

## The Voice-Ear-Brain Connection: Science and Sound Making Learning Change

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Sound and Learning? How do the two go together? When we think of learning, we should think of how the body takes in the information that eventually develops the higher thinking skills for reading, math, and other academic skills. To get to the higher skill level, the person must first feel and explore the world around them. Their brain must integrate all of the sensory information received in order to stimulate the cognitive receptors. The ear is our body's major sensory stimulator. It stimulates the receptive and expressive body responses of taste, touch, smell, vision, and hearing through the direct and indirect branching effects of the cranial nerves. These responses are activated by sound vibrations.

Sound travels in waves. We absorb these waves all over our bodies. Our cells, skin, and bones receive these vibrations which then radiate to other parts of the body. Our ear picks up the vibrations as needed and sends the information to the brain. The brain will determine if it wants to tune into the sound or block it out.

As a child develops in utero, the ear is the only sensory system that is fully functioning around 4 ½ months. All other senses begin to fully function at birth. By its very development, the ear is demonstrating how important it is to a child's learning and development. Although most commonly know the ear as our hearing mechanism, the ear is also our vestibular mechanism. Our body movement, coordination, balance, proprioception (body in time and space), and muscle tone are all supported by vibrational stimulation to this part of the ear.

Developmentally, a child needs good sound stimulation to activate the hearing part of the ear so that the brain receives good clear, crisp input for later language and social skill development. Also needed is good stimulation to the vestibular portion of the ear to balance the input of hearing.

Dr. Alfred Tomatis, in the 1950's discovered a connection between the voice, the ear, and the brain. His three laws were acknowledged at the French Academie of Science in 1957 as The Tomatis Effect, which summarized say that the voice produces what the ear hears. Since there are two parts to the ear, it is important to stimulate both the vestibular and hearing portions of the ear so that reception and expression of what the voice and/or brain produce are in balance. Two additional laws, known as The Davis Addendum® to the Tomatis Effect, were introduced at the Acoustical Society of America in 2004 that summarized say that the ear emits the same stressed frequencies evidenced in the voice. The importance of these additional laws further validates the connection between the voice, the ear, and the brain. It is this connection, which can be altered or modified with sound stimulation, that provides the foundation for making personal change.

Sound must be heard correctly in order to be processed correctly. If there is a breakdown in the transmission of sound to the hearing part of the ear, the breakdown may also impact the vestibular portion. If either of these parts is understimulated, the brain can not receive appropriate messages to process. One example is the child with a history of middle ear infections. The infected fluid interrupts the normal flow of sound's vibrations through the middle ear prior to its being received by the inner ear (that portion of the ear that picks up the sound's frequency information and body vestibular input and sends it to the brain). With this disruption, necessary stimulation at the brain for interpretation may be limited. Over time, the brain receives faulty information and children become experts at processing this faulty information, not knowing that there could have been a clearer message.

When a child displays symptoms such as an over-sensitivity to sound, or he ignores sound, the symptoms are of someone who has a 'hearing issue'. (A hearing issue does not indicate a hearing loss. Most people tested have normal or near normal hearing.) Yet there are children who have sound processing issues (not to be confused with an Auditory Processing Disorder) whose symptoms may be demonstrated by poor eye contact, poor balance and coordination, poor posture, weak oral motor skills, low muscle tone, articulation difficulties, stammering/stuttering, poor voice quality, poor receptive or expressive language skills, poor social skills, poor organizational skills, poor attention/focus skills, not wanting to try different taste textures, weak eye/hand coordination, difficulty sounding out words, poor vocabulary usage, difficulty comprehending what they read, not wanting to read out loud, and more. These children have difficulty integrating the sensory information they received as they were developing. Typically if the hearing issues are present, the sound processing issues are also present. Both of these issues affect learning.

Each of these issues can be helped with sound-based therapies. Can a person develop without helping their hearing and sound processing issues? Yes, however, they will struggle with learning throughout their life. There have been some well known people who have struggled with these issues and done extremely well, but more often people give up, feel frustrated, develop a poor self-concept, or get interested in something less challenging in order to feel good about who and what they are.

An initial diagnostic test battery called the Diagnostic Evaluation for Therapy Protocol (DETP®) is used to determine if a sound-based therapy can make positive change for the individual. Sound-based therapy involves the use of some form of sound vibration that impacts the body using special equipment, programs, modified music, and/or specific tones/beats, the need for which is identified with appropriate testing. The DETP identifies which sound-based therapy is appropriate and in which order the therapies should be administered if more than one is necessary. The DETP is based upon The Tree of Sound Enhancement Therapy®.

### **The Tree of Sound Enhancement Therapy™**

Webster's Dictionary defines sound as the sensation produced in the organs of hearing when the surrounding air vibrates. Today, sound is also considered to be vibrational energy. Vibration indicates frequency. Frequency is synonymous with sound. We may not always 'hear' these sounds as our ear 'hears' sound between 18-20,000 Hz. However, our bodies feel sound vibrations through our bone structure, our sense of touch, and our interconnected cell network throughout our body. Sound impacts our entire body, even if we are not aware of it.

There are many therapies available that utilize sound's vibrational impact on the body. All can make change to some degree. However, a comprehensive understanding of the various therapies has only recently been explained in "Sound Bodies through Sound Therapy".<sup>i</sup> By using "The Tree of Sound Enhancement Therapy™", one can make sense of the many available therapies.<sup>ii</sup> The Tree analogy defines the uses of the therapies. The "Root System" addresses one's sense of hearing. The "Trunk" addresses all processes of the ear for general sound processing stimulation. The "Lower Leaves and Branches" address specific skills like auditory memory, auditory sequencing, and auditory discrimination. The "Upper Leaves and Branches" address reading, spelling, and handwriting. The "Overall Maintenance of the Tree" addresses one's wellness or body support for maintaining change.<sup>iii</sup>

This tree analogy is based on the voice-ear-brain connection initially identified by Dr. Alfred Tomatis, and further validated by the Davis Addendum® to the Tomatis Effect in 2004.<sup>iv</sup> This combined concept suggests that the voice produces what the ear hears and the ear emits the same stressed frequencies as the voice. There is a cyclical connection between the voice and the ear that then transfers to the brain.<sup>v</sup>

"The Tree of Sound Enhancement Therapy" is the foundation for the Diagnostic Evaluation for Therapy Protocol (DETP®), a test battery that determines when, and if a sound-based therapy is appropriate, and when it is, the correct order for successful administration. The DETP tests all five areas of "The Tree". The results maximize the success of any sound-based therapy. Positive changes using sound-based therapies have been achieved by all of the therapies discussed; however maximum success is achieved when the correct order and administration of the therapies is followed.

#### **Root System**

When a hearing function issue is present at The Root System level, Dr. Berard's Auditory Integration Training (AIT) may be suggested (only the DETP can determine if the therapy will be suggested and in what order). This method 'retrains' the acoustic reflex muscle in the middle ear to stimulate both the cochlea and vestibular portions of the ear more appropriately.<sup>vi</sup> The brain and body responses become more efficient. This method especially helps one type of hearing hypersensitivity, and also increases blood flow in the brain at the auditory and vestibular receptive centers. Changes can be seen in the listener's responses to sound and movement. Very often this type of change can help people who are overly aware of sounds that impede studying, attention, focus, and language comprehension, which indirectly affects reading. By making the world "more comfortable" or "less distracting", the person can finally tune into what they are supposed to be listening to.

#### **Trunk System**

When the DETP identifies a sound processing issue at the Trunk level, a therapy based upon the Tomatis Method is introduced. This method, researched and established by Dr. Alfred Tomatis in the 1950's, addresses all of the components of the ear's sensory stimulation and connections, and often has the greatest impact on the listener educationally and developmentally when applied in the appropriate order. It includes the use of filtered and gated music, bone conduction vibration, and vocal production through the

use of special equipment. It is an intensive program of listening. Positive changes can be seen with skills needed to process auditory and vestibular information, such as body coordination, rhythm/pitch/inflection of one's speaking patterns, reading skills, listening skills, and oral motor skills to name a few.

Many sound therapies have tried to copy this method. Only a few of them are equivalent to The Tomatis Method. Some of these spin-offs fit into the upper "Trunk" because they do not include all of the processes that are a part of the very comprehensive Tomatis Method.

#### Leaves and Branches

When a specific auditory processing skill weakness is identified, the therapies at the 'Lower Leaves and Branches' are utilized. There are many sound-based therapies at this level of "The Tree". Fast ForWord® addresses temporal sequencing skills necessary for language and reading comprehension. Interactive Metronome® addresses one's rhythm, timing, and focus, all necessary for daily functioning and development. Earobics® helps develop specific auditory processing skills such as discrimination, and sound blends.

When more academic skills are found to be weak, various reading programs such as Lindamood Bell® and the Wilson® Method, are incorporated in the "Upper Leaves and Branches". These methods stimulate a combination of sensory skills, including the auditory sense, to teach reading. These methods are best introduced when the foundation of "The Tree" is sufficiently developed in order to make and maintain the most change.<sup>vii</sup>

#### Body Maintenance of the Tree

Both The Tomatis Effect and The Davis Addendum to the Tomatis Effect emphasize the importance of the voice in maintaining and supporting developmental and learning changes.<sup>viii</sup> The voice provides the resonance for the maintenance of the body and "The Tree". Although not typically a part of the learning portion of "The Tree", the science of Human BioAcoustics™ uses the voice as the identifier of one's body's imbalances and through sound presentation supports the body in returning to its natural form and function. When learning is not improving to the desired degree, this wellness portion of "The Tree" often is crucial to a person's success. In some cases, it is important to begin a therapy protocol with this method.

#### Summary

Sound impacts the entire body. The ear is the major sensory stimulator for the body and there is a direct connection between the voice, the ear, and the brain. The entire body is the recipient of sound's vibrational impact through these connections. Therefore, when addressing learning, educational, and developmental issues, sound stimulation should be considered. Sound stimulates the entire body making positive change within the system. The following sections will describe the individual parts of The Tree and each sound-based therapy in more depth as it relates to learning.

### **The Root System of The Tree of Sound Enhancement Therapy®**

The Root System refers to one's sense of hearing, not necessarily with hearing loss but with over responses to how one hears sound. To date, there is only one sound-based therapy that addresses the function of hearing. Auditory Integration Training refers to the sound-based therapy developed by Dr. Guy Berard, who believes that hypersensitivity, distortions, and delays in the auditory signal contribute to inefficient learning. His method retrains the ear and helps it process sounds in a more normal manner, without distortions or delays. It is through one's ability to process sounds that we remain alert, concentrate, and process information correctly. When hypersensitivity is present, the person hears the sounds around him more intensely than necessary and this creates pain, discomfort, anxiety, distractibility, and/or confusion in comprehension.

Dr. Berard described his method as one of 'hearing re-education'. He developed his theory: 'the behavior of a human being is greatly conditioned by the way he hears'<sup>ix</sup>. The quality of the perception of sound that one hears is equal to the behavior of the individual. His method uses a hearing sensitivity test, a graph representing the person's hearing threshold level, or the lowest sound that the person hears.

Although typically measuring hearing loss, Dr. Berard's test often identifies 'better than normal' hearing sensitivities. This test measures hearing threshold levels, Uncomfortable Listening Levels, middle ear functioning and the acoustic reflex muscle. It is

this reflex muscle that controls the loudness of sound transferring to the cochlea, which then sends sound to the brain. Research has demonstrated that Auditory Integration Training retrains this muscle<sup>x</sup>.

The muscle helps attenuate the low frequency sounds entering the cochlea so that the high frequency sounds can be heard. If this muscle reflex works at too soft a level, then the appropriate levels of loudness are not reaching the cochlea. Distortions may result that impact the processing of sound. The stapedius muscle attenuates loud, abrupt sound and if it is not attenuated properly, the incoming sound may be too painful to tolerate or too difficult to process.

Auditory Integration Training introduces specially chosen music through a device that modulates the sound and filters specific frequencies. There are two approved devices: the Audiokinetron and the Earducator®. The program includes 10 continuous days of listening, one half hour in the morning and one half hour in the afternoon separated by no less than 3 hours. There is an initial assessment, a mid audiogram, and a final assessment. Typically the program is used with children ages 3 and up.

Dr. Berard's method retrains a disorganized auditory system. By improving the acoustic reflex, the brain has less sensory overload. Once the acoustic reflex is retrained, the central nervous system has a chance to reorganize the circuits sending information to the brain and at the brain level. By improving the system, the listener improves over all and learning is easier.

Additional benefits of Auditory Integration Training are: 1) stimulation of the vestibular section of the inner ear--one's balance and coordination center, 2) increased blood flow to the auditory centers in the brain, 3) stimulation of new, 'cleaner' sound messages to the brain, and 4) stimulation of surrounding brain centers such as speech, language, and motor planning.

AIT strengthens a weak muscle, and in turn, it helps make structural changes and functional improvement within the central auditory nervous system. The muscle is exercised by the length of the program and is challenged by the intensity levels presented.

Some people with hypersensitivity, actually react as hyposensitive because they have blocked out the overstimulation and turned off the sound. If noises block out important needed sound cues, then a person may respond by creating an internal wall that blocks out these cues. If they do not have the skills to determine what is important to specifically tune in to, they respond to the internal world and block out the external world. This impedes learning.

One's hearing is always working. If we mentally have been unable to tune out the unwanted sounds, our bodies tend to over-react or turn off the sound. This hearing ability then, can be seen by some as a psychological response to life and the environment—hence Dr. Berard's theory that 'hearing equals behavior'. To maximize one's ability to learn, it is important to receive the incoming sound message accurately. With Auditory Integration Training, the psychological response and the physical response are in better balance so that the incoming message is clearer and learning can take place more easily.

The Root system of The Tree of Sound Enhancement Therapy incorporates therapies for changing hearing. If the individual has weaknesses at this level, and the higher levels on The Tree have been addressed first, maximal learning will not occur because the foundational function of hearing was not solidly in place. When the DETP® indicates the need for Auditory Integration Training, it is important to receive this therapy before addressing academic skills.

### **The Trunk of The Tree of Sound Enhancement Therapy®**

The Trunk of 'The Tree' represents how the body processes general sound stimulation. This includes not only the ear's ability to hear sound but also the vibrational stimulation of sound throughout the entire body. The ear receives stimulation through air vibration via the external ear canal. However, the ear also receives stimulation through our bone structure, our skin, and our interconnected cell matrix. Once sound is received at the ear, our neurological system transfers the stimulation to the brain, as well as indirectly to the many organs of the body. It is this direct and indirect combination of stimulation that makes The Trunk's therapies so impactful.

The Trunk therapy, or foundation of The Tree, is based on the method established by Dr. Alfred Tomatis. Dr. Tomatis discovered The Tomatis Effect, 3 laws which state that the voice produces what the ear hears. From these laws, he developed The Tomatis® Method, a method of sound stimulation that uses filtered and gated music, bone conduction stimulation, and active voice work to make positive balance and change for the individual.

Dr. Tomatis differentiated between the terms ‘hearing’ and ‘listening’. Hearing is something that just happens. Our ears pick up sound without our thinking about it. However, listening involves thinking about the sound and actively tuning into what is said or heard. Many people can hear sound but are poor listeners to the what, how, and why of what they hear. They do not listen well. This is demonstrated as an inability to follow directions, inability to stay focused on a task, inability to hear differences between speech sounds, inability to maintain eye contact, confusion about emotional content of conversations, difficulty putting one’s thoughts into words, and/or difficulty listening in background noise.

The vestibular system is also an important part of the ear. It is important for balance, coordination, muscle tone, fine and gross motor skills, and how one feels in the time and space around them. The indirect nerve stimulation from this portion of the ear also impacts the face, larynx, and eye-hand connectedness. Dr. Tomatis believed that the vestibular system impacted body posture and body positioning. When one’s body posture is perfect, the body reaches out to engulf all of the surrounding sounds for better overall responsiveness for learning. When the muscle tension necessary for this body posture is in harmony, the body is more receptive to learning.

The ear functions as an energy generator for the brain. Sounds give energy to the brain as they pass through the ear. The brain needs this stimulation to function and will organize the perceptions from the body for maximal use. The person’s voice provides a source of stimulation to themselves. The better the person’s voice is, the better the listening, and the more the brain will recharge. This explains the Voice-Ear-Brain connection—the foundation for The Tree of Sound Enhancement Therapy.

The Tomatis Method positions, activates, and stabilizes this Voice-Ear-Brain Connection. Dr. Tomatis found that the music of Mozart can energize as well as relax the body. By filtering this music, the ear is trained to focus on the higher frequency energizing sounds. Gregorian Chant is also used because of its slow, rhythmic, relaxing effect for a calm mind/body response. Eventually the listener begins to use his own voice in the listening process for maintaining the positive effects.

There are three functions when learning to listen and integrate sound: 1) discriminating meaningful sound, 2) spontaneously listening for pertinent sound, and 3) aiming the ear for best reception of sound. These three areas are evaluated using the Tomatis Listening Test. This test identifies areas of listening weakness and determines the programming for listening.

The method is an intensive one. The person listens for 2 hours per day for 15 days, takes 3-6 weeks off, and then listens for 2 hours per day for 15 more days. While listening, activities include fine or gross motor activities, relaxing, puzzles, drawing, and eventually active voice work. Benefits include: improved attention, concentration, and organization; ability to focus on conversations better; increase in creative ideas; enhanced reading comprehension; improved creative writing skills; better receptive/expressive language skills; enhanced balance and coordination; better communication skills; improved social connectedness; improved ability to listen and speak a foreign language; improved handwriting; enhanced singing and speaking skills; enhanced self-concept.

The Trunk of The Tree incorporates the concepts of Dr. Tomatis. Although his method is very powerful and can make many positive changes, it is advisable to introduce this method only at the appropriate time, as indicated from the Diagnostic Evaluation for Therapy Protocol (DETP®). There are many Tomatis Method spin-off methods. Very few are its equivalent. Some only include filtered and gated music but not bone stimulation or voice work. Because of this, these methods are placed at the Upper Trunk of The Tree and should only be introduced when testing demonstrates one has a solid foundation in place. The Tomatis Method concepts have helped people with autism, AD/HD, dyslexia, oral motor issues, auditory processing issues, and more. However, they should only be used at the appropriate time for maximum change. When indicated, the Tomatis Method should be used prior to spin-off methods.

### **The Lower Leaves and Branches of The Tree of Sound Enhancement Therapy®**

The Lower Leaves and Branches of The Tree corresponds with sound-based therapies that address specific auditory processing skills such as auditory discrimination, memory, and sequencing. Once the foundation for the Voice-Ear-Brain Connection is established, as demonstrated by skills within The Tree of Sound Enhancement Therapy model, advanced skills may simply need ‘fine tuning’.

Fast ForWord® is one program at this level. It makes positive change with temporal sequencing skills which are necessary for the reception and expression of language. Temporal sequencing is important for the ability to hear finite differences between sounds such as /t/ and /d/. Those sounds are similarly produced and the slight difference in how they are processed in the brain allows for the distinction between them. Some people do not hear the difference and this inability affects language, reading, and learning. Fast ForWord speeds up the ability to hear the difference over time.

Fast ForWord is a family of programs that use an interactive computer-based training system to help students improve their language, reading, and learning skills. There are different levels of skills to develop within their family of programs. By working on the temporal processing of sound, the listener begins to 'process faster', allowing for sounds within words to become clearer and easier to perceive, understand, and comprehend.

Earobics® is another program at this level of The Tree. A host of delightful animated characters capture the listener through multimedia games to provide practice and skill training to enhance the acoustic speech signal and develop auditory and phonological skills for speech and language development. For children with phonological and sound discrimination issues, this program allows children to learn at their own pace.

Interactive Metronome® incorporates the relationship between attention, motor inhibition, speed, rhythm, and motor coordination. This includes the ability to plan and sequence body movements. This ability to sequence is also necessary for the development of ideas, concepts, and purposeful interaction. This computer based interactive program provides real time testing and teaching capabilities. A purposeful tapping body motion helps develop precise control over basic mental functions. The responses are immediate and help the listener better maintain focus over an extended period of time.

The skills that can be addressed at this level of The Tree are many. The programs discussed highlight some of the basic ones like sequencing, memory, discrimination, rhythm, and pitch patterns. Each one of these skills is important when learning to read, spell, calculate, etc.

The special auditory processing skills addressed at this level of The Tree are very important for the development of the more academic skills which are incorporated at the Upper Leaves and Branches of The Tree. While important for the next level, if therapies at this level are used before the foundation for listening and learning is in place, such as with The Trunk or The Root System, then only splinter skills will develop. Development will be limited to those newly learned skills and restrict the total integrated learning profile.

### **The Upper Leaves and Branches of The Tree of Sound Enhancement Therapy®**

The Upper Leaves and Branches of The Tree reflect demonstrated academic skills such as reading, handwriting, and spelling. For these skills to fall easily in place, the foundational developmental skills must be established. When in doubt, readiness is identified through the Diagnostic Evaluation for Therapy Protocol (DETP®) and developed with the sound-based therapies indicated within the derived protocol.

Typically if a student has reading problems, tutoring is thought to help the child overcome the issues. However, if a student cannot hear the difference between /m/ and /n/ or /f/ and /v/, then teaching him sound blending techniques with tutoring, using one or the other of these sounds is like asking him to drop a square block into a round circle opening. After awhile, the student's motivation is diminished and they learn other compensatory techniques to succeed.

In the protocol established in The Tree of Sound Enhancement Therapy, academic skills are only addressed when the foundation is prepared well enough to succeed at this level. Tutoring is successful at this level because the person is ready to learn. Under the careful guidance of a skilled teacher, the student's particular weaknesses can be addressed while building their self-worth.

Comprehension is important for a successful reader. A good reader must retain sight words and the symbol imagery of the letters and words. This is important for spelling, multi-syllable words, writing of symbols and words, and visual tracking of connected words. A good reader must also be aware of phoneme differences and be able to process them independently. This is important for multi-syllable words and words within context as well as when listening in background noise. A good reader also needs to

know the meanings of words and be able to describe what they are processing. This is very important for total comprehension. All three of these areas: auditory, visual, and language are foundational to integrating what they have learned.

These skills are best learned when the foundational skills as described in The Tree of Sound Enhancement Therapy are present, because the connections between the Voice, the Ear, and the Brain are in place and the student is able to learn quickly these last subtle skills necessary for academic success.

### **Body Maintenance of The Tree of Sound Enhancement Therapy®**

Although some people do not consider health and wellness important to one's ability to learn, The Tree of Sound Enhancement Therapy stresses the importance of wellness for maximum learning. Whereas Dr. Tomatis' three laws say that the voice produces what the ear hears and that there is a connection between the Voice, the Ear, and the Brain, recent research has demonstrated that the ear also emits the same stressed frequencies as the voice<sup>xi</sup>. This research, known as The Davis Addendum® to The Tomatis Effect, further validates the connection between the Voice, the Ear, and the Brain.

This Body Maintenance connection emphasizes that wellness affects learning. The Voice-Ear-Brain connection must be in balance to maximize human potential.

Dr. Tomatis demonstrated that one's voice reflects the harmony of the body. Over time, people have used singing, chanting, toning, and more to feel better. Currently, the voice is used to detect imbalances in the body's responses to the surrounding world. Through vocal analysis, the voice represents the frequencies of the body as a mathematical matrix of predictable frequency relationships that help determine wellness. The frequency equivalents correspond to the various nutrients, muscles, or biochemicals in the body needed to support the body systems' interactions. This science is called Human BioAcoustics®.

Children with learning challenges often have difficulty focusing and attending, which can be caused by a chemical imbalance in the body. BioAcoustics can help support this chemical imbalance, thereby supporting learning. Once the imbalance is identified, the listener uses low frequency analog sound to further support the Voice-Ear-Brain connection. For the developing student, helping the body support its own wellness is often the key for success when preparing the student to learn better receptively.

The body, as reflected in The Tree of Sound Enhancement Therapy, has come full circle. The Diagnostic Evaluation for Therapy Protocol (DETP®) answers the question, "Where do I begin with sound-based therapies?"—at the Root, the Trunk, the Leaves and Branches, or at the Maintenance level of The Tree? By understanding the levels of the tree and various sound-based therapies, one can address enhancing the person's natural potential.

Everyone does not have access to either the diagnostic evaluation or sound-based therapies. When access is limited, the attached activities can support general enhanced listening utilizing the concepts promoted in the Voice-Ear-Brain Connection.

<sup>i</sup> Davis, D S., "Sound Bodies through Sound Therapy", Kalco Publishing LLC, Landing, NJ 2004

<sup>ii</sup> Davis, D S., "Sound Bodies through Sound Therapy", Kalco Publishing LLC, Landing, NJ 2004

<sup>iii</sup> Davis, D S., "Sound Bodies through Sound Therapy", Kalco Publishing LLC, Landing, NJ 2004

<sup>iv</sup> Davis-Kalugin, D S., "Davis Addendum to the Tomatis Effect", Acoustical Society of America Conference, San Diego, CA. November 2004

<sup>v</sup> Davis, D S., "The Cycle of Sound", International Tomatis Convention, Vienna, Austria, May 2002

<sup>vi</sup> Davis, D S., "Sound Bodies through Sound Therapy", Kalco Publishing LLC, Landing, NJ 2004, p 168

<sup>vii</sup> Davis, D S., "Sound Bodies through Sound Therapy", Kalco Publishing LLC, Landing, NJ 2004, p 255-277

<sup>viii</sup> Davis, D S., "Sound Bodies through Sound Therapy", Kalco Publishing LLC, Landing, NJ 2004

<sup>ix</sup> Berard, Guy. 'Hearing Equals Behavior', Georgiana Foundation, Pre-publication issue, 1992:1.

<sup>x</sup> Davis, D S. "Sound Bodies through Sound Therapy", Kalco Publishing, LLC, Landing, NJ, 2004:168.

<sup>xi</sup> Davis-Kalugin, D. *The Davis Addendum to The Tomatis Effect*, Presentation at the Acoustical Society of America, November 2004, San Diego, CA.

## Activities to Support the Voice-Ear-Brain Connection®

The connection between the voice, the ear, and the brain is important for active listening and all learning activities. The connection triggers all sensory responses and must be balanced for each student to be responding maximally. When sound-based therapies are not available to students, generic activities to enhance this connection can be utilized. The following are activities which will enhance the Voice-Ear-Brain Connection. It is important to position the body in maximum response mode for listening and learning with these activities:

1. Have the students sit on the edge of their chairs, with their backs straight, feet flat on the floor, knees slightly apart, and chin slightly tucked in. (This is the maximum response mode.) Then have the student hum a single sound and get them to feel the sound vibrating through their body, but especially through their bones. (The teacher can check for the correct vibration by placing their hand on the back of the student's neck and feeling the vibration.) Then once the sound is correctly practiced with a hum, change the sound to an "oh" sound and protrude the lips slightly, maintaining the vibration through their bones. Do this activity about 2-3 minutes prior to a listening activity.
2. With the correct sitting position stated in #1, have the student make a fist with their right hand. Place the fist in front of their mouth with the fleshy part of the fist between the thumb and pointer finger directly in front of their mouth—approximately one inch from the mouth. Their elbow should be lifted out to the side of their body at the same height level as their shoulder. Have the student inhale and then make an 'ooh' sound on the exhale. They should feel the vibration and their breath on the fleshy part of their fist. Repeat this breathing and vocalizing pattern 10 times.
3. With the correct sitting position stated in #1, have the student take their left hand and put it in front of their mouth. Place the inside palm in front of the mouth in a cupped position and extend the fingers pointing towards their right ear. Have the student inhale and then make an 'ooh' sound on the exhale. They should feel the vibration and their breath on the inside of their palm. The breath stream should follow the inside of the extended fingers towards the right ear. Repeat this breathing and vocalizing pattern 10 times.
4. Engage the students in a jumping activity. Have them jump in place 25 times and then move quietly to the sitting or listening position. Do not use music as a background effect.
5. Vocalize the learning task with rhythmical movements, i.e., when learning to spell a word, stand up, swing the arms back and forth to each letter of the word, and say each letter to a movement---rock: r—o—c—k : /rock/. Clapping hands, jumping in place, tapping a foot, and/or nodding the head can all be used with rhythmical patterns.
6. Individual activity, not group: For those who are slow to respond or who have a delayed processing response, place their right hand on the speaker's neck while the speaker is talking so that the listener hears and feels the necessary input together. The cheek can also be used instead of the neck.
7. While doing an initial learning/listening task, soft classical music can be played in the background. Music such as Mozart can be played. When the learning/listening task is something that was previously introduced and is now being taught for integration and practice, then a more energizing music can be played in the background. Music such as Strauss waltzes or rhythmical energizing dance music can be used.