SRT score:	-14.9 dB	-11.1 dB	within
Talker Advantage:	9.1 dB	6.8 dB	within
Spatial Advantage:	12.0 dB	4.6	outside (-4.5 SD)
Total Advantage:	12.8 dB	10.7 dB	within



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ER Recommendations

- Typically, assistive listening technology (FM/HAT System) in the classroom setting is recommended for individuals diagnosed with an Auditory Processing Disorder or a listening weakness in background noise. The purpose of this technology is to significantly improve access and clarity of information and instruction through the auditory channel. ER reported listening difficulty in the classroom as well as outside the classroom environment in situations such as social settings or extracurricular activities. It was recommended that ER consider being fit with a low gain open fit hearing aid that could be coupled to a remote microphone system. She would also be able to stream from her phone, which is a difficult listening situation for her.
- This option would provide ER more flexibility than an FM/HAT System in the classroom. If there are no contraindications for fitting and the medical clearance form is signed, ER should be scheduled for a loaner hearing aid fitting to trial this technology and assess its functional benefit. She can proceed with a personal hearing aid fitting after an appropriate trial if the technology improves her access to speech audibility.



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Vanderbilt Fatigue Scale

VANDERBILT FATIGUE SCALE-CHILDREN (VFS-C)

This scale is designed to assess listening-related fatigue in children aged 6-17 years.

Instructions: Sometimes people feel tired from listening and trying to understand. We would like to know how you feel when you listen in different places. Please read each sentence and mark the **SINGLE** response that best describes how often you feel or act that way in a typical WEEK. Do not skip any questions.

	NEVER	RARELY	SOMETIMES	OFTEN	ALMOST ALWAYS
I want to "zone out" in very noisy places.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is hard for me to concentrate when lots of people are talking.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My brain gets tired after listening all day.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I get worn out from listening at school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trying to listen at school stresses me out.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use a lot of energy trying to listen in class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I want to go to sleep after a long day of listening.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I give up trying to listen when I get tired.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I get so tired from listening that I don't want to do anything else.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel worn out when I have to listen carefully.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

VANDERBILT FATIGUE SCALE-PARENT (VFS-P)

This scale is designed to assess listening-related fatigue in children aged 6-17 years as parent proxy.

Instructions: Sometimes communicating, or just trying to listen and understand, can be physically, mentally, or emotionally tiring for children. For each item below, select the **SINGLE** response that best describes how often your child experiences the following in a typical WEEK. Do not skip any questions.

	NEVER	RARELY	SOMETIMES	OFTEN	ALMOST ALWAYS
MENTAL FATIGUE					
My child gets frustrated when it is difficult to hear.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child prefers to be alone after listening for a long time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child shuts down after listening for a long time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Listening takes a lot of effort for my child.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child gets tired of listening by the end of the day.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child shuts down if he/she becomes frustrated from listening.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child "gives up" in difficult listening situations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PHYSICAL FATIGUE					
My child needs time to relax after school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child is so tired that he/she lays down to rest.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child seems drained at the end of the day.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child is more tired during the week than on weekends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My child needs to relax after a long day of listening.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



66

ER Recommendations

- Online auditory training Zoo Caper SkyScaper
- Interhemispheric activities at home
 - Exercises that require verbal identification of similarly shaped objects which are held in the left hand and recognized through tactile sensation in the absence of visual cues.
 - Exercises that require the child to find a particular object or shape with the left hand in the absence of visual cues.
 - Exercises that require the child describe an object that he has in his left hand and to label it verbally in terms of shape, texture, identification etc.
 - Describing a picture while drawing it.
 - Singing to music.
 - Responding motorically with the left side of the body to a targeted verbal command. (Bellis, T. (1996) Chermak, G. & Musiek, F. (1997).



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ER follow-up

- Fit binaurally with loaner Oticon Real1 RITEs with Connect Clip
- Only likes to wear Right device
- 9 – 10 hours wear-time each day
- “Extremely satisfied”
- Decide to purchase personal device – right only
- Positive feedback from friends



69

KH ANC-Q

1. Have difficulty hearing in noisy environments	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Not respond from a distance (other room)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Mishear words ("hot" for "hop")	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Become confused about where to look when there is a sudden sound	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Teacher/parent expresses concern that child cannot hear	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Have problems understanding stories or basic concepts	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Have difficulty naming objects or people	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Have difficulty knowing what to expect based on information they are given	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Have trouble getting to the point or answering questions with the appropriate information	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Have problems following directions	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11. Have difficulty organizing and finishing tasks, miss details	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
12. Have difficulty focusing on a task for a long period of time (outside area of interest)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
13. Act overly active/impulsive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
14. Develop skills later than their peers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
15. Appear not to hear when involved in another activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
16. Have poor coordination	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Not like to be touched	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
18. Not like to be in places with a lot of activity or noise	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Show an aversion to certain sounds, textures, clothing, etc.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Have constant movement, cannot sit or stand still	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
21. Have difficulty recalling the alphabet, remembering letter names, or letter sounds	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
22. Have difficulty rhyming words	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
23. Have inconsistent recall when reading or spelling familiar words	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Have difficulty understanding what was read (comprehension)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Family history of reading problems or learning disabilities	<input checked="" type="checkbox"/>	YES	<input checked="" type="checkbox"/>	NO

Auditory: 11

Sp/Lang: 11

Dev/Beh: 2

OT/Sensory: 10

Read/Lit: 9



71

KH History 15 yr. 6 mo.

- Previous APD evaluation = an auditory integration deficit
- Difficulty with processing speed. Misunderstands what is said to her. Historically, she has not learned well through auditory instruction.
- Speech/Language therapy from 2 years of age through 3rd grade. Some issues persist ("yogrit" for "yogurt")
- Ambidextrous. Previously wrote with her right hand, but switched to left in 2020 after a bone fracture.
- Concerns with hearing in right ear. Sounds can be muffled. Experiences ringing and popping.
- History of chronic ear infections and strep. 1 set of PE tubes
- PT for issues in knees, ankles, hands, etc (later Dx of EDS)
- Anxiety
- Asthma
- Color vision deficiency



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KH Test Battery

Peripheral Hearing Test

- Normal speech and tonal results
- Excellent word recognition in quiet
- Normal tympanograms
- Acoustic Reflexes present from 1K - 4000 Hz ipsi and contra
- Present DPOAEs in both ears from 2000-8000 Hz



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KH Test Battery

SCAN-3			
Subtest	Raw Score	Standard Score	Percentile Rank
Filtered Words	27	9	37
Competing Sentences	64	10	50

Phonemic Synthesis Test	
Binaural: 20	(normal ≥ 23)

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Non-linguistic areas	
Lateralization	Normal
Tonal-Pattern Temporal Processing	Significant weakness (-2.9 SD)
Rapid Tones	Moderate weakness (-1.5 SD)
Dichotic double-sounds	Normal
Linguistic areas	
Word Memory	Significant weakness (-2.0 SD)
Rapid Speech	Mild weakness (-1.3 SD)
Dichotic Double Words	Normal
Speech in Noise (without localization cues)	Significant weakness (-4.0 SD)
Speech in Noise (with localization cues)	Normal



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Post-therapy (4 months)

Non-Linguistic Area

Lateralization		Normal	
Tonal-Pattern Temporal Processing	Normal	significant weakness	-2.9 SD
Tonal-Pattern Memory	Normal	significant weakness	-2.9 SD
Rapid Tones	Mild weakness (-1.0 SD)	moderate weakness	-1.5 SD
Dichotic Double-Sounds		Normal	

Linguistic Area

Word Memory	Normal	significant weakness	-2.0 SD
Rapid Speech	Normal	mild weakness	-1.3 SD
Dichotic Double-Words		Normal	
Speech-in-Noise (without localization cues)	Normal	significant weakness	-4.0 SD
Speech-in-Noise (with localization cues)	Normal	Normal	

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KH Recommendations

- KH may benefit from Insane Airplane, an auditory training activity available at www.acousticpioneer.com. This online game provides activities designed to improve a variety of tonal listening and processing skills, including pitched tones, frequency sweeps, memory and lateralization.
- Additional training using the Elephant Memory app may be considered after completion of Insane Airplane.



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