Listening Training and Music Education

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Promoting the importance of early childhood music education to a group of music educators would be like preaching to the converted. Thus, when given the opportunity to address a group of music teachers in the con text of a professional day[1], I opted to present my own point of view – the view of a clinician for whom the music is a major therapeutic tool. I believe that from this rather atypical perspective, a powerful new dimension can be added to the role of the music educator. Before continuing, however, I will provide background about who I am, where I come from, and what the work is that I do.

BACKGROUND

My childhood and adolescence were affected by dyslexia. This learning disability, which disrupted my primary school education, ultimately forced me to drop out of high school. Dyslexia also impeded my ability to make music: one of the great disappointments of my youth was my inability to learn to play the guitar (owing to my lack of coordination, I could not dissociate the movements of both hands). Experiencing dyslexia thus gave me the opportunity to learn firsthand how "disharmonious" a childhood and adolescence can truly be – a valuable experience for the therapist I was to become.

At the age of 18, and after many unsuccessful attempts to improve my condition, I met Dr. Alfred Tomatis, a French ear, nose and throat specialist. Dr. Tomatis' diagnosis of my difficulty, which he defined as being the main cause of my failure at school, was that I had a listening problem. After a few months of therapy at his clinic in Paris, I went back to school rapidly caught up with my work, and subsequently completed high school. On beginning my studies in psychology at the Sorbonne, at the same time I began to work with Tomatis in his clinic. Twenty-five years later, I am still involved in this work.[2]

In 1978, I came to Canada to participate in the development of the Tomatis Method in North America. The Listening Centre was founded in Toronto in that same year, and I am still directing it. Twenty other facilities of this kind now exist in Canada, the United States, Mexico and Central America. The children and adolescents we see at The Listening Centre come to us with problems that in most cases have already been identified. Among these problems are attention deficit disorders (ADD), learning disabilities (LD), such as dyslexia; auditory processing problems; and other difficulties relating to academic performance. Still other children come with various
developmental delays or disorders, such as pervasive developmental disorders (PDD) and autism, both of which affect their communication, language and social behaviour.

While these various conditions may be attributed to many different causes, impaired listening is a

common to them all. Curiously, most of these children usually hear well. This indicates that while their ears may function well in their capacity to receive sound, they do not function well as an "attuning device". Thus, many of these children are "off beat" and/or "out of tune" with a world around them – whether it be the world of letters or numbers or language, the world at school or at home the world of their peers, or (as is sometimes the case) even their own inner world.

Our intervention is a Listening Training Program in which sound stimulation is used to improve and enhance a person's ability to attune the ear, mind and body – that is, to improve and enhance his/her listening ability. Recorded music and singing are the key sources of sound stimulation that we use.

During the course of my clinical career, I have seen countless children blossom at the sound of music. This experience has convinced me that the role of the music educator goes far beyond teaching a subject of the school curriculum or initiating to a specific art form. It includes no less than a development, enrichment and refinement of children's ability to listen. Listening is at the very root of all human communication – both verbal and nonverbal. In verbal communication, listening is so crucial to the acquisition of speech and language that defective listening can lead to impaired learning. Hence, the music teacher who trains children to listen contributes significantly toward their readiness and ability to communicate, talk, learn, and optimize their potential. How can listening in general and, in turn, listening to music produce such profound impact? A better understanding of the ear and of its function in human development may provide at least part of the answer.

THE EAR

The ear is the sensory organ of both balance and hearing. Yet this only a part of a broader panorama of its function in and influence upon human development. This becomes especially evident when investigating the ear's role during evolution and throughout prenatal life. Before proceeding further, please note that when speaking of the ear, I refer not only to the organ itself but to its multiple connections within the nervous system and throughout the body.

Archaic multi-cellular animals, such as the jellyfish, do not have a central nervous system. For such a creature, motion in the water is made possible by a network of holes and tubes placed in circle around its periphery. These structures provide jellyfish with its sense of space and movement, without which survival would not be possible. For example, if the holes were to be destroyed, the jellyfish would fall to the bottom of the sea and die. These holes are "ancestors" of what in higher vertebrates emerges as a part of the inner ear, that is, the vestibular system. Likewise, the tubes of the jellyfish are the "ancestors" of our nervous system. Throughout evolution, collaboration between the primitive "ear" and the primitive "brain" helped establish the first communication between the animal and its environment, the first "dialogue". I don't think it is stretching the point too much to say that this was the earliest form of listening.

While our nervous system has evolved quite dramatically over time, our vestibular system continues to

operate in much the same way as that of the jellyfish. With the centralization of the nervous system, a more evolved fish can swim in a direction it chooses; a crocodile can move both in and out of the water, a bird can master a sense of space it needs in order to fly. Among primates, the evolution of the vestibular system is central to the gradual acquisition of the vertical position. Here, the unique architecture of the semi-circular canals permits an awareness of the body's movement into the three dimensions of space, both in personal space and beyond.

Yet the original purpose of the vestibular system – to help us deal with gravity and to find our position in space - has not changed. Together with the proprioceptive and tactile senses, the vestibular system keeps us aware of our body in motion in the world that surrounds us. It helps us establish a "body image," making us aware not only that we exist but that we are part of and grounded in an environment. This grounding dimension provides the very basis of communication and becomes the nonverbal dimension of listening, a dimension which is sometimes referred to as "pre-language". This dimension is missing in some children with autism and other forms of develop mental disorders or delays. Vestibular or " body" listening is also either weak or poorly regulated in children who seem to be more at ease in their minds than in their senses, more at ease in "fantasy land" than in the real world – the space cadet, the computer freak, the day dreamer as well as many children with ADD, whether hyperactive or not.

Phylogenetically speaking, listening existed well before hearing. We know, for example, that reptiles do not hear. It is not the sound of the flute that charms the snake, but the repetitive movement of the flute player. Here we see a classic example of "vestibular - visual listening." Another variation of this perceptual phenomenon may be seen in the fascination that autistic children have with fans, with many other such "visually kinetic" experiences.

Life outside water, however, makes its own unique demands. Not only must the creatures that have "landed" be in communication with information that immediately surrounds them, but also with information that reaches them from a great distance. The apparatus which deciphers vibrations coming from the water (or in the case of reptiles from the ground) is no longer sufficient. Evolution had to find ways for creatures to capture more subtle vibrations – those that are carried through the air and are perceived as sounds. It might even be argued that "sound" is merely a synonym for "short rapid movement," given that short, rapid movements produce sound. With the emergence of sound, however, came the need for a system of sound perception. Thus, it seems only natural that the part of the ear which evolved to perceive sound – the cochlear system – grew out of the vestibular system.

As we shall soon see, the influence of music on human development can only be fully understood if we keep in mind that the "cochlear – vestibular" system into which the ear has evolved is functionally integrated system. Thus, while we still may perceive sound and motion as distinct experiences, we should not be misled by our senses!

As frogs gradually acquired hearing, they began to produce "voice sounds". Admittedly, their sounds

are rather archaic, but one has to start somewhere. In frogs, birds and mammals we witness a phenomenon that applies to humans as well: to produce sounds with our voices, we first need to hear them. Without this auditory input, as happens in the case of deaf-mutes, even the most sophisticated brain is helpless. What happens to deaf-mutes, however, can also apply to us but in a far less radical way. Human voice production (speech as well as singing) is dependent not only upon the sound our brain receives from our ears but upon the way in which our brain receives these sounds. For example, singing out of tune is a result of being "selectively deaf" to the pitch level to which we aspire, whereas singing in tune is a result of being selectively deaf to sounds which we do not need. The starting point of Tomatis' lifelong research was his recognition that "the voice can only produce what the ear hears."

During prenatal life, as was earlier mentioned, the development of the human ear follows a path similar to that of evolution. Here, once again, the vestibular system is the first to develop, making it possible to for the fetus to perceive movement as early as 10 weeks into embryonic life. Later, the fetus can also react to sound as early as half way into the pregnancy and possibly even before, indicating that the cochlea is already operational. Furthermore, the acoustic nerve which transmits both the vestibular and cochlear neural input to the brain, is fully myelinized at five months in-utero, meaning that the fetus' brain can begin receiving information from the fetus' ear. Interest ingly, the acoustic nerve is the first nerve of the body to myelinize, which seems to argue for the primacy of the hearing function among the senses.

These findings clearly indicate that well before birth, the infant is already immersed in sound. One such sound is that of the mother's voice. Although the rapidly maturing brain is not yet in a position to understand the meaning of the messages carried by the mother's voice, it is nevertheless still stimulated, still massaged by the music of her voice.[3] Here is where and when language acquisition truly begins, where the fetus undergoes the experience that will subsequently enable it to acquire its proper "mother tongue." Expectant mothers have always known that modern science is still in the process of discovering: many of them sing, talk to, and "rock " their unborn child by making rhythmic movements with their bodies. Such prenatal, cochlear-vestibular stimulation facilitates and enhances the child's future motor and linguistic development.

RHYTHM AND MELODY

Made by the ear and for the ear, music is a true reflection of how the ear works. All music is a composite of rhythm and melody. The rhythmic dimension of music corresponds to the functioning of the vestibular system. Rhythms both induce and convey movement. They make us dance.

Because their vestibular system (i.e. "the ear of the body") is still intact, deaf people can also dance – they can "hear," or more precisely they can "hear" - or more precisely, perceive rhythmic vibration. Because it stimulates the "ear of the body", rhythm enhances all of our body's interrelated functions. Such stimulation provides a better sense of the body in space and thus helps develop "body image". Body image and body awareness are instrumental in establishing motor function, coordination and

organizational skills. Also related to body image and awareness are written language skills such as spelling, handwriting and creative writing. Furthermore, mastering mathematical calculation and concepts requires a mental representation of space that is facilitated by a stable, well established body image. The same can be said for rote memory. How many children agonize for months over their multiplication tables! The key is to inject these tables with rhythm which will be embodies through the vestibular system, thereby allowing children more effective access to their nervous systems. A simple strategy is all that may be needed. For example, one may wish to select a song with a strong and steady beat and ask students to sing the words of their multiplication tables to the music. This is how I learned them. I also learned my English verbs by reciting them to the tune of "Oh When the Saints Go Marching In," as follows:

I have a car, it belongs to me, it is my car, it is mine
you have a car, it belongs to you, it is your car, it is yours.

Melody, in contrast to rhythm, is associated with the cochlear system. Listening to music, playing and singing are fine ways to explore every level of the auditory spectrum. Discovering possible sound combinations, tonal differentiations and multiple blends which human voices and musical instruments can produce offers a great "work-out" for the ear. This sound exploration can start during the prenatal period with the mother singing and should continue soon after birth, throughout infancy, in the daycare centre and in preschool – in short, over all those years during which the child is developing speech and language. One fact that surprises many adults is that it is easier for children to sing than to speak. This becomes particularly obvious to those who work with children with autism and PDD who are able to access singing more easily and rapidly than they are able to access speech. While the reasons are different, the same is the case for stutterers. One of the most effective techniques I use to help stutterers is to teach them first to sing in their minds what they wish to say out loud.

Using music to train and prepare the ear is also important in kindergarten and during the early grades, when children start to transpose sounds into letters. The translation of a visual into an auditory image is necessary for reading out loud, just as the reverse is the case for writing. Both reading and writing thus require phonological awareness, that is to say, a clear, stable, and precise perception of the acoustic content of words.

Most language difficulties that involve writing are related, to a greater or lesser extent, to poor listening. These difficulties may take different forms depending on which level of listening is affected. In some cases, difficulty with written language is related to poor auditory skills, which in turn derives from the cochlear system's not processing language information either clearly or quickly enough. Often, children thus effected present a history of chronic ear infection in early childhood, along with the delay in speech and language development. In reading, these children have difficulty sounding the words, and their spelling mistakes tend to be mainly phonetic in nature. In short, the children's listening is "out of tune" with the language of their culture, their mother tongue.

In other cases, poor written skills are related to poor maturation, or else to a dysfunction, of the vestibular system. When the "ear of the body" does not work properly, the motor and language skills of such children develop erratically – in leaps and bounds. Such children are often clumsy, awkward in their movements, accident prone and oblivious to danger. Others, however, may show the opposite pattern and shy away from physical activity. Typically, these children are fascinated by computers and tend to have difficulty relating to their peers. While speech is well developed and even, in some cases, overly elaborate for a children their age, creative written language tends to be poor and handwriting is generally atrocious. Spelling mistakes are mostly visual-spatial type (e.g., reversal of letters in a word such as "top", instead of "pot") but are usually phonetically accurate. In short, these children write as they hear. Their listening is "off beat" with their bodies, which in turn affects their written skills.

The worst scenario of all in the field of learning disabilities is one in which the child is both "out of tune" and "off beat." This leaves that child with very little room to compensate, no way out, and a bleak future.

INTEGRATION

Rhythm and melody randomly assigned do not necessary amount to music. The beauty of music, its greatest value, is in its integration of the two. Music not only attunes and stimulates the vestibular and the cochlear systems individually, it also harmonizes them.

Similarly, talking, reading and writing require not only the presence but the integration of two entities: the "container" (i.e. the sound or graphic representation of the word) and the "content" (i.e. the meaning). If little or no integration exists between the cochlear and vestibular systems a gap or a distortion may occur between the meaning and the sound or graphic representation. Two examples will help illustrate what happens when the cochlear and vestibular systems do not "communicate" properly.

In the first example, when there a total gap between the two systems – as is observed in some autistic children – the children are able to vocalize but there is no discernible meaning in what they say. They either simply repeat what they hear (echolalia) or else utter a word that is unrelated to the situation. This total disconnection between the word and its meaning can be partially explained by the lack of integration in the brain of the respective functions of the ves tibular and the cochlear systems. When rhythm and melody are disconnected, there is no music. When word and meaning are disconnected, there is no language.

In the second example, cochlear-vestibular integration is weak rather than absent. In such cases, children rarely have any motor function or coordination problems. On the contrary, they are often both good in sports and mechanically inclined, which indicates that their vestibular system is functioning properly. They also tend to have normal speech and no difficulty with oral communication, indicating that their cochlear system is functioning properly. Their difficulty is located specifically at the level of the encoding and decoding of language from its oral to written form. In other words, the sound

information captured by the cochlear system does not fl ow into (and thus does not "inform") the vestibular system. The body movements required in writing (i.e. shoulder, arm, hand and finger movements) as well as in reading (i.e. the movement of the ocular system) are not sufficiently activated. One possibly needs reminding at this point that the ocular nerves, as well as the muscles that trigger eye tracking, are under vestibular control. A similar dysfunction exists with some students who have no difficulty either in understanding mathematical concepts or in carrying out calculations, but are nonetheless unable to apply their knowledge to solve specific math problems.

The vestibular system is essential to our perception and awareness of the three dimensions of space. The sound perception function of the cochlea adds an additional spatial dimension that we perceive as time. Thus, after participating in a Listening Training Program, both children and adults frequently make the following kinds of comments: "I can put things in perspective," "the future is clearer," and " I know now where I'm going." Furthermore, now that the future can be perceived with more clarity, the present also becomes clearer. A new sense of groundedness emerges. Studying suddenly starts to make sense because now there is a meaning to all of those years of learning. Parents of autistic children comment on their child's newly acquired awareness of the here and now: "She is with us; she looks at us; we now exist for her; she is a part of our life." The unique space-time dimension that music offers, along with its impact on the listening ear, greatly enhance self-actualization.

Music offers other benefits.[4] I will rapidly review two benefits that are more directly related to the theme of this article. First, as a highly organized combination of sounds, music helps organize and clarify our minds. Music can therefore help us process information more effectively. For example, Gregorian and other sacred chants can greatly help and organize my fl ow of thought. Such music is also highly conducive to meditation. Furthermore, many people, including myself, like to listen to music while performing creative activities. Others, on the other hand, may simply view music as an obstacle to the thinking process, which may indeed be true if the volume is too loud or the beat too insistent.

Better than any other sensory stimulation, sounds in general and musical sounds in particular "feed" the brain with energy. We all have heard the stories of how egg and milk production increases among chickens and cows exposed to music. Music also increases sales in stores. Many people would never work out so hard nor so long if they were not listening to music while exercising. The sound of the clarion causes soldiers to rise up; the military march motivates them to go to battle. Music gives energy to the teenager, whose rapid physical development thrives on it. Research has also shown that exposure to Mozart's music increases student's IQ.[5]

TYPES OF MUSIC

Different types of music reach and stimulate different parts of the brain. There is music that provides physical energy to the body, and music that provides mental energy to the mind. Music with the heavy beat, such as rock, rap or techno, stimulates the body primarily through the vestibular system. Like it or

not, this music "gets into us," often to the point of being invasive or even aggressive. Music for the mind, on the other hand, primarily stimulates the cortex via the cochlea. In this kind of music, there is less emphasis on the beat and more on melody. The richer the music is in high harmonics, the more mental energy it provides. Music for violin is at the top of the chart. For this reason, Mozart's music for violin (symphonies, concertos for violin, divertimentos, and serenades), is among the most commonly used in the Listening Training Program.[6]

Both types of music have a purpose, but they have to be used appropriately. I would never recommend using Mozart's music or Gregorian chants for aerobic exercise classes, but I would also never recommend doing home work while listening to rock or rap.

Music is neither "all rhythm" nor "all melody." By definition, it is a composite of both. Most music, however, exhibits a clear predominance of one or the other. At one extreme there is music with little or no beat or tempo, such as the earlier mentioned Gregorian Chants or Tibetan "ohms". This music is intended for meditation and spiritual work. It is the quintessential "music of the mind." At the other end of the spectrum, there is rap, an almost exclusively vestibular music - a music of the body, by the body, and for the body. The beated monotone voice of the rap singer has no melodic line and only minimal pitch differentiation.

FROM RAP TO CHOIR SINGING

A music teacher once asked me how he could develop music appreciation among students who are "into" rap with the exclusion of all other kinds of music. The answer was: by expanding their listening to a wider range of the auditory spectrum. I am very aware that this is easier said than done because Rap music requires virtually no listening skill to be enjoyed. Its impact on the body is such that it "gets into you" - whether you want it to or not. In the following story, I will demonstrate that with skill and patience it is possible to open the ear. I will also show that the "payback" is well worth the effort.

A few years ago I met Walter Bahn, Benedictine monk and former music director of a cathedral in San Francisco. He now works as a social worker in the Dominican Harlem of Manhattan, where community programs are avail able to keep children off the streets. One such program includes an initiation to singing and chanting which, if successful, would enable the children to join a church choir.

I was fascinated by the approach he developed to sensitize children who knew nothing about music other than Rap. In the beginning, the children had no sense of tonal differentiation whatsoever. To see if they would change pitches, Walter had them imitate motorcycles or fi re truck sirens. While they could do this, they were still unable to measure their pitch accurately. To help them, he used hand signs invented by Justine Ward in her teaching of Gregorian chant.7 The hand signs are very simple: for DO, the child points to the navel; for RE, to the middle of the chest; for MI, to the chin; for FA, to the nose; and so on. Ward's method is not unlike Kodály's hand signals. Both are excellent multi-sensory approaches which use awareness. Adding to the teaching of music, both move ment and

singing reinforce the vestibular, proprioceptive, tactile and visual stimuli which reinforce and develop auditory cochlear-vestibular integration – so important in the development of listening.

I met Walter at a time when he was searching for other techniques, including those of Tomatis, that might speed up the children's progress. At that time, it was taking him several months to bring these children from a completely amusical mode to singing and chanting in a well established choir. During this process, dramatic changes were taking place in the children's personal, social and academic lives. Those participating in his choir program were staying out of trouble, were attending school, and were improving their marks. In short, the more their musical abilities, (and hence, listening skills) developed, the more integration, self control and direction they acquired. Some of them are now studying at Harvard, Columbia and West Point. Walter Bahn offers a beautiful illustration of what a music educator can do to improve listening and turn lives around.1

CONCLUSION

As with any musical instrument, the ear needs to be tuned to do its work. Within the school system, music education gives children the best opportunity to attune their listening. While the means are different, the goal of the music educator and the listening therapist are essentially the same. Early childhood music teachers can do much to help prevent the occurrence of listening problems, just as later-grade music teacher can help maintain and reinforce listening.

Our own interventions at The Listening Centre most often occur when there is already clear indication that a listening difficulty has developed. We come into the picture when a need already exists for a more intense type of training. Despite this, one thing is certain: positive results of our program become apparent more quickly and more completely with children who have had a solid musical background. As with any kind of training, it is easier to get results when the person is "fi t". Unfortunately, with respect to listening, this is rarely the case. Furthermore, within only a few days of starting their listening program, children almost always begin singing or dialing the radio to stations that play music. Often, for the first time in their lives, they begin to show an interest in classical music.

In summary, I have tried to demonstrate that music prepares the neurophysiological pathways for speech, hu man development, and self-actualization. While this is far from being a new idea, it is so often forgotten that I feel compelled to emphasize it once again. Music educators can therefore play a significant role in children's development by teaching them, throughout their years of language acquisition, how to listen. Finally, that music in so many ways seems to "echo" listening, and that listening, in turn, seems to echo music has caused me more than once to reflect on the possibility that music and listening are but two manifestations of the same entity.

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Toronto - the first of its kind in America. He has subsequently helped other professionals create Listening Centres in the U.S. and Mexico. As one of the world's leading authorities on listening, Madaule spends much of his time lecturing, giving seminars and work shops, or participating in media events on the subject. He originated "The Listening Experience" workshop and is author of a book entitled When Listening Comes Alive.

ENDNOTES

1. Dr. Joyce Jordan-DeCarbo invited me to open Music Education Day for South Florida music educators at The Universtiy of Miami, January 24, 1997.

2. For more information on the work of A. Tomatis and on The Tomatis Method, please refer to the following works:
- Madaule, Paul. (1993) When Listening Comes Alive, Norval: Moulin;

- Tomatis, Alfred. (1996) The Ear and Language, Norval: Moulin; and

- Tomatis, Alfred. (1991) The Conscious Ear , Barrytown, NY: Station Hill Press.

3. In a feature article entitled "How the Child's Brain Develops", appearing in Time magazine (Canadian Edition), June 9, 1997, one reads: "Even before birth, an infant is turning into the melody of its mother's voice. Over the next six years, it's brain will set up the circuitry needed to decipher and reproduce the lyrics". It is encouraging to see that Dr. Tomatis' pioneering fi ndings are starting to reach the public at large...fourty years later!

4. Madaule, Paul (1997). Music: An Invitation to Listening, Language and Learning, Early Childhood Connec tions, 3 (2), 30-34. I also refer The Mozart Effect by Don Campbell (Avon Books, 1997) a fascinating and compel ling book on the importance of music in all aspects of our life.

5. Ranscher, Frances. Can Music Make Us More Intelligent? Billboard, October 1994

6. Madaule, Paul (1997): Music, an Invitation to Listening, Language and Learning, Early Childhood Connections

7. The Ward Method is taught each summer at the music department of the Catholic University in Washington, D.C. 8. Walter Bahn has developed vocal teaching techniques much more elaborate than reported in these few para graphs. For more information, he can be reached at (718) 468-8080.