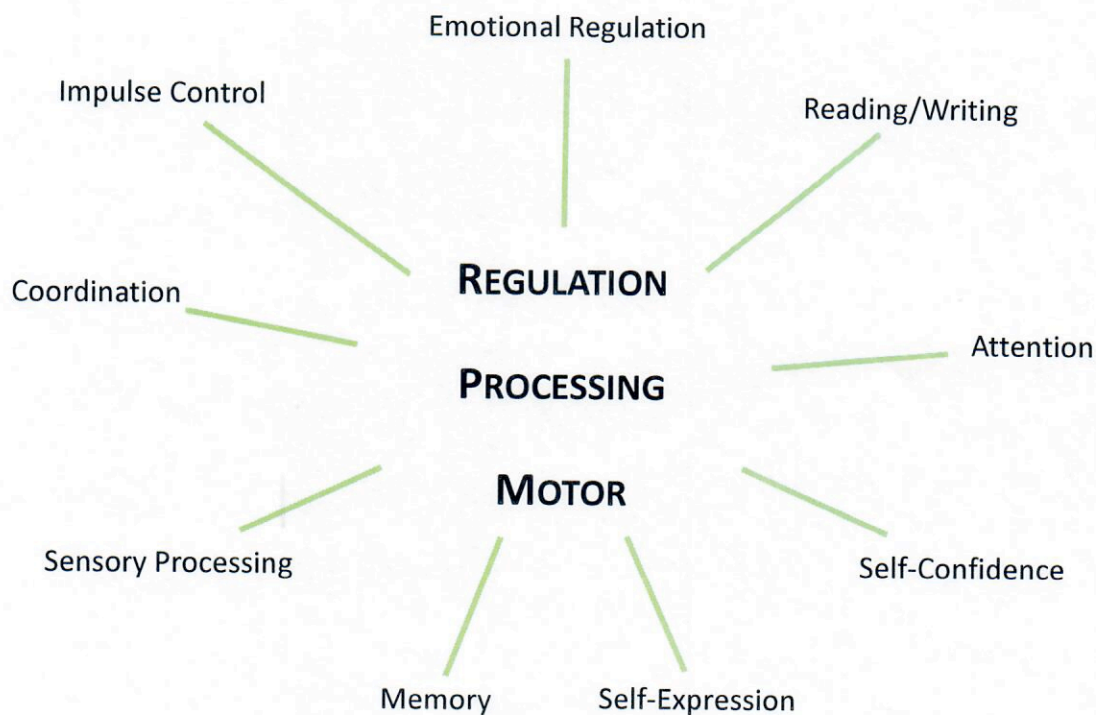


HOW iLs WORKS

The notion that the brain is able to change in response to stimulation, an ability known as “neuroplasticity,” is now so widely accepted it can be called fact. iLs programs are based on this principle, providing gentle and specific stimulation in order to activate the neural pathways used in the processing of sensory information. This is essentially a type of training: neuronal connections in these pathways are strengthened and new connections are established through repeated sessions of multi-sensory input. iLs programs are customized, i.e. individualized for each person’s therapeutic goals, and they gradually become more complex and challenging as they progress.



iLs programs include classical music that has been acoustically modified to provide enhanced or filtered signals in certain frequencies, as specific frequencies are believed to be correlated to certain brain functions. The music is loaded on an iPod paired with special headphones which deliver it through both air and bone conduction (a low frequency vibration that is conducted by bone to the cochlea and vestibular system). Simultaneous to the auditory component, the user engages in visual, vestibular and motor exercises which maximize the interaction of the systems outlined below.

Appendix: Critical Pathways

Vestibular: Directly connected to the cochlea of the inner ear, the vestibular system is responsible for balance, coordination, muscle tone, rhythm and awareness of the body in space. It plays a key role in organizing motor output and posture. The vestibular system, along with proprioceptive inputs, also has a strong impact on attention and emotional regulation. Once these systems are functioning well, we are better able to participate in higher brain functions such as reading, writing and expressive language. iLs provides specific and comprehensive stimulation to the vestibular system through bone conduction delivered via headphones, balance board activities, and body movement exercises.

Enhanced Skills: coordination, balance, focus, self-regulation

Auditory – Decoding, phonemic awareness, listening in a noisy environment and speaking clearly require efficient processing and storage of information. iLs strives to maximize efficiency and accuracy of the auditory channel by providing carefully calibrated auditory stimulation to meet specific therapeutic objectives. The goal is to activate the neuronal connections in different areas of the brain through the auditory channel and ultimately train the ear and the brain to analyze and process sound more quickly and accurately. Both bone and air conduction are utilized to deliver unique and efficient stimulation of the auditory and vestibular systems.

Enhanced Skills: pitch discrimination, auditory processing, reading, mood, concentration and balance

Visual Motor – The sub-cortical visual motor system has direct neural connections to the auditory and vestibular systems. All three of these systems must work together for proper balance, coordination, reading and sound localization. iLs activates these systems with visual tracking and visual perception exercises in addition to auditory and vestibular system inputs.

Enhanced Skills: reading, hand/eye coordination, balance, sports

Proprioceptive - The sense of one's own body -- where it is, how to control it, how to move it -- to the point where we don't need to think about it, comes from the receptors in our joints and muscles and is referred to as proprioception. This is an often overlooked sensory system that contributes to behavior and the ability to learn. When this system is integrated with the other sensory systems, the brain is freed up to focus on higher order activities. Children and adults who improve their proprioceptive abilities are able to approach learning and communication tasks in a more relaxed and regulated manner. iLs' movement program focuses on building proprioceptive abilities through specific, repetitive exercises.

Enhanced Skills: – motor planning, athletics, coordination, awareness of personal space, confidence, regulation

Parasympathetic – The autonomic nervous system (ANS) controls many organs and muscles that work in an involuntary, reflexive manner. The ANS is important in 2 situations: emergencies that require us to “fight” or to take “flight” (the sympathetic SNS) and non-emergencies that allow us to “rest and digest” (the parasympathetic PNS). Years of clinical observation lead us to believe that delivering iLs’ music through both air and bone conduction channels stimulates the parasympathetic system (through the vagus nerve’s afferent fibers on the eardrum and in the outer ear canal). The vagus nerve influences our heart rate, sweating, the mouth and throat muscles involved in speech, as well as our bowels and digestion. In addition to the calming effect iLs has on many children and adults, it is not unusual to see a positive change in bowel function, such as a child becoming potty trained.

Enhanced Skills: increased sense of calm, longer “fuse,” happier, improved sleep and digestion

Cerebellum – The cerebellum is 10% of the weight of the brain but it has 50% of the brain’s neurons. In computer terms, the cerebellum is the processor, receiving input from sensory systems and various parts of the brain, and integrating these inputs to fine tune motor activity. Most neuroscientists agree that the cerebellum is involved in motor functions, cognitive functions such as attention and emotional functions such as regulating fear and pleasure responses. The iLs Playbook’s repetitive activities are designed to stimulate cerebellar function. Inputs from the visual, vestibular and auditory systems, session after session, train the cerebellum to become efficient at processing multi-sensory information.

Enhanced Skills: control of motor movement; “automaticity” (motor activities becoming automatic); acquisition of new skills; visual motor control and cognitive skills

Hemispheric Integration – The brain defies categorization of function into neatly organized compartments but rather utilizes multiple areas simultaneously for any one function - reading being a good example. Brain areas from front to back and from left to right are simultaneously involved in this activity. This requires precise, rapid and clear communication within and between hemispheres. The strength of the connection between hemispheres is enhanced through the duration of the listening and the repetitive exercises from the iLs Playbook.

Enhanced Skills: You name it. Improved hemispheric integration applies to almost everything the brain does.

Reticular Activating System (RAS) – The RAS is a network of neurons deep in the brainstem that receives input from all sensory systems. It sends nonspecific information to the brain to “wake it up”. It is involved with regulating arousal and sleep-wake transitions, alertness, appropriate arousal to attend to the task at hand, and even prepares the motor system for action.

Enhanced Skills: Alertness and attention: the brain is ready to learn; improved sleep.