

## **AUDITORY AND LANGUAGE PROCESSING DISORDERS**

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If you were a young student with a processing disorder that was sitting in a noisy school hallway where your teacher announced “listen here all of you, settle down quietly and stand in line”, you might hear “histen ear olive you sit on down quietly nstandwin line.” You are thankful that this routine is familiar. As you look around you notice that no one else is deviating from the typical “stand and wait” and you obediently follow the directions. As an older student sitting in a noisy lecture hall setting, a professor may ask students to “conduct an orderly analysis of samples extracted from organisms in Atlantic and Pacific Oceans, but you heard “conductor analysis of samples exactly from organisms in atlantis on specific notions”. However, if you were sitting quietly, alone with the teacher in either of these situations, you may have heard each assignment accurately.

Although there is some evidence that children “grow out” of an auditory processing delay, there are many children who experience the enduring negative impact of processing problems on through adulthood. Processing auditory information accurately is crucial for learning and communicating in daily living. The behavioral characteristics of processing disorders can be confused with other disorders, such as Attention Deficit Hyperactivity Disorder (ADHD) and Learning Disabilities (LD), which can make the identification and intervention planning difficult for professionals. This confusion may also contribute to common misperceptions held by peers, teachers, parents and employers.

### **What are auditory and language processing disorders?**

There are three general levels that speech sounds travel through while we are “listening”. The first level refers to the reception of sounds that occurs within our ears. A person who is diagnosed with a hearing impairment has difficulties perceiving sounds at this level. This problem is not referred to as a “processing disorder.” Central auditory processing disorders (CAPD) refer to difficulties discriminating, identifying and retaining sounds after the ears have “heard” the sounds. Individuals who experience difficulties attaching meaning to sound groups that form words, sentences and stories are often diagnosed with language processing disorders. They may also experience similar difficulties processing and organizing language for meaning during reading. A combination of difficulties often occurs, requiring careful assessment for appropriate recommendations for possible treatment. Individuals with central auditory processing disorder and speech-language disorders are under the protection of the Americans with Disabilities Act (ADA).

## **What are some characteristics of processing disorders?**

There are several characteristics that individuals with a processing disorder may exhibit. Typically, these children show difficulties listening in the presence of background noise, localizing sounds, following directions, and attending. Similar sounding words are often confused and some individuals may experience sensitivity to specific sounds. Reduced recognition of stress patterns and word boundaries within sentences is often present, especially during rapid speech or listening without visual cues (e.g. telephone conversation). Processing and comprehension of new vocabulary words or information spoken too quickly or in a noisy environment is difficult, so individuals may often respond with vague statements such as “Huh?”, “What?” and “I don’t get it”. Individuals experience fatigue toward the end of classes, a school day or a work day from the intense concentration they need for listening. Some individuals with processing problems may resort to daydreaming or disruptive behaviors in response to the frustrations experienced from communication breakdowns. At times, only parts of messages are received accurately, so that messages and directions often appear incomplete. Specific language processing deficits are often reflected in delayed responses, the need to rehearse statements, and/or the need for frequent reviews while learning new information. Individuals with language processing deficits may have difficulties understanding language concepts making it difficult for them to integrate new ideas with prior knowledge. Academic difficulties in the areas of phonics, reading, and spelling may be particularly weak, in addition to general listening and note-taking skills.

Inconsistent performances are one of the most common characteristics of auditory and/or language processing difficulties, so individuals may often be perceived as unmotivated, lazy, over-dependent, pragmatically awkward, or inattentive. For example, children with auditory processing deficits may show stronger academic performances in a quiet, one-on-one learning setting than they do in the classroom. When information and routines are more familiar, some children may be able to complete directions and messages independently. Children with language processing problems may experience more learning success when new information is broken into smaller ideas and represented in multisensory ways, such as visual maps.

These, as well as other behaviors, may be signs of a central auditory processing disorder (CAPD) and/or a language processing disorder. Individuals do not need to show all of these characteristics in order to have a processing disorder, however, the possibility of a processing disorder ought to be explored if any of the symptoms mentioned are present. CAPD is often misunderstood because many of the behaviors noted above may also appear in other conditions. CAPD can exist by itself or be part of a larger problem such as a learning disability (LD) or attention deficit - hyperactivity disorder (ADHD). Symptoms of CAPD can range from mild to severe, and can look differently among individuals who learn

## **What are some ways to communicate best with someone who has processing disorders?**

Communication strategies that enhance one person's processing abilities may not necessarily have the same positive impact on another. Typically, strategies that are most useful help individuals organize information before they listen, comprehend information during listening and remember information after listening. Before listening begins, individuals must be attending to the speaker and be able to anticipate the most likely topic within a particular context. Extraneous noise ought to be minimized and the level of speech may need to be increased. It is sometimes helpful to enhance attention by telling the child the topic and organization of the information they will hear, such as, "I am going to tell you the four steps to complete this experiment". It can also be helpful to paraphrase and restate key information in a clear way, by using statements such as "Another way of saying the same thing is.." or "the main idea is..", in order to enhance comprehension. Visual gestures, expressions, models and pictures should be monitored and used to clarify spoken messages. During classroom and extracurricular activities, it is often helpful to assign the child a "buddy" to check assignments, notes, and directions. Learning to organize notebooks and use a schedule or an assignment book are important for remembering information, messages and directions at later times. Allowing students time to record important information and encourage them to check for accuracy is necessary.

Specific recommendations include the following:

1. Break down instructions into a simple and specific list of actions. "Wash your hands first; come back to the dinner table after" is more specific than "Go get ready; it's time to eat".
2. Obtain visual attention first and then slow down the rate of speaking.
3. State the main topic, give the information, and restate the most important idea.
4. Allow more time for processing and comprehension of the instructions and allow the student time to paraphrase what they have heard. This allows the speaker to identify errors and correct them. The whole message does not need to be repeated, but the missing information should be added.
5. When a student is learning new information or material, be sure to check that they have processed new terms and concepts accurately.
6. The use of meaningful gestures and visual aids is important.

Most audiologists conduct comprehensive tests to determine if pure tone hearing is normal, in addition to determining if central auditory processing abilities are age appropriate. The audiologist can make the final diagnosis of a central auditory processing disorder, as the specific site of the problem can be located within the central auditory nervous system. The general purpose of the testing is to determine how well the child is able to hear speech messages with one or both ears under unfavorable conditions compared with other children of the same age. This testing helps identify if children experience more difficulties identifying spoken messages in noisy classrooms, extracurricular environments, as well as home and general public settings.

### **What intervention is available?**

The type of intervention that is recommended is based on the individual's specific profile of strengths and weaknesses. Intervention typically includes a combination of specific training in the areas of auditory and phonological awareness skills, language processing skills, as well as functional organization and study skills. A "metacognitive" training approach refers to learning to "think about thinking". This approach is helpful when learning compensatory strategies that will help facilitate processing by applying strategies within specific situations. A combination of language and cognitive skills training is important for building and reinforcing tools that the individual needs to better process information for meaning by "filling in the blanks".

Students can learn compensatory strategies in the context of therapy that include watching for visual cues to enhance meaning, listening for main ideas, concentrating on the speaker, asking specific clarification questions rather than making open-ended comments such as "I don't get it", screening out background noise, and checking comprehension frequently. Other compensatory strategies may include using an F.M. (Frequency Modulated) amplification system in a classroom setting, or reducing noise levels. An F.M. system is a wireless system that is used to improve the auditory signal quality. The use of the F.M. system helps to maximize the level of the teacher's voice, while background noise and poor acoustics are minimized since the individual receives the teacher's voice as if in a one-to-one listening situation. Other classroom modifications, such as carpeting, felt-bottom chairs, and white erase boards, are used to absorb and reduce acoustic reverberations. It is important for individuals to learn how to advocate for themselves assertively with teachers and employers.

to compensate with other strengths they may have. Trained professionals, such as speech-language pathologists and audiologists who specialize in CAPD and language processing, can help to determine if you or your child has a processing disorder.

### **What causes processing disorders?**

The auditory nervous system refers to the pathway that carries sounds from the inner ear to the brain for understanding. This system is continuously developing until approximately twelve years of age. There are currently no conclusive studies available that identify the specific reasons that the auditory system of one child develops more quickly than that of another child, or that indicate reasons some children require extensive assistance developing these skills. Some professionals suggest that chronic ear infections may increase the possibility of processing problems, although current studies available show inconsistent findings that make it difficult to confirm this perspective (Teele et al., 1990). Other studies have proposed that genetics may play a role in delayed auditory processing development. Still others report that head trauma and lead poisoning may cause processing deficits. Potential causes are not attributed to the child's intellectual capacity, educational approaches or parenting styles. However, weak cognitive abilities and the presence of associated disorders, such as ADHD, may further interfere with auditory and language processing accuracy.

### **How are processing disorders diagnosed?**

Processing disorders are identified through the combined effort of neuropsychologists, speech-language pathologists and audiologists. Neuropsychologists assess a student's cognitive capacity and actual achievement in order to identify the presence of a specific learning disability, as well as to provide a profile of strengths and weaknesses that help determine the most efficient types of therapy approaches.

The speech-language pathology evaluation is necessary for assessing skills important for comprehending language mostly under optimal, quiet test conditions, and for implementing an individualized treatment plan for improving areas of weakness. Specific skills critical for processing language, such as auditory memory, phonological awareness, vocabulary, grammar and comprehension of language concepts, are measured and compared with age level peers. Word retrieval and expressive language skills are also evaluated as part of a comprehensive assessment, in addition to a specific assessment of verbal recall skills that are necessary for many of the audiological subtests. Speech and language testing also incorporates pure tone hearing and speech-in-noise discrimination screenings in order to identify potential processing problems that require further testing from an audiologist.

### **When is a referral for evaluation indicated?**

An individual who presents with developmental speech and language delays may be at risk for associated central auditory and/or language processing difficulties. It is important to keep in mind the characteristics listed above. If you or your child has difficulty listening in the presence of background noise, has difficulty following directions, needs frequent repetition of information, responds frequently with “what?”, is sensitive to particular sounds, or presents with other speech-language communication problems, a referral may be indicated. Comprehensive assessment information from a speech-language pathologist, a specialized audiologist and a neuropsychologist is necessary to generate an accurate diagnosis and create relevant treatment goals and accommodations.

Teele, D., Klein, J., Chase, C., Menyuk, P, & Rosner, B. (1990). Otitis media in infancy and intellectual ability, school achievement, speech and language at age 7 years. *Journal of Infectious Disease*, 162, 685-694.