



# Unlocking Potential

Using The Listening Program® to Help Individuals with Autism Spectrum Disorders Improve Auditory Processing

## Children with autism spectrum disorders can recover.

A bold statement perhaps – but true nonetheless, based on our own clinical experience and numerous recovery stories that populate the magazines, newsletters, chat rooms and Internet sites of the autism community. One of the greatest challenges facing parents working towards their child's recovery is choosing among the many treatment options now available. Which is 'right' for their child and confer the most benefit? Do they pursue biomedical treatments, language/communication therapies, educational programs based on behavioral principles, sensory integration, complementary or alternative medicine – or all of the above?

There's no easy answer, especially since children with an autism spectrum disorder (ASD) are each unique, often requiring an individualized treatment program. However, common to a majority of individuals with ASD is some form of auditory processing disorder. Indeed, auditory processing problems are recognized today as the #1 sensory impairment in children diagnosed with an ASD.

Over the course of the last fifteen years, there has been an increasing awareness of auditory-based interventions in the autism community. The real catalyst, however, was the publication,

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in 1997, of Anabelle Stehli's book *The Sound of a Miracle: A Child Triumphs Over Autism*, a mother's account of her daughter Georgi's success with Auditory Integration Training. This groundbreaking book offered parents a powerful new possibility: that a child with an autism spectrum disorder could be helped – to the point of recovery even - by simply listening to special music through headphones. Since that time, attention to auditory processing difficulties in ASD children has resulted in a new understanding of the degree to which auditory impairments affect a child's ability to succeed, no matter what the form of intervention.

Should parents decide to include auditory stimulation as part of their child's treatment plan, there are some helpful things to know, beginning with a basic understanding of sensory processing.

## SENSORY PROCESSING

“Sensory processing” refers to our ability to take in information through our senses (touch, taste, smell, vision, hearing and movement), organize and interpret that information, and make a meaningful response.

Individuals on the autism spectrum experience varying degrees of abnormality in sensory processing. Common symptoms include over (hyper), under (hypo) or a fluctuating reactivity to sensory information in any single sensory channels or any combination of them. This sensory dysfunction can be observed in their misinterpreting sensory cues, becoming bombarded by their environment, seeking higher-than-normal sensory experiences, as well as a host of other symptoms.

When the brain misinterprets information coming through the sensory channels the result is developmental, attention, behavioral, emotional, social and learning problems. The world just doesn't 'make sense' for children with sensory dysfunction.

A child having difficulty processing information who is over-responsive to auditory sensation may feel that they are being bombarded by sound on a continual basis. They may attempt to minimize the perceived overload of auditory information by covering their ears, avoiding the sound source or actually shutting down and acting as if deaf. Some may make vocalizations, participate in auditory self stimulation, or have behav-

ioral or emotional meltdowns. They will likely have difficulty recognizing and participating in conversational language

In order to improve the functioning of the individual with ASD we must identify and address each child's unique sensory processing impairments. Research has shown that the brain has a natural plasticity and that we can improve how the brain functions by stimulating the sensory channels with appropriate input, provided it has sufficient frequency, intensity and duration.

## THE AUDITORY CHANNEL

Individuals with ASD commonly experience auditory processing dysfunction in the following areas:

- Auditory attention- the ability to attend, focus or listen to something such as a parent's request to pick up their toys
- Filtering extraneous sound – being able to 'tune out' the sound of the air conditioner in the classroom in order to concentrate on the assignment
- Sound discrimination – at a more elementary level, being able to distinguish an 'm' from an 'n'; at the more advanced level, being able to distinguish change in voice tone to understand the emotional meaning being conveyed in language
- Temporal processing – to process the basic elements of language (phonemes) one must be able to perceive the timing of rapidly changing sounds
- Auditory memory – a fundamental skill essential for learning; the ability to receive, store, process, and recall information in a sequence such as a set of instructions like a homework assignment

Distortions in auditory perception make it difficult for the child to process the information needed to interact with his world; it affects much more than just his listening. Learning, behavior and communication abilities are all compromised by an auditory processing impairment.

The principle objective of any auditory stimulation method should be to reorganize and normalize the auditory system so that the full spectrum of sound is processed without distortion. What is the full spectrum of sound and how do we



stimulate the auditory system? That is where we turn to the field of psychoacoustics.

## PSYCHOACOUSTICS

Psychoacoustics is the study of the *subjective* human perception of sounds; that is, the *psychology* of acoustical perception. What we hear is more than just a combination of different sounds vibrating on our eardrums. Recognizing the different features that are important to auditory perception enables scientists and engineers to concentrate on audible features of sound and ignore those which are less important. For example, an acoustician relies on psychoacoustic information to design a concert hall, as does an audio engineer when developing hearing aids.

### How and what we hear

In simple terms, sound, which consists of air pressure waves, reaches the pinna (the visible portion of the outer ear), then travels down the auditory canal, through the ear drum, middle ear ossicles and temporal bones to the vestibular and cochlear organs of the inner ear. The inner ear then converts the mechanical energy of the sound waves into electrochemical messages. These messages are carried along the auditory nerve through an elaborate pathway that weaves through multiple areas of the brain until they reach the cortex where the messages are perceived and interpreted.

The audible spectrum of sound for human beings is approximately 20 Hz to 20,000 Hz. Hertz (Hz) is a unit of frequency named for the late German physicist who was the first to produce electromagnetic waves artificially. One Hertz has a periodic interval of one second. As an example the frequency range for language in North America is approximately 750-4,000 Hz.

The question of what humans hear is not only a physiological question involving the structure and function of the ear and brain, but very much also a psychological issue. Some of the features important to perception include the frequency and intensity of sound, phase, masking and spatial origin. When the auditory system is functioning properly these work together in perfect harmony, like a birdsong in nature. However, when auditory dysfunction occurs, as it does in individuals with ASD, the ability to listen, learn and communicate is impacted due to the misperception of sound.

We have all experienced the subtle power of music. Often the first few notes of a familiar piece instantly change our perception and current state of consciousness. This is what psychoacoustics is all about. Listening to some of the great composers, such as Wolfgang Amadeus Mozart and Joseph

Haydn, we witness their intuitive understanding of this field. The balance of pitch, melody, tempo and harmony seem to combine effortlessly with the power to relax or stimulate the nervous system.

## AUDITORY STIMULATION METHODS

Auditory intervention is a growing field that started in 1950's France with the clinical research of Alfred Tomatis, MD. Dr. Tomatis can be credited with originating the practice of balancing auditory perception through the use of acoustically modified sound.

The Tomatis Method incorporates listening to the music of Mozart and the human voice, processed through a device called the Electronic Ear, with delivery through air and bone conduction headphones. The primary purpose of the method is to retrain the auditory system and restore a normal perception of sound. When most parents mention 'auditory integration training', they are often referring to this method.

However, over one dozen different auditory stimulation methods have been developed since the original Tomatis Method. They include: So Listen™, LiFT™, Dynamic Listening™, Auditory Integration Training, Auditory Enhancement Training, Digital Auditory Aerobics, Kirby Auditory Modulation System, Sound Therapy International, SAMONAS™, EASE, Johansen, Therapeutic Listening™, and The Listening Program®.

These methods share one common trait: they are designed to reorganize the individual's auditory system through listening to acoustically modified music. The differences between the methods are vast however, and comparing them on an individual basis is beyond the scope of this article. Parents researching auditory stimulation methods can ascertain a program's suitability for their child by evaluating the following program components:

- Accessibility
- Cost
- Frequency, intensity and duration
- Ease of use
- Type and quality of music
- System used to modify music
- Methods of modifying music
- Practitioner training and continuing education
- Research and development

## THE LISTENING PROGRAM

The Listening Program® (TLP) is a Music-Based Auditory Stimulation method that is accessible through an international network of trained TLP Providers in almost 30 countries. Over 1000 individuals are trained in North America alone. It is offered through professionals in private practice, clinics, hospitals, schools and other organizations, making it widely and easily accessible.

TLP programs are generally administered by the family in the home with consultation and monitoring by a trained TLP Provider. They are designed to build the auditory skills an autistic child needs to effectively process sensory information. Consisting of audio CDs containing acoustically modified classical music, the program is easily administered at home in just 15-30 minutes a day and is comparatively inexpensive, with a typical family investing less than \$650 in materials. (This includes the CDs, CD player and high-quality headphones which they own and can use continually.) Provider service fees are relatively low and TLP is often cost-free to the family when offered through their child's school or subsidized through early intervention, education vouchers and other programs. Best of all, TLP is a promising intervention that can be combined with any other type of intervention a family may be using with their child.

The multidisciplinary development team for The Listening Program has training and clinical experience in the majority of auditory stimulation methods. This experience is coupled with backgrounds in medicine, neurodevelopment, occupational therapy, speech and language pathology, audio engineering, music and other fields. Extensive research and clinical testing is continually employed in the ongoing development of the TLP method. Empirical evidence is collected through client and clinician reports, independent research studies (school and university) and individual case studies. Empirical studies, including an extensive number of case studies on children with ASD, can be found online at [www.advancedbrain.com](http://www.advancedbrain.com).

Since TLP first became available in 1999, there has been a rapid increase in its application with children on the autism spectrum. This is due in part to the many successes children have experienced: increased engagement, emergent skills, improved sensory integration and auditory processing, and reduced sound sensitivity.

Five-year-old Jordan, diagnosed with Autism, had difficulty with auditory processing. After starting The Listening



Program the first change his mother noticed was that he was using pronouns properly; pronoun reversal had been a problem up until then. After several days she noticed he became more sensitive to feelings and was more affectionate than usual. He seemed to have better sentence structure and his sentences contained more detail. His school teacher noticed Jordan's improved attention to detail and that transitioning became easier for him – an area that had been especially difficult for Jordan.

**To create a permanent change in the brain, sensory stimulation must be delivered with sufficient frequency, intensity and duration.**

Isabelle was diagnosed as Autistic Moderately Impaired by doctors at the University of Michigan following speech, behavior and other regressions the parents started to observe at 28 months. At age 3 she showed additional signs of auditory processing difficulties that lead her parents to The Listening Program. For example, when told to “touch mommy” she would touch her tummy.

Isabelle completed approximately 40 hours of listening with The Listening Program while still 3 and experienced gains in many areas. Her receptive and expressive language improved. Isabelle went from using limited sign language to speaking in couplets with a limited vocabulary. Attention and focus sharpened and she is initiating and completing projects. There is more expression in Isabelle's face and she has better motor coordination. Sleep patterns have improved, and she is trying and liking many more foods. She has also gained in maturity as a result of her improved behavior. Isabelle's parents are ecstatic and are continuing with her listening program to help maintain and build on these gains.

In order to create a permanent change in the brain, and bring about some of the positive changes described above, sensory stimulation must be delivered with sufficient frequency, intensity and duration.

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- TLP is done 5 days per week with 2 days off
- Listening sessions are typically 15 minutes, once or twice a day
- Listening times are shortened for those who need less intensity
- There are options for listening with speakers rather than headphones
- CDs are available in four treatment categories at varying levels of intensity for program individualization
- Initial programs are typically 40-60 hours over the course of several months
- Maintenance listening is recommended to sustain and build on gains

## RECENT ADVANCEMENTS

Families and professionals with previous exposure to The Listening Program will be familiar with the TLP Classic and Kids CDs that have been used over the last several years. Although these programs have been highly effective and will continue to be offered, the need was identified to develop new CDs to address areas that require greater treatment focus, such as spatial awareness, temporal processing and auditory attention.

After two years of development, new CDs have been recently released which are of particular interest for children with ASD. All incorporate ABT's most recent psychoacoustic advancements, based on on-going research and professional/parent feedback, and meet ABT's high quality standards.

First is a set of four very gentle CDs called Full Spectrum Prelude, available in a Dolby Headphone™ version and also available in a new stereo speaker version for children not ready to wear headphones. This new category of TLP CDs is generally used at the start of a listening plan for children with ASD. It allows them to gradually be introduced to the method.

Second is the TLP Level One Kit which is available exclusively through TLP Certified Providers. This system includes 10 CDs developed in a sequence of four treatment categories: Full Spectrum, Sensory Integration, Speech and Language, and High Spectrum. Each category systematically addresses a different range of the audible sound spectrum. All the CDs are produced with Dolby Headphone and ABT's Spatial Surround™ technologies, which provide better sound quality, a more natural listening experience, improved spatial training and more.

Other developments include the introduction of a clinic-based bone conduction system for TLP that is coupled with home-based listening to better address vestibular stimulation. In addition, clinical testing is underway for Spatial Surround™ HD. This promising development incorporates the use of a surround sound system for schools, clinics and eventually homes, providing TLP on the new High Definition DVD Audio format that eliminates the need for headphones.

The Listening Program can be an effective intervention tool for children on the autism spectrum. However, since not every child will benefit in the same way, TLP should always be considered as part of a holistic treatment plan.

At Advanced Brain Technologies we believe it is critical to continue our research and development of the TLP method and the continuing training and education of TLP Providers. For whatever part The Listening Program may play in improving auditory processing and unlocking a child's potential to succeed in all areas of life, we feel a tremendous responsibility to ensure its safety, accessibility, quality and effectiveness.



To learn more about ABT programs, which include The Listening Program®, SoundHealth®, Music for Babies™, BrainBuilder®, BrainBuilder.com, Shelly's Interactive Computer Learning Series™, Listening Trainer™, and ABT Audio's Spatial Surround® HD systems call (801) 622-5676 or visit [www.advancedbrain.com](http://www.advancedbrain.com). Professionals interested in becoming TLP Certified Providers can find more info at [www.tlpprovider.com](http://www.tlpprovider.com).

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Each year, Alex trains hundreds of health, therapeutic, education, and music professionals, and regularly lectures at international conferences and seminars. He is co-author of the upcoming book *Music for Your Brain*.

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