



## Certification Training Manual

### AUDITORY COMPETENCE

Organized auditory processing is critical for an organized brain, and the lack of organization in this sensory function can be a factor in anxiety, ADD, poor receptive and expressive language skills, and other functions.

The sound that goes into our ears travels through several areas of the brain on its way to the cortex, where it is interpreted as speech, or music, etc.

#### Stage I – Medulla/Spinal Cord Level: Startle Reflex

Our first response to sound is recognizing its presence through a startle that is unsuppressed in the neonate, then becomes more selective as the child matures.

The brain recognizes that a sound has occurred at the medulla/spinal cord level of development.

The sounds we hear are first sent to the cerebellum, with a detour through the pons.

#### Stage II – Pons Level: Vital Response to Threatening Sounds

At this second pons level stage, we evaluate the sound for threat. Survival and threats to survival are always the first concern of any species, so the first response is to determine if this is a danger, such as the loud horn of a large truck barreling towards us, or the hiss of a venomous snake. The responses at this level occur before the cortex has had a chance to evaluate them. So, for instance, the hissing of a snake that suddenly appears close to you can cause you to jump many feet away before your cortex has made the decision to jump.

#### Stage III – Midbrain Level: Appreciation of Vocal Tonality and Meaningful Sounds

At the third, midbrain stage of development, sounds continue on to the cerebellum which interprets and sequences them. Poor sequencing of sounds can cause many challenges in receptive and expressive language. For instance, the child who has an immature cerebellum may hear the word 'spaghetti' pronounced as 'busghetti'.

Technically, the 'p' sound, which is explosive, travels faster than the sibilant 's' sound. Thus, the child will hear and say 'busghetti'. As the brain matures, or as we create better organization through a NeuroDevelopmental Movement program, the brain begins to hear the sounds in their correct order and their speech will be corrected.

We say that the midbrain has an "appreciation of meaningful sounds". What we are talking about is a level of the central nervous system that is critical to social interaction. More than half of our



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communication through speech involves tonality. The same words can be interpreted in a variety of ways, dependent on the tonality of the speaker. Pauses, verbal ‘bullet points’, loud, soft, fast, slow, firm, sarcastic elements of our speech are all interpreted at this level of the central nervous system.

This is also the level of the central nervous system that filters out excess and irrelevant information. For example: to set aside the murmur in a crowd in order to focus on the discussion with one person who stands in front of you; or to filter out the sound of the washing machine to listen to the news.

We want to know if the client has an ability to understand jokes, sarcasm, if they interpret a neutral voice as an angry voice, or if they cannot interpret a pause during which they might enter into a conversation in order to skillfully navigate social interactions. We will get most of this information from parent reporting.

### Stage IV – VII – Cortex Level: The Understanding of Words

The cortex is the organ that decodes sounds that have been sent from lower levels of the brain. If these sounds have come into the brain appropriately filtered, this stage is the beginning of understanding words that are said to us. This begins with the understanding of two words at about the first birthday, which grows to a couple of dozen words by 18 months. By three years, we have at least 2000 words that we understand, and we continue to grow to a full understanding of a large vocabulary, proper sentence structure and grammar.

As the cortex finishes its maturation, a dominant ear begins to become apparent. In the most integrated brain, the client has a dominant ear that is consistent with the dominant hand and eye. When the client is, for instance, left-ear dominant when vision and manual skills are on the right, the brain may work less efficiently. Words may be detoured through the subdominant hemisphere before arriving at the dominant hemisphere and its language center.

What this might look like in a client is one who cannot understand an accent, or who only gets the meaning a bit after the words have been spoken. There are clients who have to force themselves to listen to the words, because if that effort isn't made sounds may come into the brain as background noise rather than words with meaning.

Damage to the cortex, and particularly the left hemisphere, can prevent the cortex from understanding the words, hearing them almost as a foreign language.



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#### Testing

##### Stage I – Medulla/Spinal Cord Level: Pupillary Reflex

Test process:

Much information will come from parent or client reports.

- Client may have a history of startling at many sounds. This will have been suppressed in the healthy brain after about two to four months of age.
- If not currently suppressed, watch for big responses to small sounds, such as someone starting to talk, a door closing, a chair scraping against the floor.
- Note on the client's chart any reports of the neonate (under 2.5 months) being unaware of sounds in their home in the absence of any hearing loss or ear damage or infection.

What to note on your chart:

- If the client has a history of startling in response to sound, note that.
- If you witness a strong response to ambient noises, note that.

##### Stage II – Pons Level: Vital Response to Threatening Sounds

Test process:

Much information will come from parent or client reports.

- Has a reported history of over responding to non-threatening sounds such as a door slamming, people speaking loudly, unexplained noises, etc. After seven months of age, the healthy brain suppresses the startle while appropriately evaluating any threat.
- May under respond to alarm sounds that would signal danger.

What to note in your chart:

- If the client has a reported history of responding to non-threatening sounds, note which sounds seem to threaten them. Common ones are hand dryers, vacuum cleaners, blenders.
- If the client is more sensitive at home or more sensitive out in the world, note that.
- If the client does not respond to threatening sounds, such as a fire alarm, note that.



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### Stage III – Midbrain Level: Appreciation of Meaningful Sound

Test process:

Much of this may be from client or parent reporting, but you can also observe how the client responds to the auditory environment in the room.

- Notice any distractibility the client may have to any sounds in the treatment room – air systems, clocks ticking, noises in the hallway, etc.
- From self or parent reporting and your own observations, find out if the client misinterprets the emotional content of speech. For instance, if the parent speaks in a neutral tone does the child think they are angry at them? Similarly, an adult client in a work setting may misinterpret interactions and believe that they are being picked on in an otherwise neutral conversation.
- Ask if noisy environments cause anxiety, exhaustion, giggling, withdrawal, or hyperactivity in the client.
- Ask what sounds distract or irritate them: loud sounds (get specifics); background sounds (get specifics); hearing one voice against a background of other sounds (such as in a classroom); sounds of other people breathing or chewing. Is this a client who cannot tolerate eating around others because of the sounds of eating?

What to note in your chart:

- If the client is hypersensitive to noise, note that.
- If the client is distracted by the sounds in the room, note that.
- If the client seems to think that people are yelling at them or judging them all the time, and everyone ‘talks mean’ to them, note that.
- If the client is unable to interpret sarcasm or humor and is easily teased, note that.

### Stage IV – VII – Cortex Level: Understanding Words Up to a Full vocabulary

Test process:

Tools needed: Two seashells about the size of your fist or slightly bigger.

- Speak to the client at an age appropriate level to discover if they understand the vocabulary you are using at that level. Do not speak down to or baby talk a client who appears to have cognitive impairments or delays.
- To establish which ear is dominant is a process that happens over time. Put a seashell at midline in front of the client. Ask them if they can hear the sounds inside the shell. Note with which hand they pick it up and particularly note to which ear they put it. Take away the first shell and offer them a second shell at midline. See if they choose the same ear. Over time, if you see consistency, you will know which ear is dominant.



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Note: Do NOT present both shells at the same time because they will likely put one on each ear. Make each shell a discreet choice.

If you do not have a shell, you can use a watch and ask if they can hear it tick. (Even though many watches no longer tick, it is the putting of the watch to the ear that matters.) Alternatively, you can ask them to put their ear to the door or wall and see if they can hear anyone talking on the other side. Our concern is which ear they prefer.

What to note in your chart:

- If, by report from parents or client, you understand that they have poor receptive vocabulary, note that.
- If they do not understand conversations with you because of a limited vocabulary, note that.
- Note which ear they use to listen to the shell, watch, etc.