



## How iLs Influences Learning Ability

### INTRODUCTION

Often, our educational interventions are putting a roof on a weak foundation. The acquisition of reading, writing, math and other academic skills is dependent upon a normally-developed nervous system. Communication between the brain's two hemispheres and integration of sensory input from the eyes, ears and motor system must be intact for adequate response to intervention. However, efficient processing doesn't occur in an immature nervous system. By providing appropriate auditory, visual and vestibular stimulation, iLs helps the nervous system develop. This ability of the brain to change in response to stimulation is known as "neuroplasticity." iLs builds a solid foundation for learning and communicating through repeated, gentle stimulation of the following areas and systems.

### VESTIBULAR SYSTEM

The vestibule in the inner ear plays a key role in our balance as well as our ability to modulate sensory input. In terms of learning and behavior, vestibular and proprioceptive (see below) input tends to help children and adults become more regulated. Once regulated, they can more easily attend to higher brain functions such as reading, writing and expressive language. The balance activities and bone conduction stimulation of the iLs headphones provide different types of vestibular stimulation in each session.

**Impacted Skills:** coordination, balance, focus, self-regulation

### AUDITORY PROCESSING

iLs processes classical music to emphasize different frequencies per therapeutic objectives. The goal is to train the ear and the brain to analyze and process sound more quickly and accurately. For example, the iLs Sensory Motor Program for those with autism and/or sensory processing challenges emphasizes a range of low frequencies which influence balance, rhythm, coordination and body awareness. The iLs Reading & Auditory Processing Program focuses on the mid-range frequencies of the English language to train and improve the perception and discernment of the subtle differences in closely related phonemes. This skill is essential for the development of spelling and reading proficiency. As a result of repeated listening, the vestibulo-cochlear system improves the subcortical transfer of auditory information to the brain. Additionally, the bone conduction delivery in iLs headphones provides an important stimulation to the vestibular system.

**Impacted Skills:** pitch discrimination, auditory processing, spelling, mood, concentration, balance

### VISUAL MOTOR

iLs Playbook activities include visual tracking and visual perception activities in every session. The simultaneous exercising of these skills with balance and auditory training seems to have an exponential effect on reading and other related skills.

**Impacted Skills:** reading, hand/eye coordination, balance, sports

## **PROPRIOCEPTIVE**

By improving 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, we are freeing up the brain 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 with specific exercises in each session.

**Impacted Skills:** attention, calm, athletics, coordination, daily movement, confidence

## **PARASYMPATHETIC NERVOUS SYSTEM**

The Autonomic Nervous System (ANS) controls many organs and muscles that work in an involuntary, reflexive manner. The ANS is important in two situations: emergencies that require us to “fight” or take “flight” and non-emergencies that allow us to “rest and digest”. The part of the ANS which governs the latter is the Parasympathetic Nervous System (PNS). iLs' auditory program stimulates the PNS through the Vagus nerve (afferent fibers in the outer ear). Many children and adults beginning iLs programs are in a state of hyper-arousal, not far from “fight or flight”. The gentle stimulation of the PNS brings about a balance of the ANS which is reflected by increased calm and self-regulation.

**Impacted Skills:** behavior, ability to focus, the calm state which allows one to better focus on higher cognitive functions

## **CEREBELLUM**

The cerebellum has 10% of the volume of the brain, but it has 50% of the brain's neurons. In computer terms, it's our processor, receiving input from sensory systems and various parts of the brain, and integrating these inputs to fine tune motor activity. Most neuroscientists agree it 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 believed 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.

**Impacted Skills:** motor control, “automaticity” (motor activities becoming automatic), processing

## **HEMISPHERIC INTEGRATION**

Receptors in the body deliver sensory information to the brain (and vice versa). If these receptors and the pathways leading up to the brain are not working because they were damaged or did not develop properly, the activity level of the brain decreases and different areas of the brain may not communicate with each other properly. In addition, connections between the right and left sides of the brain must be robust in order to allow for proper communication to take place between the different areas involved in higher brain function. Cross-lateral activities in the iLs Playbook require the almost constant transfer of information from one hemisphere to the other, “exercising” the bridge that transfers information, the corpus callosum.

**Impacted Skills:** processing speed, cognitive functions, emotional health