An Overview of Auditory Processing Disorder Subtypes and Practical Therapy Tips

Lynn Carahaly, M.A., CCC-SLP

Hearing vs. Listening

Hearing
• The ability to detect sound. Screening tests the ability to hear a pure tone at 15 dB HL across various frequency levels.

• Hearing occurs 24-hours-a-day, even during sleep.

• A hearing loss affects both hearing and listening by altering the sounds the brain receives.

Listening
• What we DO with Sound and making sense of what we hear.

• Listening is active hearing. The brain interprets every sound that comes into the ears and screens out or ignores unimportant sounds.

• The brain not only receives and interprets sound, it actively processes or thinks about the sound.

Humans can discern sounds ranging in loudness from a quiet murmur to a cannon shot, and spanning over ten octaves in pitch; if we translated vision to the same scale, we can only see a tenth of the corresponding dynamic intensity from dim to bright and only one "octave" of visual light frequency.

What is an Auditory Processing Disorder?

An APD (also known as CAPD) occurs when the neural processing of auditory input in the CNS is impaired. It can affect a variety of areas that depend on proper processing of auditory input such as:

- Listening in the presence of background noise
- Discriminating similar-sounding speech sounds
- Following directions
- Phonological awareness
- And other areas

The auditory system is responsible for processing information related to:

- Sound Localization - To identify the source of a sound in your environment.
- Auditory Attention - To attend, focus, or listen to sound.
- Auditory Discrimination - To distinguish between sounds or words that are similar or different in the way they sound.
- Auditory Closure - To fill in the missing pieces of sounds or words.
- Auditory Anticipation - To expect what sound is coming next.
- Auditory Temporal Processing - To analyze the timing and pattern of sounds.
- Auditory Memory - To sequence sounds, words, or other meaningful combinations. To receive, store, process, and recall auditory information.
- Auditory Cohesion - To understand the meaning, abstraction, and intention of verbal communication and music.
- Auditory Figure Ground - To perceive speech or other sound when other competing sounds are present.
- Auditory Scene Analysis - To separate sounds when a large mixture of sounds is present.
Speech Sound Disorders and Speech Perception

- Increasingly, research is suggesting and supports the view that subtle auditory processing deficits make up part of speech output disorders.

- Children with CAS, for example, demonstrate poorer perception of vowels compared to normally developing children (Maassen, et al., 2003). Children with CAS, demonstrate poorer phonemic perception and phonological awareness skills than their normally developing peers.

- Children with severe phonological disorders perform more poorly than typically developing children matched for age, gender and nonverbal IQ on speech perception tasks (Edwards et al., 2002).

Studies like these, and other studies with similar findings, contribute to the speculation that difficulty with perceptual task might be one of the underlying causes of various speech sound disorders. The question remains, does a child fail to perceive auditory speech contrasts because he or she does not produce the contrast, or does the child fail to produce the contrast because he or she cannot perceive the contrast?

Left Hemisphere APD

- Difficulty understanding speech in noise
- Poor perception of speech sounds
- Can demonstrate poor phonological awareness skills & poor word attack skills
- Hard time analyzing wholes into their constituent parts (segmenting)
- Show difficulty in syntax, semantics, and vocabulary skills
- Difficulty following a multi-step direction
- Poor auditory memory

Right Hemisphere APD

- The Right Hemisphere is more responsible for aspects of prosody
  - Pitch patterning (syllable and word stress)
  - Durational patterning
- It’s not what you say, it’s how you say it!
- Misconstruing the intent of the speaker can be a problem
- Difficulty with perceptual judgment deciphering if a speaker is being sincere or sarcastic
- Individuals can have a monotone voice, pitch problems, or an awkward cadence

Addressing Prosody

Therapy should incorporate developing accurate prosody skills from the very beginning.

Examples:
- Omitting the weak syllable (unstressed syllable). For example “banana” is pronounced as “nana”.
- Overstress the weak syllable in a word resulting in equal syllable stress or inappropriate syllable stress. “baby” incorrectly pronounced as “baBY”.

It is tempting to emphasize the omitted syllable to make sure the child “hears” what they left out: BAnana. A common mistake practitioners and parents may make is to model inappropriate syllable stress and prosody when trying to correct the child. Do not encourage accurate articulation at the expense of prosody.

It is recommended to preserve the natural tone and rhythm of the phrase. Do not model unnatural prosody for words, phrases or sentences.

Example: “I – want – juice.”

Other examples of prosody

- **lexical stress**, targeting appropriate syllable stress at the word level (caNOE vs. TAco).

- **sentential stress** (stress of a whole word at the phrase or sentence level:

  Mom wants *chocolate* ice cream.
  Mom wants chocolate *ice cream.*
  *Mom* wants chocolate ice cream.

- Jim likes racing cars
Remove speech to work on auditory processing for prosody

- Blowing into the kazoo, the child must imitate the number of “toots” he or she hears. This is a listen and repeat tasks. The practitioner or parent “toots” three times, then the child’s “toots” three times. This correlates with the number of syllables in a word.

- **Duration pattern** of the “toots”. For example: short-long-short, or long-long-short.

- **Pitch pattern** of the “toots”. For example: low-low-high, or high-low-high.

- Blowing in the kazoo, the child must imitate the pattern of the “toots” with varying pitch, duration, and tempo, and volume.

**Interhemispheric Integration APD** (The way the two hemispheres interact and communicate with each other)

- Usually one aspect of a child’s overall difficulties
- Difficulty connecting language and tone
- Significant difficulty listening in noise
- Both sight words and word attack skills are poor
- Note taking can be very hard because of integration of auditory and visual skills
- Sensory integration issues are not uncommon

**Phonological Awareness**

Phonological awareness refers to knowledge of the sound units (phonemes) used in a language, including the ability to hear and produce separate phonemes.

- Rudiments of compound words
- Syllables in words
- Rhyme unit starting point within syllables
- Individual phonemes contained in rhymes
- Individual phonemes contained in consonant clusters
- Evaluating same versus different of phonological segments
- Counting phonological segments
- Manipulating phonological segments
Deficits in auditory processing skills are strongly linked to difficulties with reading and spelling particularly phonological awareness. Children with deficits in one or more areas of phonological processing abilities may have more difficulty learning to read than those who do not.

**Early Intervention is Key!!!**

- Children with perceptual difficulties are particularly susceptible to phonological awareness and persistent reading and spelling disorders in addition to their spoken communication difficulties.

- Intervention for children with more severe speech sound disorders may have processing problems. Thus therapy must facilitate skills underlying reading development in addition to resolving speech deficits in order to improve the spoken and written language outcomes of this population (McNeil et al., 2009).

- Including phonological awareness and pre-literacy development as part of a child’s overall intervention plan to minimize the risk of reading challenges is critical (Lewis et al., 2003; Skinder-Meredith, 2003).

**A Word About Auditory Memory**

A component of memory called the phonological loop, provides short, exact storage of auditory content. A phonological memory deficit is usually expressed by poor decoding of new words rather than reading of familiar material; particularly words long enough to decode by means of storing intermediate sounds.

Furthermore, an individual may have difficulty following multi-step directions not exclusively because he or she has a processing problem but rather or in addition to an auditory working memory problem. The child may not be able to hold on to the auditory information verbally presented to them long enough to process the information.

Don’t ignore auditory working memory!

**Activities to perform in order to promote phonological awareness:**

- Rhyme awareness:
  - Identify words that rhyme
  - Producing a rhyme

- Phonemic awareness:
  - Identify the beginning sound of a word

• Identify the ending sound of a word
• Identify the middle sound of a word

  o Segmenting and blending:
    • Segment sentences into words
    • Segment words into syllables
    • Segment words into sounds
    • Blend syllables into words
    • Blend sounds into words

  o Phonological manipulation:
    • Delete syllables from words
    • Substitute syllables in words
    • Delete sounds from words
    • Substitute sounds in words

Teach children the sounds of letters very early on in treatment. This will not only help with phonological awareness skills, this will also help with articulation skills as well.

Q and A

Thank you!

Lynn Carahaly, M.A., CCC-SLP
Chandler, AZ
lynn@Speech-EZ.com
www.Speech-EZ.com
@LynnCSLP