

A PERSONAL STORY ON NEUROFEEDBACK ATTENTION (PLAY ATTENTION) TRAINING AND COGNITIVE IQ SCORE



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INTRODUCTION

Zack is an energetic, intelligent nine-year old boy diagnosed with Attention Deficit Hyperactivity Disorder (ADHD). Zack's parents had started him on regimen of Taekwondo approximately three years ago. Recent studies have demonstrated that Taekwondo is beneficial for children with ADHD^{1,2}. After one of Zack's Taekwondo classes, his parents approached me about starting Play Attention (neurofeedback or biofeedback) attention training. They were concerned with Zack's attention, impulsivity and reading comprehension. They were receiving feedback from his teachers that Zack was still struggling in the classroom.

ADHD is one the most common neuro-developmental/behavioral disorders among adolescents and young adults³, with prevalence estimates as wide as 2–18%⁴. ADHD is a complex, chronic mental health disorder, associated with: (i) global developmental and learning problems such as autistic spectrum disorders (ASDs) or, (ii) difficulties with speech and language, motor co-ordination and reading, and (iii) a range of psychiatric disorders as potential co-morbidities. What this means is that children or adults with ADHD have challenges with Executive Functions and Cognitive Skills.

Our Executive Functions represent a plethora of mental functions which control our logical reasoning, strategy, planning/organization, problem-solving, and hypothetical-deductive reasoning skills. These functions are often impaired in ADHD children and adults. For example, planning helps us formulate an action plan and define and organize our priorities to solve a problem or complete an activity. The control of these functions is critical to our everyday lives at school, work, and home. Here's a simple example; the teacher assigns homework and your child cannot formulate a plan to start, complete, and then turn the assignment in on time.

Cognitive Skills include paying attention, visual processing, pattern recognition, and memory and auditory processing (following directions). These skills are essential for learning and navigating everyday life.

THE PLAY ATTENTION SYSTEM

One solution for the executive function and cognitive skills issues associated with ADHD is neurofeedback training. Scientific Studies have demonstrated that Play Attention is the #1 neurocognitive (neurofeedback) system, to "teach" attention to children with Attention Deficit Disorder (ADD), ADHD or ASDs. Two randomized, controlled studies^{5,6} in Boston public schools conducted by Tufts University School of Medicine found that students who used Play Attention had greater improvements in attention, hyperactivity, and executive functioning than did students who used cognitive training programs commonly known as brain games; one additional follow-up study⁷ found that the results persisted over a period of six months.

How does Play Attention work? To understand how Play Attention works, it is important to understand how new neural networks are formed during the learning process. Current research^{8,9,10} clearly demonstrates that the brain is always changing (adjusting our neural networks) due to learning, exercise and our environment. Simply put, the brain constantly changes when we learn something new. The brain is an amazing instrument that also has the ability to compensate when it's not fully functioning. Play Attention students actually train themselves to control the "brain conductor" that regulates attention! The brain will change if we instruct it to. This is the foundation of all teaching and learning from pre-school to post graduate.

Up until now, attention was nearly impossible to teach because it was not tangible – it is not something that is concrete and apparent to a student like their pencil. Play Attention students can see their attention in real-time by controlling the computer screen with their attention alone.

Now, attention is concrete and controllable. Play Attention is a computer program that works in combination with a BodyWave® armband to measure a neuro signal which is used to monitor the user's attention level. While a user wears the BodyWave® armband, he'll play a computer game that he controls using only his brain (attention). Play Attention has many different executive function and cognitive skills modules to work on different areas of attention.

These modules are:

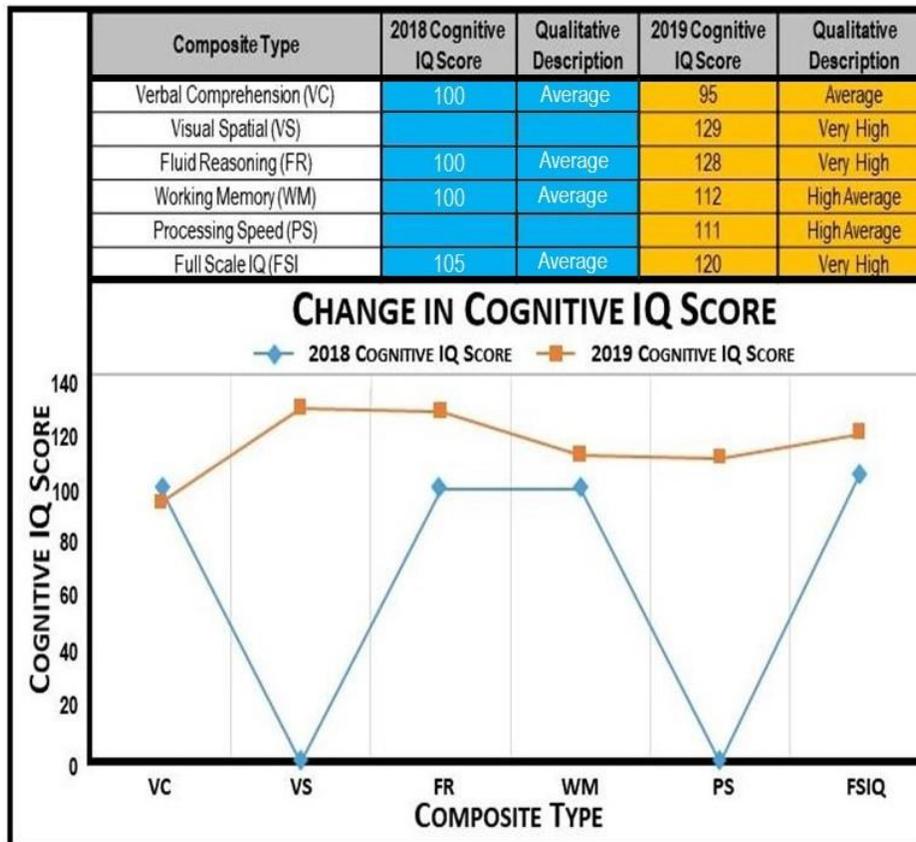
- 1) **Attention Stamina:** Attention Stamina will teach you how to direct and sustain your attention. This will help you develop your ability to pay attention to low stimuli activity, such as schoolwork, for longer periods of time.
- 2) **Visual Tracking:** Visual Tracking will teach you how to maintain your attention while visually tracking a randomly moving object or person. This will help you pay attention to your teacher's lesson while he/she is walking around the room.
- 3) **Time on Task:** Time on Task teaches a student to begin an activity quickly and stay focused on that activity until it is finished. This is difficult for an individual who struggles with attention.
- 4) **Discriminatory Processing:** Discriminatory processing will teach you how to take in different bits of information and recognize what is important and what you can filter out.
- 5) **Short Term Memory:** Short term memory teaches you how to process information (both visual and auditory) and hold that information in short term memory long enough for recall. This will help you develop your ability to remember dates, names, items in a list, and other facts.
- 6) **Auditory Processing (Home, Office or School):** Auditory Processing develops your ability to follow directions. Your goal is to gradually increase the number of directions you can absorb, process, and carry out.
- 7) **Spatial Memory:** Spatial memory helps us remember where we left our keys, jacket, book bag or homework.
- 8) **Working Memory:** The Working Memory exercise strengthens an individual's ability to retain and manipulate information needed to do complex tasks such as reasoning, comprehension and learning—even amidst distraction.
- 9) **Math Skills:** First and second grade students can practice their math facts, however only while they are paying maximum attention.
- 10) **Social Skills:** Social Skills are typically lacking in persons with attention challenges. Play Attention's Social Skills module teaches appropriate recognition and response to social cues.
- 11) **Mindfulness Training (Lotus):** Lotus will allow you to practice mindfulness. Learn how to keep your mind on the present moment. It will help you be present, calm and in the moment. Once you have begun to master the first 11 modules of Play Attention, then you begin Academic Bridge.
- 12) **Academic Bridge:** Finishing tasks is a skill that can be learned by anyone regardless of ADD, ADHD or other cognitive impairments. The task may be homework, balancing your checkbook, or even cleaning your room. You can learn to do it in an appropriate amount of time. Play Attention also has modules to practice "physical" abilities.
- 13) **Hand Eye Coordination:** Hand eye coordination strengthens neural networks most important for hand-eye coordination. In terms of practical application, this improves real world skills like handwriting, sports, keyboarding, and any activity requiring fine motor skills.

- 14) **Motor Skills:** For most young children with attention challenges, they also experience motor skills challenges. Young children practice gross motor skills while helping a wizard build his castle while your mind becomes the joystick!
- 15) **Media Player:** Recently, Play Attention added the Media Player. It can work with an audio book or video to enhance mindfulness, attention, and visual & auditory processing. It further improves listening comprehension, processing speed, ensures maximum attention to video or audio instruction and maintaining maximum attention to an audio recording from work meetings or phone conferences.

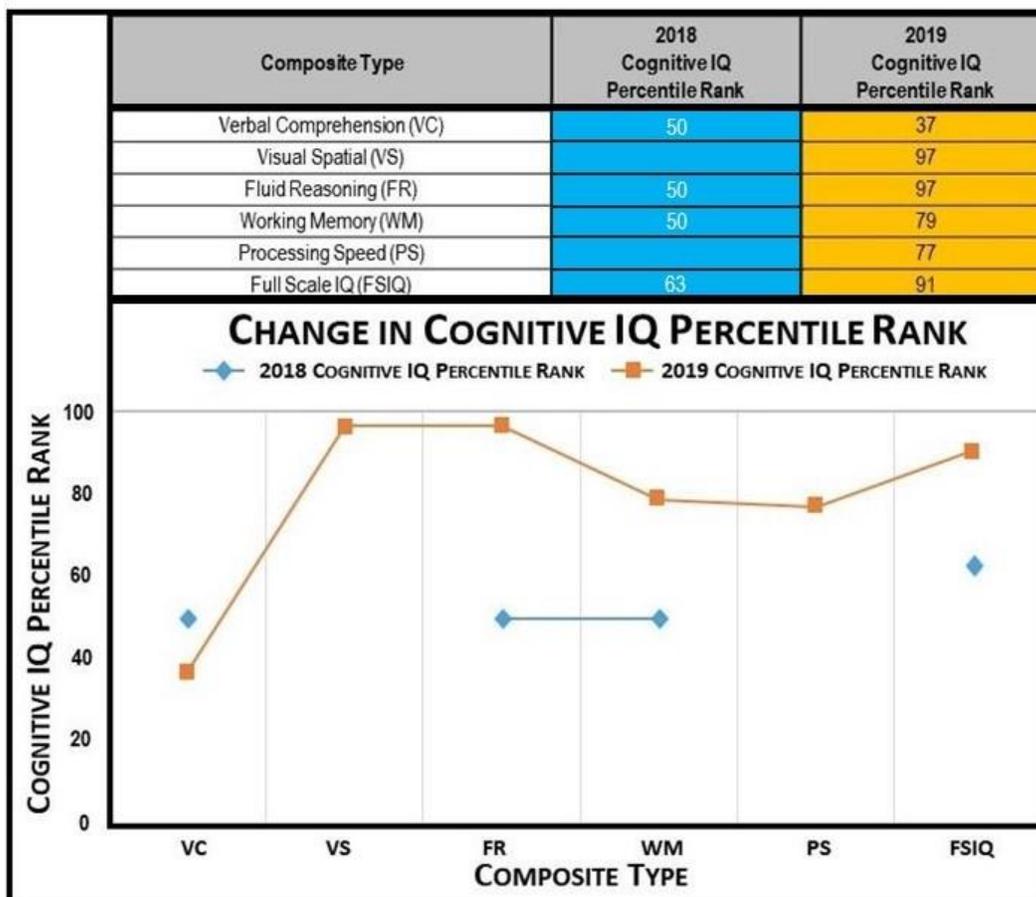
RESULTS & DISCUSSION

Zack has been doing one to two Play Attention session per week for about one year. He has worked diligently during his sessions and has progressed to the advanced level on all the Play Attention games (modules). Zack had a Cognitive IQ test prior to the introduction of Play Attention sessions and another one approximately a year later. During these tests, Zack was assessed for verbal comprehension, visual spatial awareness, fluid reasoning, working memory, processing speed and full-scale IQ. His cognitive IQ scores dramatically improved after approximately one year (see figures below) of Play Attention training with a concomitant improvement in Zack’s classroom performance and over all behavior as well. Zack’s councilor commented that these dramatic increases in the cognitive IQ scores is very uncommon to see in a one-year period. These results are in good agreement with a recent study that demonstrated that children who had undergone neurofeedback attention training had an increase in their K-Bit IQ Composite score compared to the control group without training¹¹. Zack’s parents are incredibly supportive. They have been guiding Zack and providing him with a nurturing environment at home to help him succeed. Supportive parents are MUST for any child to succeed.

Zack’s Cognitive IQ Results Before and After Play Attention



Percentile Change in Zack's Cognitive IQ Scores after Play Attention



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