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Listening to Autism: How Effective is The Listening Program in the Public School Classroom for Children with Autism?

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Thesis Abstract

This research examines The Listening Program and its benefits of increased communication and social skills for children with autism. The Listening Program is an auditory processing intervention that is non-intrusive and offers support in communication, social interactions and behaviors for children with autism. The Listening Program is based on the research of Dr. Alfred Tomatis. Dr. Tomatis invented the Tomatis method, which is a very expensive and intrusive auditory processing intervention. The diagnosis of autism is on the rise in the United States and it is important for the public school system to find effective interventions for these special children that can be used with little financial burden, The Listening Program provides a more cost effective approach than the Tomatis method for auditory intervention in the public school system.

People with autism have many issues and a great deal of them stem from their ability to process auditorily. In this study, the investigator will use The Listening Program to increase the ability of students with autism to communicate, thereby increasing their level of social skills in becoming a part of the mainstream within the school system and community. An increase in communication will decrease frustration and problem behaviors. Speech and language development will increase their comprehension of text and their ability to understand the world around them.

This research will show that The Listening Program is an effective and viable therapy for children with autism in the public school system.
Chapter 1

Introduction

Working with children with autism one has seen changes in the treatments, attitudes and education of these very special people over the past two decades. The school system has gone from chairs with straps to keep children in place and boxes for time out to having children with autism participate in general education classrooms. The students may, at times, be unproductive, aggressive and inattentive. They may rip everything off the walls and tear supplies to shreds, but there are so many redeeming qualities in these special students. There was a girl who remembered every word she had ever seen, she was able to play songs on the piano after hearing them one time, and then thought that she was a Mattel toy. How can so many conflicting aspects of one person be in one body? It is exciting and interesting trying to discover the world of autism. There are so many scientists looking for a cure, but what would be lost. When the cure is found do we lose interesting personalities and brilliant minds. In finding a cure, do we lose our history of people with major disabilities like Thomas Jefferson, Albert Einstein or Temple Grandin, who have been diagnosed with autism? However like everyone else, people with autism could use some help in understanding the world around them. We need to find a way for them to reach their fullest potential, and with the incidence of autism diagnosis going up at an alarming rate (Autism Society of America, 2003) we need to
look at every available avenue and resource that will help them reach that potential.

Autism is a complex developmental disability that typically appears during the first three years of life (Autism Society of American, 2003). The result of a neurological disorder that affects the functioning of the brain, autism and its associated behaviors has been estimated to occur in as many as 2 to 6 people in 1,000 individuals (Centers for Disease Control and Prevention 2001). Autism is four times more prevalent in boys than girls and knows no racial, ethnic or social boundaries. Family income, lifestyle, educational levels do not affect the chance of the occurrence of autism (Autism Society of America, 2003). This disorder manifests itself in a person’s ability for communication, speech and language development and social interactions. People with autism often exhibit behaviors of aggression and frustration and show an inability to comprehend the world around them.

Autism is being diagnosed at an alarming rate in the 21st century. Since 1990 the diagnosis of autism in California has increased by 273% with a 172% increase in the United States compared with 16% increase for other disabilities (California Department of Developmental Services, 2003). The cost of autism in the economy of the United States is currently 90 billion dollars with a projected cost in 10 years of 200-400 billion dollars (Autism Society of America, 2003). Many in the medical profession, teaching profession and parents are looking for answers. What are the solutions cures or helps for those displaying this disorder?
Statement of the Problem

The general goal of this research is to attempt to determine if The Listening Program is a viable therapy for children with autism that could be used in public schools. In order to begin to answer this question, the focus will be a single classroom in which the effectiveness of the implementation of The Listening Program will be measured on a small group of children. The Listening Program was based on the Tomatis method. The Tomatis method will be reviewed for its history and its importance in the facilitation of auditory processing. Most modern auditory processing programs, like The Listening Program, are based on the original of Tomatis and his method. It is important to understand the Tomatis method in order to become familiar with and understand the underlying process of The Listening Program.

Rationale for the Study

Children with autism display difficulties in communication, social interactions and speech and language development (McEachin, 1999). These difficulties stem from an inability to process auditorily. Auditory processing affects the ability of a person to process information received by the ear. “An inability to process auditorily shows a lack of an ability to attend, discriminate, recognize, remember or comprehend information presented auditorily” (Treharne, 2000, P1-2). The lack of auditory processing can lead to frustration, aggression and an inability to function in the mainstream.
Questions of the Study

The major questions of this study include:

1. Is The Listening Program a viable therapy, which can be used with success in the public school system?

2. Can improved auditory processing effect communication, social interactions and behaviors?

This study will also examine the expense, staff preparation, and implementation of The Listening Program at home and at school. This thesis will address these questions in a quantitative and qualitative manner with the use of quantitative and anecdotal evidence.

The Tomatis Method

Fifty years ago Dr. Alfred Tomatis, a French ear, nose and throat doctor, made astonishing medical and psychological discoveries that led to audio-psycho-phonology, or the Tomatis method. (Gilmore, T.) The Tomatis method is an auditory training program, which is based on the belief that some learning disorders are a sensory regulation problem that begins in the inner ear and can be improved by retraining the ear to listen using “charging high-frequency sounds” (http://www.tomatis.net). Building on the research of Dr. Tomatis, The Listening Program was developed by Dr. Ron Minson, Alex Doman, and Richard Lawrence. (Davies, 2002.)
The Listening Program

A team of professionals in neurology, psychiatry, neurodevelopment, education, speech pathology, psychoacoustics, music and sound engineering developed The Listening Program. The team Minson, Doman and Lawrence), when developing The Listening Program, believed that the combination of psychoacoustics and neurology could improve the auditory processing abilities of children with autism, ADD and ADHD (Davies, 2002). They believed that how we listen and perceive sound, the neurological impact music and sound has on the nervous system and our psychological responses to them could affect auditory processing. Dr. Minson, Alex Doman, and Richard Lawrence believed that music and sound could affect the nervous system and in turn affect emotional and behavioral disorders. This combination of acoustics (sound and music), neurology and psychiatry is defined as psychoacoustics (Leeds, 1999).

Purpose of the Study

Auditory processing has become an important skill for the classroom and the mainstream. Children who are unable to hear sounds, follow directions, hear words and understand what is being said have a distinct disadvantage in the world. They are unable to develop an understanding of phonics so reading progress will be delayed. They do not understand what is expected of them because they do not understand the words that are being said, and they cannot communicate their needs because words and sounds have become jumbled. If their auditory processing improves perhaps their behaviors of frustration and aggression will also improve. They may also be
able to work on a higher level in a general education classroom and experience more success in the mainstream.

Participants and Data Collection

Six subjects in the 4th/5th grade combination class, ages 8-11 participated in The Listening Program. They took a TAPS-R (Gardner, 1996) pre- and post-test and expressed their thoughts in written form, drawings and teacher journals kept on each student. The pre- and post-tests provided information on improvements in speech and language development, thinking and reasoning, word discrimination, interpretation of directions and auditory memory. Student writings reflected the subject's feelings about the listening, reflected thought processes and revealed if it is helping the student. Teacher journals reflected the improvement in the subject's social interactions and daily communication and reflected a student's reactions while listening and the impact listening may have had on any given day.

The Tomatis method was reviewed through historical research for better understanding of The Listening Program and the effects it may have on children with autism. The Tomatis auditory processing program is only administered in clinical settings, and the equipment and training is only available in Europe. It is too costly to conduct a comparable study in the public school system involving The Listening Program and the Tomatis method.

Since autism is a spectrum disorder the variety of children participating in The Listening Program will include a range of subjects, including those with severe autism (Fragile X) to those with higher functioning autism. Increases in abilities and
improvements will vary according to subject and the level of autism each displays. Fragile X syndrome, called Martin-Bell syndrome, is a genetic disorder and is the most common form of inherited mental retardation (McEachin, 1999) approximately 15% to 20% of those with Fragile X Syndrome exhibit autistic-type behaviors and are considered to be on the low end of the Autism Spectrum (Autism Society of America, 2003). Asperger’s syndrome is probably hereditary in nature, although is not accompanied by mental retardation. People with Asperger’s syndrome are in the above normal range in verbal ability and in the below average range in performance abilities. They are on the high end of the Autism spectrum (Autism Society of America, 2003). Children with autism show lack of auditory memory, which is a vital element in following directions, word discrimination, thought processes and reasoning. Through the use of an auditory processing program, The Listening Program, it was projected that these areas would improve and the participants in the study would show an improvement in communication and social skills. Communication and social skills are the primary disabilities reflected in the disorder of autism.

It was also projected that use of The Listening Program would result in improvement in the development of speech and language, social interactions, daily communication and behaviors. The researcher hypothesized that The Listening Program would be equal or have a greater impact on auditory processing for children with autism and that this improvement would continue throughout the year and the lifetime of the students. Students with autism who use The Listening Program would
show a definitive amount of improvement in auditory processing, as well as improvement in the development of speech and language, communication, and social interactions. Results of both quantitative data (TAPS-R) and qualitative data (journals and anecdotal records were employed in addressing the two research questions.

Definitions:

*Autism*—a complex developmental disability that typically appears during the first three years of life. It is the result of a neurological disorder that affects the functioning of the brain.

*Fragile X*—A genetic disorder; the most common form of inherited mental retardation.

*Asperger’s Syndrome*—Possibly hereditary although not accompanied by mental retardation. People with Asperger’s syndrome are above the normal range in verbal ability and the below average range in performance abilities.
Chapter Two

Review of Literature

Children with autism have problems processing and using auditory information. A child with autism may hear the speech sound, but not understand the meaning of the sound or may not be able to retrieve the meaning of the sound at that time. (Ceponiene, 2003). Auditory processing problems may be linked to several autistic characteristics, such as social-communication problems, anxiety or confusion in social situations, inattentiveness and poor speech comprehension (Edelson, 1999). So auditory training appears to be a therapy to use to address these difficulties.

Several well-known auditory processing programs are available worldwide, but all seem to be based on the Tomatis (1954) method of auditory processing. The three programs to be explored in this review of literature are: the Tomatis method, (Dr. Alfred Tomatis, 1954) and AIT (auditory integration therapy) which was developed by Dr. Guy Berard and The Listening Program. The first two programs are the most widely recognized and used auditory processing program. Dr. Guy Berard, a student of Dr. Tomatis, developed AIT after many years of working and researching with Dr. Tomatis. The Listening Program was based on the work on both of these gentlemen.

The Tomatis Method

Fifty years ago, a French ear surgeon, Dr. Alfred Tomatis made groundbreaking discoveries about the role of the ear and brain development. Dr
Tomatis showed that the auditory nerve is fundamental to human neurology. It was discovered that the auditory nerve not only regulates balance and spatial orientation, but also vision and tactile senses. Dr. Tomatis discovered that sound is a “nutrient that can stimulate and feed the brain” (Gilmore, 1999, p. 62). One of his greatest innovations was to find new ways to stimulate the ear and brain to improve learning and behavior. Most of Dr. Tomatis’ research was written in French and has not been translated. Therefore sources quoted are not direct references to him, but translations and interpretations of his work by other authors.

The theory underlying the Tomatis Method of sound stimulation is based on a developmental model. It assumes that many of the behavioral and communicative problems observed in autism are not the causes of the disorder, but rather are symptoms based on the body’s ability to regulate sensory and auditory input (Lawton, 2003). The focus of the treatment is on the sensory systems involved in sensory regulation to provide an improved foundation for normal development to take place. There are many studies on how lack of, or abnormal stimulation, results in delayed and atypical development of the sensory and auditory systems. (Porges, 2003). The same delayed development process occurs in children with Autism. Their central nervous systems do not allow them to properly perceive, process and organize sensory information from their bodies and their environment. These are the necessary ingredients for a child to respond adaptively and develop normally (McEachin, 1999).

The inner ear, which is really the vestibular-cochlear system, is one of the earliest sensory systems to develop and mylinize in utero. The ear completes its
development well before all the other sensory organs. The inner ear reaches adult size and becomes fully operational, sending information to the development temporal lobe, by the fifth month in utero. The ear is first in the developmental process, which allows the temporal lobe to develop and maintain connections with the rest of the emerging nervous system. Temporal lobes are involved in the primary organization of sensory input and when there are lesions or damage to this area then sensory and auditory disturbances can occur (Kolb & Wishaw, 1990). This is why stimulation to the temporal lobe, via sound, provides an important portal into the central nervous system (Bleeck, 2003).

In 1954, Dr. Tomatis, did experiments to duplicate listening from within the womb; he found that the low frequency sounds of respiration, heartbeat and visceral (other body organs) noises were filtered out through the liquid environment. He found that the filtered, high frequency sounds of the mother’s voice were sounds that were left. These high frequency filtered sounds comprised a large part of what the fetus was hearing. These sounds are transmitted rapidly via bone conduction from the mother’s spinal column to the fetus. Through these observations it was shown that babies are born imprinted to their mother’s voice and plays an important role in the development of audio-vocal control and language (http://www.vanderbilt.edu/AnS/psychology/health-psychology/TOMATIS.html, 2003).

The vestibular system is part of the inner ear mechanism and can be called the “ear of the body” (Gilmore, 1999, p. 63). The vestibular system detects motion,
gravity, and provides us with our sense of balance. The vestibular system influences
the state of our muscle tone through its direct influence on anti-gravity musculature
and contributed to our erect posture. The vestibular system has influence over other
sensory systems and can help regulate sensitivity to touch, sound, vision and
movement. The vestibular system provides the opportunity for the two sides of the
body to communicate on the brain stem level. (Gilmore, 1999). The vestibular system
also has direct connection with the eyes so that a person knows if s/he is moving or
the room is moving. The eyes rely on the vestibular system to accurately interpret
information from the visual field and will provide the basis for space perception and
visual processing. The vestibular portion of the vestibular cochlear system also
provides the foundation for auditory processing as it provides “dimension and locality
in auditory perception”. (www.childrenstherapycorner. Shelia)

The vestibular-cochlear system ranks first in the developmental process, as a
result the use of sound stimulation provides an opportunity to influence many areas of
function including gross motor, fine motor, visual processing, auditory processing,
attention and speech and language. Through this research Dr. Tomatis developed his
auditory listening program (Gilmore, 1999).

Dr. Tomatis’ method of listening involves a minimum of two listening
sessions, called intensives, lasting fifteen days each and then there is 4-6 week break
to allow for the integration of the listening process (Tomatis.net.JillLawton). Each
day of the intensive involves two hours of listening through special headsets to allow
for listening via bone and air conduction. Dr. Tomatis devised Electronic Ear
processing equipment to gradually remove low frequency sounds to arrive at filtered music where all sounds are high frequencies. Audiocassettes or compact discs, with sounds of Mozart, Gregorian chants and filtering of mother’s voice, lasting about 30 minutes, are preprogrammed (www.his.com/~spectrum/aboutspectrum.html, 2003, Dr. Joan Neysmith-Roy).

The Tomatis method works on three levels: (1) good functional use of vestibular and cochlear listening, (2) establish an emotional desire to use the auditory system and (3) the functional and emotional systems improve relationships to self, others and environment (Gilmore, 1999).

The Tomatis method benefits those people who need improvement in language, communication, learning, listening, vestibular, oral motor, and emotional areas. The method specifically helps those auditory processing weaknesses (Tomatis.net.JillLawton).

*Auditory Integration Therapy – Dr. Guy Berard*

Dr. Guy Berard was a student of Dr. Tomatis. Dr. Berard was an ear, nose and throat doctor who saw the value of Dr. Tomatis’ research and decided to develop his program for auditory processing (Edelson, 1999, pp. 73-81).

Taking Dr. Tomatis’ research one step further, Dr. Berard discovered that the schoolwork of children exhibiting hearing difficulties was affected by their hearing loss. Dr. Berard developed Auditory Integration Therapy (AIT), which is a sound therapy. Dr. Berard conducted research (written in French) with students in the French school system and discovered that learning and behavioral problems of the
children were rooted in hypersensitivity, as well as below-normal sensitivity, to sounds at particular frequencies. "Dr. Berard's program is designed to improve, strengthen, or exercise the acoustic reflex muscle in the middle ear" (Edelson, 1999, pp 73-81).

AIT requires an Initial Consultation, three Audiograms (initial, mid and final) twenty half-hour sessions and an analysis of a follow-up checklist after three months. The audiogram determines the accuracy of auditory processing abilities of each student and it was shown that students most severely affected by auditory processing could not be accurately obtained. The twenty-hour sessions occur twice daily, one in the morning and one in the afternoon. The music from the Audiokinetron, a listening device invented by Dr. Berard, is played at levels below the threshold of discomfort and is OSCA (Occupational Safety and Health Administration) approved. OSCA insures that the equipment is of no danger to any of the participants of AIT. The Audiokinetron processes music using wide-band and narrow-band filters. "Wide-band filters present either the low end of the frequency spectrum (1000 Hz and lower) or the high end of the frequency spectrum (1000 Hz and higher) at random intervals, approximately ¼ second to 2 seconds" (www.up-to-date.com)

The modulation consists of alternating from the low end of the spectrum to the high end of the spectrum at these random intervals (1/4 to 2 seconds). The narrow-band filters are used to weaken or taper the frequencies that the listener hears too well, made evident in the person's audio test. It is important that the music source covers a wide frequency range and that these frequencies occur in a short period of
time. “A wide variety of music styles are included in the program including reggae, pop, folk, rock, new age, and jazz. Dr. Berard recommends using dynamic music with a wide range of frequencies and a rapid beat” (www.up-to-date.com).

According to Eddelson (1999), “AIT works on the principle that if sound has been partially blocked or becomes painful successive flexing and extensions of the middle ear muscles will increase mobility and decrease pain in the middle ear. This treatment should strengthen the muscles and improve the body’s reaction to sensory overload” (pp.73-81).

By stimulating the auditory areas of the brain the auditory cortex reorganizes and improvement is noted (Edelson, 1999). This improvement is noted in people who may have receptive language and balance difficulties. They may be distracted by random sounds, slow response time, inconsistent performance, and experience auditory perceptual problems.

Annabel Stehli wrote her book The Sound of a Miracle in 1991 and introduced AIT to America. Mrs. Stehli has a child with autism who was helped with the use of AIT. Her daughter’s main sensitivity was her inability to filter noises. Annabel’s daughter, after using AIT, was able to function in the mainstream. She completed high school on the honor roll and attended college. This gave hope to thousands of parents who had children with autism. Although, no other patient has shown the dramatic improvements of Annabel’s daughter, the seed had been planted for use of auditory training.
The Listening Program

The Listening Program (TLP) was developed by Minson, Lawrence and Doman in 1998, and built upon the Tomatis method of auditory processing (Leeds, 1999). Like the Tomatis method and AIT, it deals, as the Tomatis method and AIT, with sound therapy. Sound therapy is a science that, has evolved over the past fifty years. "This therapy is for those with auditory processing problems and is quite distinct from music therapy, or any interventions for hearing disorders particularly relevant to those children and adults whose language difficulties are linked to auditory problems, which often occurs among children with autism" (Doman, 2003, pp. 33-36).

The Listening Program is an active listening program built on the concept of psychoacoustics (Davies, 2002). Psychoacoustics is the study of human perception of sound and provides an explanation of how the human ear-brain system interprets sound and decodes information from a pair of receivers (ears) in a complete three-dimensional auditory image. There are three general fields by which humans can determine or perceive sound: pitch, volume (or loudness), and time. These three fields (pitch, volume, and time) provide the information or cues necessary for localization, a process that determines where a sound came from in three-dimensional space. In order to understand the basics of human auditory localization, one must first understand the method by which sound is received through the ears, as well as the basic definitions of pitch, loudness, and time. (Wyatt, 2001). Pitch is defined as a tone that is determined by the frequency of the sound waves producing it; highness or
lowness of sound (Webster’s Seventh New Collegiate Dictionary, 1971). Volume is the intensity of the sound and time refers to the interval between sounds.

A cross-disciplinary team from the Center of Psychoacoustics Research including professionals in neurology, psychiatry, neurodevelopment, education, speech pathology, psychoacoustics, music and sound engineering, developed The Listening Program. The three originators of The Listening Program are Dr. Ron Minson, Alex Doman, and Richard Lawrence (Davies, 2002).

The originator of The Listening Program was Dr. Minson, a practitioner in Psychiatry. He had a daughter with dyslexia who benefited from the Tomatis auditory processing method to such an extent that her literacy skills improved so much that she changed from being introverted and depressed to becoming a vibrant and employable young woman. Dr. Minson, as a result, went to France to study the Tomatis method and returned to administer the Tomatis method in the United States for ten years. His experience contributed to the development of The Listening Program (Davies, 2002).

The second originator of The Listening Program was Alex Doman (Davies, 2002). Alex Doman was involved in neurodevelopmental (nervous system development) programs for children; from those severely brain damaged to others whose disabilities were less obvious and yet debilitating on their lives. Alex Doman has years of experience working with sound therapy programs many of which are rooted in the Tomatis method. Alex Doman’s interest became personal because he
suffered from tinnitus, a ringing or roaring in his ears. Alex Doman was cured from tinnitus through Sound Therapy (Davies, 2002).

The third member of the original team was Richard Lawrence, Music Director of the Archangels Chamber of Ensemble and an acoustic engineer. Acoustics is a science that deals with production, control, transmission, reception and effects of sound. The aim of the team was to develop a powerful sound therapy based on the Tomatis method within an attainable price range so that many more people could benefit from the therapy. To do this they pooled their wide expertise, and employed modern acoustic tools to produce The Listening Program (Davies, 2002).

The Listening Program is designed to improve the student’s processing of sound. Every individual has a dominant ear for processing sound, even though both ears pick up sound and hearing is perfectly normal in both ears (Davies, 2002). The Listening Program is designed to exercise and tone tiny muscles in the ear and help build stronger multi-sensory pathways in the brain. It has been designed to re-train the ears in those individuals who are left ear dominant. There is some evidence indicating that another possible cause of learning disabilities and disorders is left ear dominance. People who are right ear dominant have an advantage because the right ear processes much faster. Right ear dominant people have more control over the parameter of their voice and speech, relate to situations faster, respond to stimuli more appropriately and have better control over their emotions (Ceponiene, 2003).

The Listening Program will help with ear dominance (Doman, 2003). Classical music and nature sounds are included in each compact disc. The classical
music is filtered and gated to produce high frequency sounds. Filtering sound means the removal of specific frequencies from an existing sound recording. With filtration, any part of the low, mid or high end of a recording can be withdrawn and reintroduced at will and it is possible to isolate and mute certain frequency bandwidth (Leeds, J.). Gating refers to the creation of a random sonic event. Sonic refers to waves and vibrations in the audibility range of the human ear. This is accomplished by electronically processing a soundtrack so it unexpectedly jumps between the high and low frequencies. This may not be the best to hear, but the sound treatment will vigorously exercise the muscles of the middle ear. The combined process of filtration and gating creates a powerful auditory workout. (Doman, 2003). High frequency sound helps the attention and focus of listening. Nature sounds are used to calm and soothe and help create spatial awareness and focus directed listening. The participant becomes an active listener. Active listening means to be fully aware of what they are hearing, moving beyond passive hearing into a state of auditory attention.

The Listening Program should show improvement in the thought processes. This improvement could be shown in oral language development, social skill development, reading comprehension, following directions, balance and coordination, sensitivity to sound (hypo and hyper) and some hearing loss related difficulties. The Listening Program should be used in conjunction with other therapies that may already be in place. It is not a replacement therapy, but an additional help for children with autism.
The cost of The Listening Program can be purchased for as little as $500.00 per station. The headphones must be of high quality to insure the sound quality of the compact discs and be able to eliminate other distracting sounds (www.daviscenter.com). Any compact disc player will work for playing the compact discs. The Auditory Integrating Training (AIT) which was developed by Dr. Guy Berard (Edelson, 1999) requires a number of assessments with the use of an audiometer. When assessments are completed then Dr. Berard’s Audiokinetron processor must be used to electronically modulate the notch-filtered musical program received from a compact disc player. The modulated music is the routed to stereo headphones. The cost can run into the thousands of dollars becoming cost prohibitive for most school districts (Gilmore, 1999). So the therapy is conducted in specially designed clinics.

The Tomatis method requires an electronic ear processor, which is unavailable to laymen and can be found through special centers that conduct the therapy. The equipment necessary to administer the Tomatis method can only be purchased in Europe. The cost that the Tomatis method would incur is something a school district could not or would be reluctant to pay.

Training for The Listening Program involves the manual and a few instructions from a professional (an Occupational Therapist and The Listening Program schedule guide). The schedule guide discusses aspects of auditory training, the method for administering The Listening Program and a schedule for participants to follow. The schedule of listening is recommended for the best results.
The training on use of the program is included when you purchase The Listening Program. AIT (Auditory Integration Therapy) requires training for the facilitator to understand the operation of the Audiokinetron processor. The facilitator must learn how to use the filters to modulate the musical program and this training could take a number of weeks to complete (www.daviscenter.com). The facilitator must also learn how to conduct listening assessments to determine specific frequencies or peaks. The Tomatis method requires training in the use of the electronic ear processor and the recording of the proper music to filter and gate for high frequencies. Based upon this research The Listening Program would be the most cost effective approach for the public school system and the general public.
Chapter Three

Methodology

This study will address two questions: (1) Is The Listening Program a viable therapy, which can be used with success in the public school system? and (2) Can improved auditory processing effect communication, social interactions and problem behaviors? The researcher will discuss in this thesis the implementation, monitoring and feedback procedures used for the collection of data for The Listening Program. The research will show evidence of marked improvement in areas of communication, and social skills and reduction in adverse behaviors based upon (a) statistical data analysis using the test TAPS-R (Gardner, 1996), and (b) the anecdotal evidence collected by this researcher. This study will help to evaluate the value of The Listening Program to determine if a child with autism participating in The Listening Program will be able to participate in the mainstream with more success. The main purpose of this study was to find a successful auditory intervention for children with autism. Auditory disabilities impact a child in the mainstream and thwart the ability to access the standard curriculum. Children with autism have many auditory difficulties, which lead to behavior issues, lack of communication, sensory confusion and the inability to interact on a social level. There is a need to find a successful auditory intervention or therapy for children with autism. The increase of the diagnosis of children with autism has risen so dramatically in the last ten years that
that interventions must be found to help children with autism deal with life in the school and community.

Participants

Students in a 4th/5th grade combination class in the public school system participated in the use of The Listening Program. They ranged from nine to eleven years of age. The participants represented the autism spectrum from Fragile X (severe autism) to Asperger’s syndrome, a higher functioning form of autism (Autism Society of America, 2003). All students demonstrated difficulty with auditory processing. This difficulty was demonstrated by the preliminary assessments given to each student prior to the administration of The Listening Program using the TAPS-R (Gardner, 1996). Data was gathered on these students with the use of the TAPS-R (Gardner, 1996) an auditory processing test, student journals (Appendix A), parent questionnaires (Appendix B), general education teacher, therapists, and support staff interviews (Appendix C) and this researcher’s field study notes. (Appendix D)

Design

The study included data analysis through the use of TAPS-R and anecdotal records collected through student journals (Appendix A), parent questionnaires (Appendix B); general education teacher, therapists and support staff interviews (Appendix C) and this researcher’s field study notes (Appendix D). Six student participants were included in the study. The participants are children with autism eight through eleven years of age. A pre-test and post-test using the TAPS-R was given to each participant to determine auditory processing skills, pre- and post-
intervention. Each student was given a journal (Appendix A) to express their feelings through writings or drawings after each day of using The Listening Program. Parent questionnaires (Appendix B) were sent home every 2 weeks during the administration of The Listening Program. Interviews (Appendix C) were conducted after the second week, fourth week, sixth week and eighth week of The Listening Program interventions. These interviews were conducted in an informal manner with general education teachers, speech and occupational therapists and support staff. The support staff are the instructional assistants in the classroom. Teacher observations were recorded in a field study notebook (Appendix D) each day to reflect each participant’s improvements in communication, behaviors and social skills.

Data Collection

The Listening Program was administered to each participant for eight weeks and analysis of pre-and post-test using the TAPS-R (Gardner, 1996) was conducted. Student journals were perused for any positive changes in communication through their writings or drawings. Teacher anecdotal notes in the field study notebook were analyzed each week for improvement or changes in daily communication and social interaction abilities. This researcher’s field study notebook reflected the participants’, positive or negative, behavior during the intervention. After the second week of listening the first interviews of staff and teachers were conducted. Questionnaire sheets were sent home for the parents to complete. All interviews were given to the general education teachers, therapists and support staff of the participant to note any changes within the mainstream environment concerning communication, social skills
and behaviors. Communication may reflect an ability to use more words; social skill ability may be demonstrated, as a higher level of participation and improved behaviors could be a decrease in negative actions or disruptions.

Materials

The materials necessary to administer The Listening Program are a compact disc player, headphones and the set of eight weeks of compact discs from The Listening Program. Journals for students’ drawing and writing were given to each participant with crayons and pencils to be used in any manner after given prompts to enable them to write or draw. The prompts were: How did you feel while doing The Listening Program? and What did you hear?

The parent questionnaire was organized and kept in the field study notebook for analyzing. Teacher observation sheets were kept in a field study notebook for easy access and note taking (Appendix D). The completed staff and teacher interviews were kept in the field study notebook to be studied and analyzed. It is important to have materials on hand for the participants to use while listening. Some of the hands-on materials used by the participants while using The Listening Program were Legos, toy cars, a dollhouse, modeling clay, building blocks, paper, scissors, and glue. It is helpful to have a wide variety of choices for each participant to do while listening. It is also helpful to know what each participant enjoys doing to make The Listening Program a productive and positive experience for each participant.
Procedures

The procedures for listening with The Listening Program are outlined in the study guide (Leeds, 1999). The Listening Program study guide gives one a schedule to follow for the eight-week intervention. The participants are required to complete this eight-week course with two listening sessions per day. Each session requires a 15-minute block of time.

There are eight different compact discs that are changed from week to week. Each session of fifteen minutes consists of three segments. Each segment consists of:

- Pre-recorded and Intentionally Recorded Music

- Classical music and nature sounds have:
  - High and low frequencies to reflect pitch
  - Intensity to reflect volume
  - Time to reflect interval between sounds

The classical music is filtered and gated to produce high frequency sounds. Gating is when a random sonic event is created. This occurs when a soundtrack unexpectedly jumps between high and low frequencies. High frequency sounds help attention and focus of the participant. Nature sounds are used to calm and soothe. Nature sounds also help create an awareness of space and focus directed listening. Through the use of these sounds the participant becomes an active listener. Active listening is being fully aware of what you are hearing. The participant moves beyond passive hearing into a state of auditory attention (Davies, 2002). During the listening phase a student may do other things that interest him, such as drawing, putting
puzzles together, Legos, etc. However, he may not eat or read during the listening phase of the session. These activities detract from active listening.

The sessions were conducted once in the morning and once in the afternoon. Each session lasted approximately 15 minutes, five minutes for each of three tracks. For The Listening Program to be effective the participants had to wait at least an hour before the next session could begin. After each session students were asked to write or draw in their journals. Prompts were given so they would know what they needed to write or draw. The prompts given were: “How did you feel when you were listening? And “What did you hear?”

A field study notebook was kept by the researcher on each subject as they listened, for reactions to the listening and to note any changes in communication, social interactions and behaviors daily (Appendix D). This data will provide information on progress as also evident by pre-post-test of TAPS-R (Gardner, 1996).

**Figure 1**

The Listening Program’s Base Schedule.

<table>
<thead>
<tr>
<th>Weekly compact disc</th>
<th>First session tracks</th>
<th>Second session tracks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>1, 2, 3</td>
<td>4, 5, 6</td>
</tr>
<tr>
<td>Day 2</td>
<td>7, 8, 9</td>
<td>10, 11, 12</td>
</tr>
<tr>
<td>Day 3</td>
<td>1, 2, 3</td>
<td>7, 8, 9</td>
</tr>
<tr>
<td>Day 4</td>
<td>4, 5, 6</td>
<td>10, 11, 12</td>
</tr>
<tr>
<td>Day 5</td>
<td>7, 8, 9</td>
<td>1, 2, 3</td>
</tr>
</tbody>
</table>
Each week a new compact disc was introduced. Every track on TLP’s compact discs reflect high and low frequencies in the classical music, with sounds of nature entwined in the music and then seconds of silence. After the three tracks are completed there is a 20 second pause so the participants know when their listening time is completed.

The Listening Program study should last approximately eight weeks. It may require a longer period of time when delayed due to the holidays, vacation or illness that may be experienced during school.

Method of Analysis

The data collected was analyzed in a quantitative and qualitative manner. Quantitative data is the administration of a pre- and post-test of the TAPS-R (Gardner, 1996) to each participant. The TAPS-R was designed to diagnose students having difficulties with auditory-perceptual processing skills that are necessary for learning. Five subtests were administered to determine a participant’s strengths and weaknesses in auditory processing abilities. Although there are seven subtests available in TAPS-R only five were chosen to be administered for the pre- and post-tests. The five subtests were chosen for their ease of administration and ability for each student to understand the directions necessary to complete the test. The tests determined their ability in auditory memory and sound discrimination. It measured what a person does with what is heard. The scores are evaluated for any positive or negative changes.
The qualitative data consists of student journals (Appendix A), parent questionnaires (Appendix B), general education teachers, therapists and support staff interviews (Appendix C) and this researcher’s notes available in a field study notebook (Appendix D).

Student journals (Appendix A) were analyzed for any changes in writing or drawing abilities. These changes reflect an increased ability to understand the prompts given and the ability to draw or write after each prompt. It is noted if the participant can draw or write to reflect an increased awareness of The Listening Program.

Parent questionnaires (Appendix B) were analyzed for positive behavior change and productive social skill abilities. Information from parent questionnaires was evaluated for any unexpected positive or negative changes, e.g. an increase in frequency of undesirable behaviors (self-stimulation, temper tantrums, etc.). Parent questionnaires are used to address any concerns parents may have about The Listening Program.

Interviews conducted by this researcher with general education teachers, therapists and the participant’s support staff (Appendix C) were conducted in an informal manner. Specific questions were asked to collect data on changes in behaviors, social skills and communication. The data collected was analyzed and noted for any positive results and leaps in their abilities to participate in the mainstream of general education.
This researcher’s field study notebook (Appendix D) contains information on the process of the administration of The Listening Program. It shows the participants' willingness to listen, their focus and behaviors. The notebook also contains data concerning behaviors, communication and social skills. Notes reflect any communication change and their abilities to use words instead of gestures, or their ability to use more words that are intelligible and relevant. Each participant’s behaviors were noted and decreases in those behaviors (self-stimulation) were written in the entries. Social skill ability was evaluated and analyzed for their new-found ability to participate in the mainstream without reluctance or behaviors that are disruptive to the classroom environment. All qualitative data is analyzed to note improvements in the participants’ communication, social skill ability and behaviors. These changes are reported in the data analysis sections of this study.
Chapter 4

Data Analysis

In review of the data collected on the intervention of using The Listening Program two questions were established. The first question: Is The Listening Program a viable therapy, which can be used with success in the public school system? The second question: Can improved auditory processing effect communication, social interactions and behaviors?

The statistical analysis (TAPS-R) (Gardner, 1996) is reported. The anecdotal evidence is shown in: (1) student journals; (2) parent questionnaires; (3) general education, therapists and support staff interviews; and (4) field study notebook to determine the effectiveness of TLP.

Quantitative Findings from TAPS-R

The primary purpose of TAPS-R is to assess various areas of a participant’s auditory-perceptual skills. This test does not measure physical hearing – only a participant’s ability to perceive auditory stimuli and process the stimuli; such as the abilities to discriminate, understand, interpret and express. It is an untimed test and can be administered completely in 15-25 minutes depending on the participant. The participants for this study took several days to complete the pre-test. Some of the participants had a difficult time focusing so the test needed to be administered over several days. The post-test took a shorter period of time and that was a definitive positive change for the participants.
The test can provide the examiner other information about the participant—such as the ability to understand various types of directions (key words and sequencing), accurate pronunciation of words (correct articulation of words), reasoning (using common sense in solving common thought problems), immediate recall of nonsensical/rote auditory matter, and discrimination of word sounds.

The TAPS-R (Gardener, 1996) subtests:

1. **Digit Span – Forward:** ability to retain and recite spoken numbers in a forward sequence (e.g. 1, 2, 3; 5, 6, 7)

2. **Digit Span – Reversed:** ability to retain and recite spoken numbers in a reverse sequence (e.g. 7, 6, 5; 10, 9, 8)

3. **Auditory Sentence Memory (AR):** ability to retain and recite spoken sentences (e.g. He sat.)

4. **Auditory Word Memory (AR):** ability to retain and recite spoken words in a given sequence (e.g. go, car, stop.)

5. **Auditory Reception of Directions:** ability to process verbal description and provide a proper response to a question about that description (e.g. “The box is by the door. Where is the box?”)

6. **Auditory Word Discrimination (DISC):** ability to distinguish the pronunciation of spoken words as either the same or different (e.g. “car, car”; “cat, sat”)

7. **Auditory Processing (Thinking and Reasoning) (AP):** ability to abstract from the specific to the general given a verbal description (e.g. “The fish swam. Can fish swim?”)
The TAPS-R has retained the same concept and purpose of the original TAPS, but norms and standardization have been changed and refined. Other changes delete some items and add some new items. A further and important change is increasing the raw score for each item of the subtests Auditory Processing (Thinking and Reasoning). This revision allows for multiple-point scores. Standardization, reliability, validity and development of the TAPS-R (Gardener, 1996) can be viewed in the instruction manual.

There are seven subtests available for testing in the TAPS-R (Gardner, 1996). Five subtests were chosen for the pre- and post-tests because of the ease of administration and the ability for each student to understand the directions necessary to complete the subtest. A standard measure was needed for each participant to show and compare the results not only for the individual, but the participants as a class. If a participant could not attend or take the test in any form it was not administered to any of the participants. The subtests determine the participants' ability in auditory memory, auditory reception and sound discrimination. The subtests measure what a person does with what is heard. Overall changes in the pre- and post-tests are shown in percentage form presented in Table 1.
Table 1

Test of Auditory Perceptual Skills - Revised (TAPS-R)

<table>
<thead>
<tr>
<th>Participant</th>
<th>Digit Span Pre-test</th>
<th>Digit Span Post-test</th>
<th>Digit Span Reversed Pre-test</th>
<th>Digit Span Reversed Post-test</th>
<th>Auditory Discrimination Pre-test</th>
<th>Auditory Discrimination Post-test</th>
<th>Auditory Processing Pre-test</th>
<th>Auditory Processing Post-test</th>
<th>Auditory Reception Pre-test</th>
<th>Auditory Reception Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Carl</td>
<td>95</td>
<td>95</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. Billy</td>
<td>87</td>
<td>87</td>
<td>0</td>
<td>94</td>
<td>0</td>
<td>94</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3. Jimmy</td>
<td>96</td>
<td>96</td>
<td>86</td>
<td>86</td>
<td>81</td>
<td>106</td>
<td>83</td>
<td>99</td>
<td>27</td>
<td>41</td>
</tr>
<tr>
<td>4. Seth</td>
<td>86</td>
<td>86</td>
<td>90</td>
<td>90</td>
<td>87</td>
<td>106</td>
<td>72</td>
<td>86</td>
<td>5</td>
<td>33</td>
</tr>
<tr>
<td>5. Mark</td>
<td>85</td>
<td>85</td>
<td>96</td>
<td>96</td>
<td>87</td>
<td>113</td>
<td>92</td>
<td>116</td>
<td>28</td>
<td>40</td>
</tr>
<tr>
<td>6. Luke</td>
<td>69</td>
<td>69</td>
<td>67</td>
<td>67</td>
<td>0</td>
<td>77</td>
<td>55</td>
<td>55</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Average</td>
<td>86.33</td>
<td>86.33</td>
<td>56.5</td>
<td>72.17</td>
<td>42.5</td>
<td>82.67</td>
<td>50.33</td>
<td>59.33</td>
<td>10</td>
<td>23</td>
</tr>
<tr>
<td>Percent change</td>
<td>0%</td>
<td>28%</td>
<td>95%</td>
<td>18%</td>
<td>130%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Student’s T-Test, for pared value, two-tail test.

| p values | 1 | 0.363 | 0.049 | 0.087 | 0.041 |

TAPS-R (Gardner, 1996) can be reported as standardized scores (SS), scaled scores, percentile ranks and t-scores.

Overall changes for the participants in each area are as follows:

- **Digit Span Forward (AM)** – 0% change from pre- to post-test, for all students indicating that in this test there was no noticeable change in their ability to retain and recite numbers in a forward sequence. A Statistical Student pared value, two-tail; T Test p value of 1 noted in table 1 supports the no change conclusion.
- **Digit Span Reversed (REV)** – 28% change from pre- to post-test meaning in this test there was a noticeable change in the overall ability of the participants to recite numbers heard in a reverse sequential manner. This change was attributed to all students and was confirmed through an analysis using a pared value, two-tail, Student’s T-test that shows a p value of .36.

- **Auditory Discrimination (DISC)** – 95% change from pre- to post-test showing a dramatic increase in their abilities to discriminate different sounds that were heard. There is a high probability that these findings are true through the use of a pared value, two-tail Student’s T-test. Results indicate a p value of .043.

- **Auditory Processing (AP)** – 18% change from pre-to post-test shows an increase in the participants’ ability to process sounds (words) in a sequential manner. This shows improvement in their auditory memory confirmed again via a pared value, two-tail Student’s T Test with a resultant p value of .088.

- **Auditory Reception (AR)** – 130% change from pre-to post-test had a dramatic increase in receiving auditory information and the participants’ ability to generalize information with yes/no answers. The Student’s T-test p result of .042 supports the probability of change in the two sets of pared data.

The participants showed an average overall change that was the most significant in the areas of auditory discrimination and auditory reception. This is an important finding and reflects a change in their ability to retain sequential information
in their memory, process that auditory information and respond to general information in a yes/no manner.

Qualitative Findings from Journals, Questionnaires, Interviews and Field Study Notebook

Student participants were given journals (Appendix A) to express their feelings during listening. Every two weeks questionnaires (Appendix B) were given to parents and interviews (Appendix C) were conducted with general education teachers, instructional assistants, the speech therapist and the occupational therapist. Notes were entered in the field study notebook (Appendix D) for an evaluation of the participants' communication, social interactions and behavior changes during the administer of The Listening Program. The interviews and questionnaires were essential in collecting descriptive and qualitative data for documenting changes occurring in communication, social skills, and behaviors in the classroom environment and the home. These questionnaires and interviews would reflect positive or negative changes. Questionnaires were given to parents because interviews were time restrictive for the parents. The questionnaires were returned at a 75% rate by the parents.

The parents' questionnaires and the interviews of the teachers and staff showed no significant or noticeable changes in the participants' communication, social skills or behaviors until the fourth week of listening. During the fourth week of The Listening Program small, subtle changes were noted in the researcher's field study notebook and interviews given to general education teachers and support staff.
The student journals, parent questionnaires, teacher and staff interviews and the researcher’s field study notebook supported changes in communication, social skills and behaviors in the next four weeks of significant value to each participant.

Case Reports on the Individual Students

Carl

Carl is an aggressive 9-year old boy, diagnosed with Fragile X syndrome; he has difficulty understanding directions and social cues. Carl is unable to verbalize his feelings or thoughts. He is able to ask for food, use the bathroom and will speak when provided a model. Carl can use the Picture Exchange Communication system as a model for communication, but is reluctant to do so and will throw his communication book across the room. He speaks in an angry tone at all times. Most of Carl’s words are parroted in the videos he watches and listening carefully one can recognize phrases from those videos. His favorite video at the time of this research project was “Finding Nemo” (Disney, 2003), and one can hear references to the fish Dory, in his unintelligible discussions. Carl was unable to participate in the journal writing. Carl’s aggression takes the form of hitting, biting, kicking and pinching. This aggression manifests itself; when he is approached; without warning, by peers or adults, or when a desired object is taken from him.

However, after the intervention of The Listening Program, this researcher’s observation noted that his aggression diminished to the point where he was able to have an accidental bumping from peers or adults without the aggressive tendencies being displayed. He was able to part with a desired object without becoming
aggressive. This is a major behavior change for Carl. Although the TAPS-R did not reflect significant changes in memory or auditory processing, the anecdotal evidence shows changes did occur in behavior and social interactions.

Parent questionnaires revealed no change in Carl’s behaviors, social interactions or communication at home. Therapists, teachers and instructional assistants stated that his ability to curb his aggression had improved and instructional assistants noted that he responded to greetings from general education peers without anger or aggression. While he did not initiate greetings, Carl was able to return the greetings. The results of the anecdotal evidence do reveal several positive changes in social interactions and behavior.

**Billy**

Billy is a happy 9-year old boy with limited verbal skills and a limited ability to interact socially. Billy can return greetings of “hi” and “good-bye” and ask for things he would like or need such as food, use of the bathroom and to play on the computer. That is the extent of his ability to converse with adults and peers. Billy has limited ability to interact with peers on a one-to-one basis. He must be told to make eye contact, listen, sit quietly and answer questions. Billy becomes agitated and wants to leave the area when he sits for more than five minutes in a social situation, such as playing a game with his peer group. Billy could not participate in the student journals because he was unable to understand the prompts given. Billy showed significant improvements in digit span reverse and word discrimination on the TAPS-R (Gardner, 1996). However, teacher observations in the field study
notebook showed no observable change in Billy's communication, social interactions or behaviors. Parent questionnaires reflected no changes and the interviews with teachers, therapists and support staff showed no change that was detected. These changes show the opposite of Carl where TAPS-R scores showed no big change, but anecdotal documents noted social and behavioral changes.

**Jimmy**

Jimmy is a 10-year old student diagnosed with severe autism. Before the intervention Jimmy displayed echolalia (repetitive use of words or phrases), with very few verbal skills. Jimmy uses one and two word phrases to express what he wants. The only communication he uses is for things he wishes to obtain, e.g. drink, bathroom, food or toys. Jimmy has a difficult time following directions, written or verbal, understanding and speaking in complete sentences and relating to the world in the most general sense. Jimmy was unaware of those around him and no attempt was ever made to initiate social interaction with peers or adults. Jimmy only interacted with others when forced to sit, listen and look. After the intervention using The Listening Program, Jimmy showed marked improvement in his TAPS-R (Gardner, 1996) scores. Jimmy's TAPS-R scores show ability to process sounds he is hearing and discriminates between the sounds heard. Jimmy's ability for auditory reception increased dramatically allowing him to respond to information he receives. This helped Jimmy eliminate most of the echolalia from his speech. He is able to hear what is being said and understand words or phrases and he does not need to repeat them. Journal writing was difficult for him but he was able to draw or color different
pictures after the fifth week, which reflected his progress in understanding the prompts given to him. Teacher observations in the field study book noted that Jimmy was becoming aware of peers and adults in his world. He began to initiate interaction with his peer group. He would go up to different peers touch them and smile. Jimmy is now attending a general education classroom for four to five hours a week. Jimmy is listening to those around him and is able to answer questions without repeating what has been said. This ability has helped in his general education classroom so he can follow directions and listen to others around him. He can now answer questions about stories or the day, etc whether he is first or last by using one or two- word phrases or pointing to pictures. His parents returned questionnaires indicating marked improvements in his social interaction and behaviors at home and in the community. Before The Listening Program intervention Jimmy would become frustrated with his inability to communicate, which would lead to pinching and hitting. It is noted that communication did show improvement in the classroom through Jimmy’s ability to listen, follow directions and respond to questions his communication skills became more effective. Jimmy is able to communicate more effectively with his family in his home. He is now touching things he wants or pointing to them so that his family does not have to guess what he is trying to communicate. This is a very powerful improvement for his overall quality of life.

Jimmy’s behaviors have also improved as his communication improved. He became less frustrated with the world around him. Jimmy started to interact with his brothers trying to get them to play with him and was willing to go with them when
they wanted to play. Jimmy’s parents were astonished at the progress he made after using The Listening Program.

Interviews with therapists, teachers and support staff noted an improvement in Jimmy’s social interactions and behaviors. The general education teacher reported that he was participating with other students in art and reading projects. He showed more involvement and willingness to follow the direction of the student in charge of his cooperative learning group. The therapists and support staff noted that Jimmy was working for longer periods of time; not just five minutes but for 20 minutes. His adverse behaviors decreased and he wanted to initiate social interaction with his peers. During the teacher observations Jimmy had the most difficulty while listening to the last track of each 15-minute segment. He would throw the headphones down and scream not to listen. It is interesting that he had the most significant improvement in several areas. Jimmy’s TAPS-R scores reflect improvements in auditory processing and auditory reception. Socially Jimmy was able to participate in a general education classroom and initiate play with his peer group. He is able to interact in a positive manner with his brothers and other members of his family. Jimmy is now able to communicate more effectively at school and home. At home he is able to interact with his brothers and communicate his needs with his family, which improves his behavior. Jimmy’s frustration level has been reduced with his ability to communicate.
Seth

Student number 4, Seth showed remarkable improvement in the social arena. Seth is diagnosed with autism and reacts well to educational interventions for children with autism, e.g. picture schedules and workstations. His main area of difficulty is communication and social interactions. Before The Listening Program intervention, Seth did not speak above a mumble and preferred playing and sitting alone. The results of TAPS-R (Gardner, 1996) for Seth showed marked improvements in several areas (see Table 1). Seth showed improvement in phoneme awareness and used his newfound knowledge during his reading sessions by sounding out words that are unfamiliar to him. His ability to comprehend and answer most questions about his reading has shown a large improvement. After use of The Listening Program Seth is able to speak in a clearer voice and play with others at recess. Seth can participate in conversation beyond the use of a basic model, e.g. “What is your name?” or “How are you?” Seth listens and participates in conversations with his peer group e.g. “What do you want to do?” “How do you like this?” or “What did you do this weekend?” Seth’s voice became clearer and the adults and peers did not have to ask him to speak up or say, “I can’t hear you.” These improvements were noted in the researcher’s field study notebook. Seth enjoyed listening and would do a variety of things while listening. He enjoyed doing art projects. He would draw, make three-dimensional objects (trains, wagons, hats), build with Legos and mold with clay. The participant expressed a desire to listen and looked forward to doing The Listening Program. Questionnaires with Seth’s parents revealed that his level of interaction with his
sibling had increased dramatically and they noticed that he was speaking in a clearer voice. The general education teacher expressed that Seth showed a marked improvement in his ability to listen and follow directions. Before The Listening Program Seth would take several prompts to follow directions and at times others would have to lead him through all the directions. He can now do most tasks given with directions independently or by watching others. Seth’s general education teacher would like him to venture to the general education classroom independently, without his assistant.

Mark and Luke

Student 5, Mark and student 6, Luke both diagnosed with autism, showed the most noticeable improvement in socially acceptable behavior. While the TAPS-R (Gardner, 1996) showed improvement in several areas (see Table 1). Both Mark and Luke showed dramatic improvement in the auditory discrimination test, which shows an ability to discriminate different sounds they hear. Mark also showed improvement in auditory processing and auditory reception skills. His ability to process information he hears and respond in a positive manner improved.

Mark and Luke were obsessed with self-stimulating behaviors. Mark would hit his legs, tables, or chairs in a loud and distracting manner. Luke chewed on anything available to him, e.g. paper clips, staples, erasers, or gum. They both enjoyed being in social situations and are quite verbal, but their peers only interacted with them when absolutely necessary. While listening they indulged in their self-stimulating behaviors to the point of distraction and needed to be reminded to have
“quiet hands,” with no eating or chewing. Mark and Luke were asked to write and draw pictures in their journals. Their journals reflected feelings and thoughts about listening. Some of the pictures were drawings of birds and waterfalls, while the writings reflected their thoughts about the volume of the music. They provided comments such as, “It was too loud,” or “I couldn’t hear it.” This was a productive exercise for the students and this researcher. At the beginning of The Listening Program they would only draw pictures from the prompts given by the sixth week they were making comments and writing them in their journals.

The parent questionnaire for Mark revealed their satisfaction that Mark’s self-stimulating behavior had decreased. Mark was only hitting objects or himself when in a stressful situation. Stress might be shown when he did not know what was happening or what would be happening. They also reported that his reading skills had increased and he was reading and looking at more books. Interviews with the general education teacher, for Mark, revealed that Mark’s self-stimulating behavior had decreased in the classroom and that he was quieter while doing his work. Therapists and support staff reported that Mark was able to focus for longer periods of time on work presented to him. He was not being distracted by his self-stimulating behaviors. The field study notebook revealed a decrease in Mark’s self-stimulating behavior, an increased interest in different types of books and an ability to focus on work for 30 minutes. These improvements in Mark’s self-stimulating behavior allowed for a more positive and productive interaction with his peer group in the general education classroom, at lunch and recess.
Interviews for Luke, student 6, showed some improvement in his self-stimulating behavior, putting things in his mouth. Luke’s parents did not return the questionnaires. Luke’s general education teacher reported that Luke was not spending as much time looking for things on the floor to put in his mouth. Luke was able to focus and follow directions with more success. Interviews with Luke’s therapists, reported that they did not note any changes in his self-stimulating behaviors, although they did admit they did not notice the behavior previously. Support staff interviews revealed that Luke was more focused and not spending all of his time looking for things to put in his mouth. The researcher’s field study notebook notes that Luke did decrease his self-stimulating behavior, but would return to it at random intervals, e.g. other students exhibiting their adverse behaviors, when he viewed a task as being difficult. Luke was able to have more productive and positive interactions with his peer groups after The Listening Program.

Summary

This study has shown that The Listening Program is an effective therapy for persons with autism. Of the six participants, 80% showed significant positive gains on the TAPS-R (Gardner, 1996) in the areas of auditory processing, auditory reception and auditory discrimination. All these relate to anecdotal evidence revealing improvement in communication, social skills reduction of adverse behaviors.
Chapter 5: Conclusion and Interpretation

*Interpretation of Results*

This study has shown that The Listening Program is an effective therapy for students with autism. Of the six participants, 80% showed positive results in the areas of auditory discrimination, auditory processing and auditory reception as measured on pre- and post-test results using TAPS-R (Gardener, 1996). The anecdotal evidence also supports the thesis of this paper, that The Listening Program can be effective in the public school system. Only one participant did not show positive results from the anecdotal evidence collected. The fact that the participant did not experience improvements in the areas measured may mean that The Listening Program can be administered again to see if circumstances change and results change.

The Listening Program is a cost effective method of auditory processing that can be used in the public school system. The Tomatis method and AIT (Auditory Integration Therapy) are expensive programs given in a clinical setting. Training for both programs is expensive and unavailable in the United States. It appears that the only ones who can afford to use these systems are the clinics set up for that purpose. They are dependent upon parents and people looking for that special cure and willing to pay a great deal of money.

Observing the children using The Listening Program was informative and interesting. The child with the most difficulty in use of The Listening Program (Jimmy) had the most improvements in TAPS-R and anecdotal evidence. At times the participants would make loud, distracting sounds while listening to the compact
discs. There were days of listening when all the participants would yell out, start humming or singing. These started to occur in the second week of The Listening Program. These were the days when Mark and Luke told me the music was too loud. No aggression or increase in adverse behavior was noted and actually on those days the participants were in an improved state of mind. They would follow directions, do their work with no complaining and be able to interact in their general education classroom with more success.

No changes in behavior and social skill were noticed until the fourth week of The Listening Program. Changes occurring for the participants appeared in the fourth week of listening. General education teachers, parents, support staff and therapists did not recognize any noticeable changes until that fourth week. However, upon review of the researcher’s field study notebook and journals, changes were occurring, though subtle, by the second week of listening, e.g. less self-stimulating behaviors by Mark and Luke.

The atmosphere in the classroom became less aggressive, noisy and more productive for everyone. All participants followed their school schedules, attended general education classes, assemblies and did work for longer periods of time without complaint. The participants were able to listen and follow directions.

The Listening Program cannot be a therapy that stands alone. However, the results of the anecdotal evidence and TAPS-R were so powerful that The Listening Program is an auditory intervention that is necessary for children with autism and is a stepping-stone to other interventions. Children with autism need many interventions
and The Listening Program should be used in conjunction with other educational interventions for children with autism. The Listening Program is just another link for children with autism in their quest for coping in the “normal” world.

Recommendations

This researcher recommends The Listening Program as a viable intervention therapy for children with autism. It is especially appealing for use in the public school system. More and more children with autism are being identified and several in the public school system and it is important that school systems find interventions that will help these children cope with the world around them in a positive and productive manner. The Listening Program is an affordable auditory processing program and training can be completed by all who are interested. It also makes it a viable therapy for home use.

Limits of the Study

The study was limited in the number of participants available. No control group was established; use of The Listening Program was interrupted due to holidays, illness and vacations.

Future Research

This researcher would like to further establish the efficacy of The Listening Program. An in-depth study could be conducted involving a greater number of children with autism to make it reliable and valid. These participants would be given a variety of tests to prove with scientific data the efficacy of The Listening Program. The participants would then be given the tests every two years, throughout their
school careers, to determine the effectiveness of the program throughout the years. This researcher would like to see if a participant uses The Listening Program for a second, third, or fourth time if changes will still occur or does the amount of times used deteriorate the effectiveness of The Listening Program. Time, money and participants would be all that is necessary for this research to go forward.
Citations


Appendix A
Prompts for Student Journals During Administration of The Listening Program

Prompt 1: How do you feel while you are listening?

Prompt 2: What did you hear?
Parent Questionnaire

Please respond to each question if possible. Please comment when necessary.

Speech is improved. He is using 3-4 words at a time to express his wants or needs.  
Yes  No
Comments: ____________________________________________

Continues to repeat phrases or words spoken to him.  
Yes  No
Comments: ____________________________________________

Avoids contact with others.  
Yes  No
Comments: ____________________________________________

Is he having temper tantrums or being disagreeable and not compliant.  
Yes  No
Comments: ____________________________________________
Appendix C

General Education Teachers, Therapists, Support Staff
Interview

Is he interacting in a positive manner with peers in the classroom? Is there a change?

Comments:


Is he speaking in complete sentences or using 1-2 word phrases? Is there any change in this ability?

Comments:


Can he sit quietly in the classroom and follow directions? Is he doing better/worse?

Comments:


Are his behaviors interfering with the classroom atmosphere or his ability to be in the classroom?

Comments:


### THE LISTENING PROGRAM

#### FIELD STUDY NOTEBOOK

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