

The Importance of Auditory Processing

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What is auditory processing? Auditory processing is the ability to take in and immediately utilize information from sounds in our environment. There are several forms of auditory processing.

When most people use the term “processing”, they are referring to auditory sequential processing, which is the ability to take in sequences of auditory information and immediately be able to work with that information, either by repeating the sequence or by using the information in language production or other action. Many standardized intelligence tests have used “digit spans” as part of their assessment.

Auditory tonal processing is the ability to distinguish tones within sounds. A person who consistently misunderstands similar sounding words may have a tonal processing problem. A person with typical hearing acuity who sounds like one who is hearing impaired may also have a tonal processing problem.

Some individuals process sound very slowly. This slow processing is called “rate processing” and may have to do with metabolism and with connections in the brain.

ICAN Neurodevelopmentalists have called auditory sequential processing “The greatest piece of cognition”, and “The greatest secret in education”. It is the aspect of mental function that has greatest impact on the level of success your child will enjoy in his or her life.

What is the impact of auditory processing on function and life? Sequential auditory processing is related to short term auditory memory and it relates to many important skills needed to be successful in school and in life. It is about holding pieces of sound together in short term memory. This includes all sounds including those within words and words themselves. Students who process well are able to hold pieces of auditory information together in short term memory long enough to use phonics to decode unfamiliar words, apply phonics “rules”, remember directions, make decisions, understand receptive language, produce expressive language, get the main idea of a piece of writing, produce written language, follow a conversation, make peer group friends, succeed in social situations by picking up on social cues, maintain attention, make wise decisions, use logic, work successfully with word problems in math, and successfully comprehend reading. Those who do not process well struggle in these areas.

As adults, those who process well are the skilled achievers, the leaders, and the decision makers. Those with processing challenges have difficulty making decisions, challenges in finding and keeping jobs that pay well, and have difficulty coping with the social side of life.

What is the impact of auditory processing on language? If you have a child who has a significant delay in language, auditory processing may be one of the largest pieces of the puzzle. Sequential auditory processing is a vital part of language, both receptively and expressively. Children who do not process one piece of auditory information do not use words to communicate and do not understand the words that are said to them. It takes about two pieces of auditory information held together in short term

memory to produce couplets in speech, such as “up please”, “want drink”, and “go bye-bye.” As processing increases, so the length of spoken phrases and sentences and their complexity also increases.

If your child is having difficulty with language, it is very important to rule out fluid or infection in his or her middle ears by use of a tympanogram. The tympanogram is an inexpensive non invasive test used to assess middle ear function. Parents should ask for a copy of the print out of the tympanogram for their records and so they can see the results themselves. A good tympanogram should have a nice peak like an inverted V. If a the printout looks low or flat, or if it is interpreted as indicating “retracted” tympanic membranes, there may be fluid. Parents of children with genetic disorders such as Down Syndrome, should never settle for tympanograms that are typical “for Downs”. Tympanograms that are typical for anyone should be the goal if excellent auditory processing is to be obtained.

Simply looking in the ears, even by experienced professionals, has historically missed significant middle ear fluid problems. Fluid muffles sound and causes enough inconsistent reception of sound so that the child may rarely hear sounds the same way. Since it takes a great deal of input of clear sound for the brain to learn to process, anything that interferes with the reception of sound can delay auditory development. For every month that a child’s ears have been compromised with fluid or infection, the child’s auditory processing and his or her development is delayed by a month. In fact, when neurodevelopmentalists look back on developmental histories of children with developmental delays, health issues with the ears are one of the most common causes. Therefore, it is imperative to effectively address any health issues that impact the development of processing.

What is the impact of auditory processing on social skills? Typically, it takes us about a year to develop one “digit” of processing and about another year to add another “digit”. We increase processing one digit per year of age until we are about 7 years old and then many people plateau unless specific input is available to increase processing to higher levels. Our thinking, behavior, and communications are strongly correlated with our processing level. When children process at lower levels than their more typical peers, they can often be left behind socially. Their attention span is less than that of their peers, causing them to act more like younger children. Peers may interpret their behavior and their language as “babyish”. Not holding together enough words to get the meaning of social nuances can cause peers to avoid interaction with a lower processing child. Not understanding the intent of pragmatic language can make a lower processing person a laughing stock in a mean spirited social group. Of course, interrupting others and not getting the point of what the peer group is saying can make a person unpopular.

What is the impact of auditory processing on attention and focusing? Our attention spans are closely related to our auditory processing. As processing increases attention span also increases.

What is the impact of auditory processing on behavior? Behavior also reflects auditory sequential processing. Generally, we act and speak our “processing age”. So, if someone (no matter how old they are) can only sequence two pieces of auditory information, those around them may experience “terrible two” behavior and two year old receptive and expressive language until they are able to increase the

person's processing to three, which usually reflects more reasonable thinking, more communicative language, and a more cooperative social stage.

If a person is processing only 5 digits of auditory information, he is developmentally more like a 5 year old. He may be inattentive or impulsive, not think about the consequences of his behavior, often interrupt others (because he doesn't want to forget what he wants to say), be socially inappropriate and immature, have few friends, play with younger children who are cognitively more at his level, and not "get" series of directions from his teachers, parents, or as an adult, his spouse or employer.

What is the impact of auditory processing on reading? If you are a parent who has employed numerous phonics programs without success, it is important to realize that your child's lack of mastery probably is neither because of your curriculum choices nor your skill as a teacher. For young students who struggle with phonics as they are learning to read, low auditory processing is most probably a large part of the cause. It takes auditory sequential processing of about 5 digits to begin working with phonics and at least an auditory digit span of 6 to apply phonics well. The child with low auditory processing will continue to struggle with decoding unfamiliar words no matter which phonics approach is used. Remediating the auditory processing cause, is often a major key to success in reading.

What is the impact of auditory processing on other academic areas? Students who encounter difficulty when they reach middle school, upper grades, and high school, may not have enough auditory sequential processing skill to empower the cognitive skills that are required there.

The most important cognitive skill area is that of conceptualization. Conceptualization is the ability to think in terms of words and thus derive meaning from groups of words. Since words are pieces of sound that must be held together and processed in short term memory in order to be thought about, without adequate auditory sequential processing, higher levels conceptualization are not possible.

Those who do not conceptualize well may have difficulty with math word problems, reading comprehension, getting the main idea of essays, working with logic problems, understanding lectures, and writing essays. Remediating auditory processing in the early grades effectively circumvents these academic problems in the upper grades, high school, and in college.

What is the impact of low auditory processing on our nation? By reading the documents written by our country's founding fathers, we can observe extremely complex language and cognitive thought indicating higher levels of auditory processing than we commonly observe today. These individuals were reared in an auditory society where families spoke to one another and their neighbors and learned listening skills. The modern visually stimulating inventions such as television and videogames were not vying for their attention as they developed their cognitive skills.

Their greater ability to conceptualize about the important political issues of their day led them to want to vote for candidates based on their values and thoughts. Unfortunately, today, due to our lower ability to conceptualize, we often vote for the tallest or best looking candidate or the one who can generate the cutest short glib sound bites.

What is the impact of low auditory processing on success at school and on the job? The teacher may say, "Take out your math book, turn to page 55, do the first set of problems." Because of the number of words, a child with low processing, may not "get" all of the assignment or may be confused by some of the details. Your child may miss large parts of the assignments because he can not hold all of the information together in his short term memory.

An adult with the same challenges may not comprehend instructions given by supervisors and may find himself with limited occupational prospects or having difficulty on the job due to not comprehending social situations there.

Of course, these people get in trouble a lot for "not listening", not following through with assignments, and having to be reminded to do their responsibilities. Adults may find it difficult to make decisions, to express themselves, or to comprehend the consequences of financial decisions. Such individuals are often misunderstood as lacking in self control or diligence when they actually may be well meaning, doing their best, and desiring to cooperate.

Sadly, if someone is not processing at age appropriate levels they are not going to catch up by getting older. Specific intervention is needed to make the necessary changes so that processing can develop.

How can you assess someone's auditory processing level? You can test auditory processing. Start by making at least three random sequences of numbers or words at each level you are testing, do not use "twin" numbers or words in your sequences. 7393 is a good sequence, but 7339 is not. Do not let the subject see the numbers or words. Speak without tonality or grouping the numbers or words. Speak the numbers or words one second apart. Start by speaking one word or number, then if the person can repeat back that word or number, try sequences with two numbers or words. For very young children ask that they touch "nose" or "hair" or follow simple directions like "sit" or "stand." Do not give visual cues or model what you are asking. Keep increasing the length of the sequences until the person can no longer repeat the sequences back on the first try. Use all three of your sequences at each level.

A person should be able to process at least the number of digits that corresponds to his or her age, up to the age of 7. Adults should be able to process at least 7 pieces of auditory information.

Can we prevent auditory processing challenges? Auditory processing challenges can be prevented by keeping the ears healthy and by providing infants and young children with large amounts of good clear auditory input from tapes or CDs or other auditory sources. Environmental sounds, babbling sounds, vowel sounds, consonant sounds, blends, phrases, sentences, conversations, counting, hand songs, good classical music, and interesting information can be presented. Interactive conversation, reading to them, and speaking to and with children is also very beneficial.

Can we change someone's auditory processing? If specific intervention is effectively implemented, it is possible for processing to increase up to and beyond typical levels. This is true, even if you are an adult concerned about your processing ability. As processing increases, the child or adult will exhibit improved skills and greater maturity. For every increase in one "digit" we say that auditory processing has improved by one year!

ICAN neurodevelopmentalists have been very successful at helping families remediate auditory processing issues. Many varieties of auditory input and sequencing activities are used in specific ways to give input to the brain so it can organize and so that longer auditory sequences can be processed. Since, tonal and rate processing may delay the development of sequential processing, neurodevelopmentalists often use additional auditory interventions to remediate these issues so that sequential processing can increase.

What do you suggest for a parent's plan of action? If your child struggles in any of the areas listed above, it is well worth the effort to begin an individualized neurodevelopmental plan so that your child's processing can increase.

If your child has already had an evaluation diligently implement all the processing activities that have been suggested by your neurodevelopmentalist. Consistent results are obtained by following your program instructions carefully, and doing the activities the full suggested frequencies and number of days listed on your INP, and being sure to use an effective reinforcement system. Putting a priority on processing is extremely important for most families so that they can reach their educational goals for their child