Overview of chapter 4

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4.1. Introduction

In this chapter auditory processing problems, which can mimic attention problems or lead to attention deficits, will be discussed. Berard AIT will be introduced as an intervention that could possibly enhance listening skills as well as effective attention skills.

The only connection that a learner has with the environment is through the different sensory systems. Attention (cf.2.1) is continually given to incoming sensory stimuli. The visual and auditory systems are the most important systems through which information from the outside world can be obtained when attention is directed towards the various stimuli. Learners with attention problems often do not direct their attention outward and therefore possible learning moments are missed (Andreassi, 2001:61).

Sound (cf. 3.4), especially non-verbal sound, has been shown to have a stabilizing influence on the brain (Levitin, 2006: 178). The most effective listener is the one who can block out background noise and focus on relevant incoming information.

According to Brockett (2006b:46) practitioners of the sound intervention Berard AIT (cf. 4.6) have reported positive effects on learners’ attention levels as a result of auditory training. It is possible that Berard AIT (cf. 4.6) can address and rectify some of the causes of the attention problems and be part of the solution, so that learners can pay attention easily and naturally. As learners develop efficient listening abilities, it will be reflected in other educationally related areas as well. Verbal directions given by teachers will be understood easily and rapidly. Learners may then be more able to follow instructions and participate in their own learning. Classroom behaviour should then improve as a consequence, since it is difficult for learners to cooperate if they do not understand the directions (Brockett, 2006b:46).

4.2. Hearing & Behaviour

Berard (1993:17) postulated the following analogy:

"Take a person functioning satisfactorily in every way, and then interfere with his hearing. If he is made totally deaf, his behavior will be radically disturbed. Suppose the
person develops painful hearing in the high frequencies. The person will find these frequencies unpleasant and threatening, and will try to avoid them. This will influence his reaction to certain environments and will influence his behaviour.

In his book “Hearing Equals Behavior” dr. Guy Berard states that in his practice as an otorhinolaryngologist – an ear, nose and throat specialist – he worked with many learners whose hearing problems were affecting their school work. He came to two important conclusions. Firstly, that there was a direct connection between poor hearing and disruptive classroom behaviour. Secondly, he found that there were variations in hearing dysfunction, and that either abnormal sensitivity or abnormal insensitivity to certain frequencies of sound waves, independent of overall hearing ability, was clearly associated with many behavioural and learning problems, including hyperactivity and dyslexia (Berard, 1993:18).

4.3. A Specific Learning Disability

According to Brockett (2006:6) an informal survey has revealed that 90% of children with attention problems and Specific Learning Disability (SLD) has a history of repeated ear infection, upper respiratory infections, and allergies that affected the ears. However, medical opinion is divided as to the significance of repeated ear infections in the histories of these children. It has also been seen that about 90% of children with autism have this same medical history. Research, by Berard (1993,34), showed that structures in the middle ear can be influenced by repeated ear infections. Hearing problems will be the result, which will affect the quality of information that is received by the brain (Brockett, 2006:6).

4.4. Hearing versus Listening

Machado (1993:137) as well as Brockett (2006:8) assert that “hearing and listening” are quite different. They state that hearing is a process involving nerves and muscles that reach adult efficiency by age four to five and listening is a learned mental process that is concerned with hearing, attending, discriminating, understanding, and remembering. However, listening can be improved with practice. “Listening affects
social interactions, one's level of functioning, and perhaps one's overall success in life.” (Machado, 1993:137).

Treuer (2006:1) affirms that hearing is the perception of sound by the ears and the brainstem. Listening is the de-coding of these incoming sounds into recognizable phonemes. Hearing does not take much energy and is a passive act which occurs even when we sleep. It's something that comes naturally and does not require any attention to doing so, while listening takes focus and paying attention to what a person has to say (Treuer, 2006:1). Listening is thus something you consciously choose to do. It requires concentration to allow the brain to process meaning from words and sentences which leads to understanding and learning. If the learner's listening skills are not developed optimally, attention problems will ensue, which will make learning difficult (Treuer, 2006:1).

Lamb and Gregory (1993:19) assert that research shows that “music training can be of immense benefit to language development”. They declare that music listening, such as paying attention to pitch and timbre, can increase a child's ability to distinguish specific sounds within words. “The awareness that comes from listening to rhythm in music can increase awareness of the rhythmic structure of language, thus helping children learn to read fluently.” (Lamb & Gregory, 1993:19). This is further affirmed by Register, Darrow, Standley & Swedberg, (2007:23) who describe improved reading skills in children with reading disabilities after music therapy.

Brockett (2006b:9) affirms that difficulty with listening ability (or auditory-processing problems), is clearly recognized as being a significant part of attention problems. Phonemic and phonological awareness, which are auditory components of reading, are the fundamental skills used when learning to read, thus the importance of auditory processing has taken on new significance. Advanced listening involves both the exclusion of irrelevant sounds and the ability to focus upon a specific sound. The better a learner's listening skills, the better his functioning in and out of the classroom (Brockett, 2006b:9).

It has been propounded that the learner who has problems in auditory processing will often respond to a retraining of the listening system (Brockett, 2006b:8). In the different methods available there is a common principle that language skills such as
speech, reading, writing, spelling and musical expression can only develop if the learner has learned to “listen” (Brockett, 2006b:9). If the hearing system does not perform its task efficiently, i.e. if the message is received in a distorted manner, meaning will be lost to some extent, and the learner will have to concentrate very hard to “fill in the gaps”. Consequently, after a while, the learner tires and loses concentration; he may give up trying to comprehend and his attention may wander. This could be because he is probably still trying to process the question that was asked, instead of being ready to come up with an answer (Brockett, 2006b:8).

Brockett (2006b:8) emphasizes that in a classroom situation, such a learner will almost certainly be accused of daydreaming. Such a learner has no idea that auditory input registers differently to him than it does to others - all he perceives is that everyone else is coping better and is getting into less trouble than he does. As a result, discouragement begins to grow and, added together with frustration, this can lead to bad behaviour. He then either becomes disruptive in class or withdraws and disengages. Many experts in the field of education and learning disabilities have long been aware of the impact of Central Auditory Processing Disorder (CAPD) on academic performance and learning (Welsh, Welsh and Healy, 1996:117). It has been identified as one of the primary deficits that compromise a learning disability (Brockett, 2006b:8).

The learners who appear to be hypersensitive to noise, covering their ears or avoiding noisy situations such as birthday parties or loud, unstructured play activities, are easier to spot than those with more subtle manifestation of auditory hypersensitivity, but are often misidentified as seeking attention or being immature (Brockett, 2006b:7). Yet others appear to be so over-focused on television or visual activities that it is difficult to get their attention when calling them. These characteristics are often misinterpreted as attention problems; behaviour problems, adjustment difficulties and immaturity (Brockett, 2006b:7).
4.5. Listening Skills

Berard (1993:4) observed that “everything happens as if human behaviour were largely conditioned by the manner in which one hears.” He saw the cause and treatment of behaviour problems as stemming from our ability to hear.

Berard (1993:22) claimed that when a learner has the ability to hear clearly without conscious effort it will be much easier to pay attention. He did a study where he tested the listening skills of all the learners in a specific classroom. He then arranged the learners’ names in three groups according to their listening abilities. This list correlated with the percentages that the learners achieved in their academic studies. The learners with the most efficient listening skills were first in their class. Those who had medium listening skills were average academic achievers, while the learners with the least effective listening skills were the underachievers (Berard, 1993:22).

The same study has been replicated by Maria Vegas in Madrid, Spain during 2000 - 2001. (Brockett, 2006a). The purpose was to verify Berard’s hypothesis: “The influence of a student’s hearing quality on school performance is so great that it is possible to identify those with learning disabilities just by their hearing quality deficiencies.” (Berard, 1993:34).

Maria Vega found that listening intelligence – how effective the learner’s listening skills are as such that sound can be understood as information – is so important for classroom activity that it determines how successful the learner will be academically. If a student’s grades are consistently low, it can be estimated that his listening quality is poor. Conversely, if a learner has a deficient listening intelligence, he will most probably not be amongst the top achieving learners (Personal communication with Brockett, 2006 & 2010).

Poor listening abilities mean that learners must work harder than learners with effective listening skills, in order to interpret their world. It will be similar to constantly translating a foreign language. The listener becomes tired and may “tune out” for a while in order to rest. In contrast efficient listeners know what the speaker is saying as he says it, without having to think about it (Brockett, 2006b:12).
After studying thousands of learners, Berard (1993:23) found that poor listening skills can cause:

- slowness in the processing of the sound input;
- failure to establish a perfect auditory laterality. Some sound frequencies are processed better through the right ear, others through the left ear, which results in an inversion in the perception of certain phonemes; and
- learners with good listening abilities also have an advantage socially. For instance, they will not be overwhelmed by the multitude of sounds typical of the social environment. Many socially isolated individuals withdraw due to problems created by their inability to focus on the conversation because of their inability to tune out background sounds. Their sensory system may become overloaded, causing anxiety and stress that may only be relieved by seeking a less stimulating environment. It has been said that when listening skills are trained to be efficient through Berard AIT, the learner often demonstrates more appropriate social relationships (Brockett, 2006b:12).

4.6. The Berard Auditory Integration Training

Brockett (2006:12) contends that adequate listening skills should be the main focus of any intervention programme for learners experiencing attention problems. It has also been shown that children with learning difficulties improve in terms of behaviour, auditory processing measures and demonstrated an accelerated cortical maturation pattern after training with commercial auditory training programs (Hayes, Warrier, Nicol, Zecker & Kraus, 2003:673). Berard AIT, which is the focus of this study, also entails retraining the auditory system. All intervention programmes for learners with attention problems aim to ensure appropriate development in learning and behaviour. When a learner is helped by different professionals who try to increase attention control, the accumulative effect of the interventions obtain a composite improvement in the learner’s development (Brockett, 2006:12).

Berard AIT is a ten day intervention programme where the learner listens to music which is randomly modulated. It re-trains the listening system and addresses hyperacusis (hypersensitivity to sounds), central auditory processing problems and
focusing problems. Dynamic music, with a wide range of frequencies, is processed through a system of filters in the Berard AIT device - the Earducator or the Audiokinetron (which is no longer produced but which is still used by some practitioners). The volume and tone of the music are constantly and randomly modulated (such that unexpected changes in the sounds are produced). This auditory stimulus activates the listening abilities, which is said to open up the whole sound spectrum in a co-ordinated and efficient manner (Brockett, 2003:4).

The majority of children who received Berard AIT when the training method was introduced in the USA were those on the autistic spectrum. Berard AIT was hailed as a ‘miracle worker’ by parents and teachers who began to report important changes in the area of attention, hyperactivity and impulsivity that they observed in the learners. It soon became apparent that many of these learners not only showed improvements in a reduced level of sound sensitivity and auditory problems, but also exhibited improvement in their attention span. The learners were more at ease, relaxed, calmer, they were able to shift their attention and concentrate better. Most of the learners displayed a more flexible attention pattern after the Berard AIT training (Stehli, 1995: xii). Berard AIT was introduced into South Africa in the early 1990’s, where it was used to alleviate problems experienced by children with developmental problems (Seymour, 1998:12).

4.6.1. The Origin of Berard AIT

4.6.1.1. Tomatis method or Audio-Psycho-Phonology (APP)

Dr. Alfred A. Tomatis (January 1, 1920-December 25, 2001) developed a music programme. He was an internationally known otolaryngologist, and inventor. He received his Doctorate in Medicine from the Paris School of Medicine. His alternative medicine theories of hearing are known as the Tomatis method or Audio-Psycho-Phonology (APP) (Davis, 2004:121; Thompson & Andrews, 2000:175). Tomatis grew up in a musical family in France. His father was an opera singer and soon after he began his practice, his father began referring opera colleagues with voice problems to him. He coined the phrase: “The voice does not produce what the ear does not hear”,

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which became known as the “the Tomatis effect” and it was the hallmark of his career and his method (Davis, 2004:121).

Tomatis found that the voices of opera singers had damaged their own ears. While the ear can be damaged with sounds of 80 or 90 decibels, a male opera singer often produced 150 decibels. With damaged hearing, they were forcing their voices to produce sounds in registers they could no longer hear. In his attempt to retrain the singers, he developed his device, the Electronic Ear, which used earphones and sound filters to enhance the missing frequencies. The goal was to sensitize the clients to the missing frequencies and literally train the ear to listen more efficiently (Davis, 2004:117).

Tomatis was the first to develop a technique specifically to stimulate the abundant interconnections between the ear and the nervous system. He used modified music to integrate aspects of human development and behaviour. Tomatis defined the ear as a primary organ for multiple physical, emotional and neurological development responses. The ear has the complex ability to send information to the brain and the body for hearing and sound perception, and it establishes balance and equilibrium which creates an internal calmness (Davis, 2004:123).

Tomatis adapted his techniques to target diverse disorders including auditory processing problems, dyslexia, learning disabilities, attention deficit disorders, autism, and sensory integration and motor-skill difficulties. He also claimed to have helped adults fight depression, learn foreign languages faster, develop better communication skills and improve both creativity and on-the-job performance. Some musicians, singers and actors also maintain that they had found his training helpful in fine-tuning their artistic skills. Tomatis named his new field audio-psycho-phonology (Davis, 2004:151).

4.6.1.2. The Berard AIT

Guy Berard developed a method of using electronically modulated music to bring the hearing mechanism to more effective function. This method is known as Auditory
Integration Training. It was developed by Berard to treat his own progressive hearing loss.

Dr. Berard worked as a medical doctor in Cambodia. After he developed tinnitus he sought medical advice and was told that he was losing his hearing. Berard related this history in SAIT (1995:2,3): “To give the history of my method of auditory training, after I had spent a few years in Indochina, I began to suffer from tinnitus, an uncomfortable ringing in the ears. When I consulted the best Ear, Nose and Throat (ENT) specialists in France, they all told me that I was becoming deaf, and that nothing could be done for me. Then I found out about another kind of treatment involving stimulating the hearing with the help of an electronic device. I bought one and also many books on the ear, nose and throat, and the problems of my hearing were solved. After several years I became an ENT specialist, as well as a surgeon and general practitioner in Cambodia.”

“In 1963, because of the political situation in Cambodia, I returned to France and opened an office in Annecy. I had discovered that hearing anomalies, apart from deafness, were the root cause of many learning disabilities. Some of these cases responded to an electronic device that I had designed. Quite simply and logically, I found that when children can not hear correctly, they can’t reproduce words correctly, if at all. This seemed obvious for me, and I established a reputation as a “specialist” in dyslexia and other learning disabilities, with patients coming to me from all over Europe.” (SAIT,1995:2,3).

Intervention programmes in the Tomatis style encompass a range from fifty to two hundred hours of auditory stimulation over a period of a few months, utilizing both air and bone conduction of sound. After dr Berard worked with dr Tomatis for a short period he felt that this programme was unnecessary long and that the ear could re-train in a much shorter period. Dr Berard did his own studies and found that it was unnecessary to have the extended training periods that dr Tomatis advocated. A short, intensive training period of two weeks was sufficient to alleviate most of the client’s problems (Seymour, 1998:12). Dr Berard then went back to medical school in his forties and qualified as an ENT specialist, and subsequently formally developed the Berard Auditory Integration Training Programme (Brockett, 2006:14).
Berard's search for a treatment for his condition, led him to develop the “Audiokinetron”, an electronic device which distorts the music that is played through it. The sounds are rapidly and randomly switched from low sounds to high sounds. These sounds are played to the listener over headphones for 20 sessions, each lasting half an hour. It is claimed that at the end of this time, the learner's hearing mechanism has adjusted itself, and has become an efficient transmitter of auditory information (Brockett, 2006:13).

4.6.2. Audiokinetron and Earducator

When production of the “Audiokinetron” was stopped, because it was investigated by the FDA as a medical device, the “Earducator” was developed by Tim Hagen in South Africa. This new device was hailed by Dr Berard to be even better than the original “Audiokinetron”. The Earducator’s name indicates its function: to “educate” the ear. AIT is seen as a re-education of the listening system. The Earducator is also registered as an educational device, and not a medical device (Brockett, 2006:13).

4.6.2.1. The re-education of the ear with the Earducator

The sound amplifier within the Earducator randomly deletes low and high frequencies from the music played from a compact disc player through headphones to the listener. It is important to note that the change in frequencies happens on an unpredictable, random basis, so that the ear and brain cannot prepare itself and thus no sounds are blocked out (Brockett, 2006:13). When Berard was developing the Audiokinetron, he tested the equipment on his daughter, who had central auditory processing disorder (CAPD). After listening to the music through the device, her parents realised that her auditory processing problems had greatly diminished. It has been commonly noted after that Berard AIT intervention there is a significant flattening of the audio-test as well as an improvement in behaviour (Brockett, 2006:12).

Berard likened the effect of this electronic modulation of the music to a type of physical therapy of the hearing mechanism, akin to an aerobic work-out. It starts out at a medium loudness level, like a moderately-paced exercise session, and then increases
in intensity until one reaches the optimum level of intensity. This level is then maintained for the remainder of the sessions (Berard, 1993:22).

The improvement in the auditory processing mechanism continues to impact on the child’s behaviour and learning over the next three months. One commonly sees a slow, but sometimes dramatic improvement that is sustained. It has also been claimed that progressive positive changes have been noted for more than a year (Brockett, 2006:45).

4.6.4. Description of the Berard AIT procedure

Both Berard’s AIT devices, the Earducator, which is manufactured by Tim Hagen of Cape Town, South Africa, and the original Audiokineton, accept music from a CD player, transform the sound electronically, and then send these processed sounds through headphones to the listener (Brockett, 2003). One step in the processing – an optional step – permits the filtering out of sounds at certain selected frequencies in accordance with the needs of the individual learner. The other step entails the modulation of the music by alternatively dampening and enhancing, on a random basis, the bass and treble musical output (Berard, 1993:82).

Before the Berard AIT training is started, a listening profile is done to determine if any filters must be activated during the training.

4.6.4.1. The Listening Profile

An audiometer is used to determine the softest level at which the client can hear at eleven different sound frequencies. The test is not done in a sound proof room as it is important to notice the effect of background noise on the client’s response ability (foreground/background distinction). The results of this test are plotted on a graph. If auditory peaks are present in the learner’s listening profile, filters are used to dampen the frequencies to which the person is hypersensitive (i.e. which they hear ‘too well’). Auditory peaks refer to frequencies at which there is a 5 or 10 dB difference between the specific frequency and its adjacent frequencies on the audiogram or Listening
Profile. These auditory peaks are said to be reduced or eliminated by the AIT training process (Berard, 1993:62).

In practice the Listening Profile is obtained no longer than two weeks before the AIT training commences. The learner then listens to processed music for a total of 10 hours over a ten-day period. Each listening session lasts for 30 minutes and is conducted twice a day, with a three hour period between the two sessions. This is necessary to allow the auditory system to rest. The maximum decibel level output during the listening sessions is 85dB (Berard, 1993:62).

After 10 half-hour listening sessions (the halfway point), the learner's listening skills are assessed again by an audiologist or a trained Berard AIT practitioner to determine if the filters need readjustment. According to Berard, the volume level for the left ear is reduced at this point if a learner has speech-language problems, or learning problems. This will result in increased stimulation of the left hemisphere in which the language reception and output centres, Broca’s and Wernicke’s areas, are located (Berard, 1993:62).

As the stimulation of the brain is integral in the optimization of attention, it is necessary to look at different brain structures, which are activated by music. This activation could play a role in the regulation of attention control.

4.7. The Influence of Music on the Brain

Research on the Berard Auditory Integration Training method is reported to show significant improvement in the regulation of attention, activity and impulsivity of children whose auditory system have been re-trained by the Berard AIT method (Edelson & Rimland, 2001:21). Anecdotal reports have found improvements in sleeping patterns, balance, allergies, eyesight, eating patterns, depression and other seemingly unrelated physiological states. The vestibular system, brainstem, recticular activating system and the auditory nerve may all play a role in the physiological normalization of the system. A calm and focused system will aid the learner in paying attention without any effort (SAIT, 1995:3).
In "This is your Brain on Music" Daniel Levitin (2006:189) explains how musical activity involves nearly every region of the brain and nearly every neural subsystem. When one part of the brain is stimulated, a ripple effect will follow with stimulation and change occurring all over the brain. As different aspects of the music are handled by different brain regions and music is processed in different areas of the brain, this is a wonderfully effective way to obtain change in the brain (Levitin, 2006:189).

During a course of Berard AIT (cf 4.6) the learner listens to pulsating music from different artists. The music covers a wide range of frequencies and this stimulation brings about, in almost every case, a normalization of the response to the frequencies involved and, almost always, the amelioration of the behaviour or learning problems. Dr Berard (1993:xii) found that in over 2,000 cases of attention problems as well as learning and behaviour problems, three-quarters of the clients showed very positive results and the remaining demonstrated noticeable partial improvement; none failed to show some benefit obtained from the training (Berard, 1993:xii).

4.8. Conclusion

Problems of listening are not well understood and are often ignored or even denied. If compared with the way the eyes are tested, evidence of hearing dysfunction is not as obvious as it is for visual dysfunction. The sounds which reach the ear are fleeting, fluctuating and constantly changing. No comparison can be established, for the perceived sound has evaporated, being replaced by a multitude of succeeding sounds. Hearing problems are therefore more complex and less perceptible in everyday life. When one thinks of hearing problems, one tends to think of people who are hard-of-hearing. Hearing problems which affect learners are mostly in listening skills. It is in this domain where Berard AIT delivers the greatest benefits (Berard, 1993:12).

In this chapter a literature review was done on the effect that hearing and listening deficits can have on the quality of attention. Berard AIT was discussed as an intervention.

In the next chapter the research design and procedure will be discussed.