

the **Neuroconnection** News



Benefits of Connectivity-Guided Neurofeedback In-School Therapy

In this month’s edition of The Neuroconnection News, we are excited to provide an update on the improvements students see when they receive Connectivity-Guided Neurofeedback in a school setting. The Neuroconnection has been training students at Harvest Christian Academy since Fall 2016, and in that time we have seen dramatic improvements in students’ test scores and a decrease in problematic symptoms. Thanks to the collaborative efforts of parents, teacher, and TNC staff, our students continue to demonstrate tremendous developments in academics, social pragmatics, and mood and behavior. (Continued on page 3).

Research Spotlight

Video Games

Video games have become so pervasive that it’s as if much of a child’s social development is migrating from physical playgrounds to digital ones, and with 90-97% of children playing video games it is no wonder researchers are calling them a modern form of play.¹ Recent studies found that children and adolescents play an average of 7-13 hours per week, and 1 in 4 adult men play four or more hours each day.² The rising prevalence of video games has sparked numerous studies on their effects, and while we might hope for a definitive ruling on whether video games are “good” or “bad”, the results are not so simple. (Continued on page 7).

Inside this issue

- What is Connectivity-Guided Neurofeedback?2
- Who Can Benefit?2
- HCA Progress Summary3
- Symptom Improvements.....3
- Test Score Improvements4
- TNC Case Study6
- Video Games7
- About The Neuroconnection8

Special points of interest

- Who can benefit from CGNFB?
- TNC at HCA progress summary
- Are video games good or bad?
- Contact The Neuroconnection



What is Connectivity-Guided Neurofeedback?

Connectivity-Guided Neurofeedback (CGNFB) is an advanced form of Neurofeedback (NFB) that allows the brain to make changes in brain wave patterns across cortical regions in order to develop more functional neuropathways. CGNFB is more accurate than traditional NFB because it measures the neuronal network activity in three dimensions across regions. This is in contrast to traditional NFB which only trains specific sites. CGNFB allows for improved communication within the brain and in turn decreases neurologically rooted symptoms.

Learning disabilities, ADHD, Autism, and other problems impacting school success have specific connectivity patterns. These patterns are identified via a QEEG brain map, and they are found to improve with CGNFB training. Typical functional improvements include: improved focus, attention, and cognitive abilities, improved mood and behavior, increased learning capacity and academic performance, and better sleep regulation. Because CGNFB creates new neural pathways, changes in the brain are lasting and involve none of the adverse side effects that may be experienced with medications.

“Because CGNFB creates new neural pathways, changes in the brain are lasting and involve none of the adverse side effects that may be experienced with medication”

It’s a Collaborative Effort

Our goal at The Neuroconnection is to assist educators in having the best opportunity to teach by addressing the underlying impediments that some students enter the classroom with.

We value and appreciate the cooperation and communication that teachers provide us with throughout a student’s training.

It is through this collaborative effort with educators that we are able to assist in learning through the use of CGNFB, thereby increasing student’s ability to perform academically, while also improving emotional functioning.

Who Can Benefit?

In relation to in-school therapy, training the brain with neurofeedback has resulted in dramatic and lasting improvements for the following conditions:

- *Attention Deficit Disorders
- *Autism Spectrum Disorders
- *Learning Disabilities
- *Mood Disorders
- *Obsessive Compulsive Disorders
- *Seizure Disorders
- *Traumatic Brain Injuries

Notable Areas of Improvement

- Attention
- Shifting attention
- Processing speed
- Executive functioning
- Following directions
- Organization
- Sensory sensitivity
- Mood
- Anxiety
- Behavior
- Obsessive thinking
- Reading comprehension
- Word fluency
- Speech and language ability
- Grammar and writing ability
- Handwriting
- Spelling
- Math ability
- Test performance
- Sleep
- Social skills
- Motor skills
- Phonetics and semantic language

TNC at Harvest Christian Academy

Progress Summary

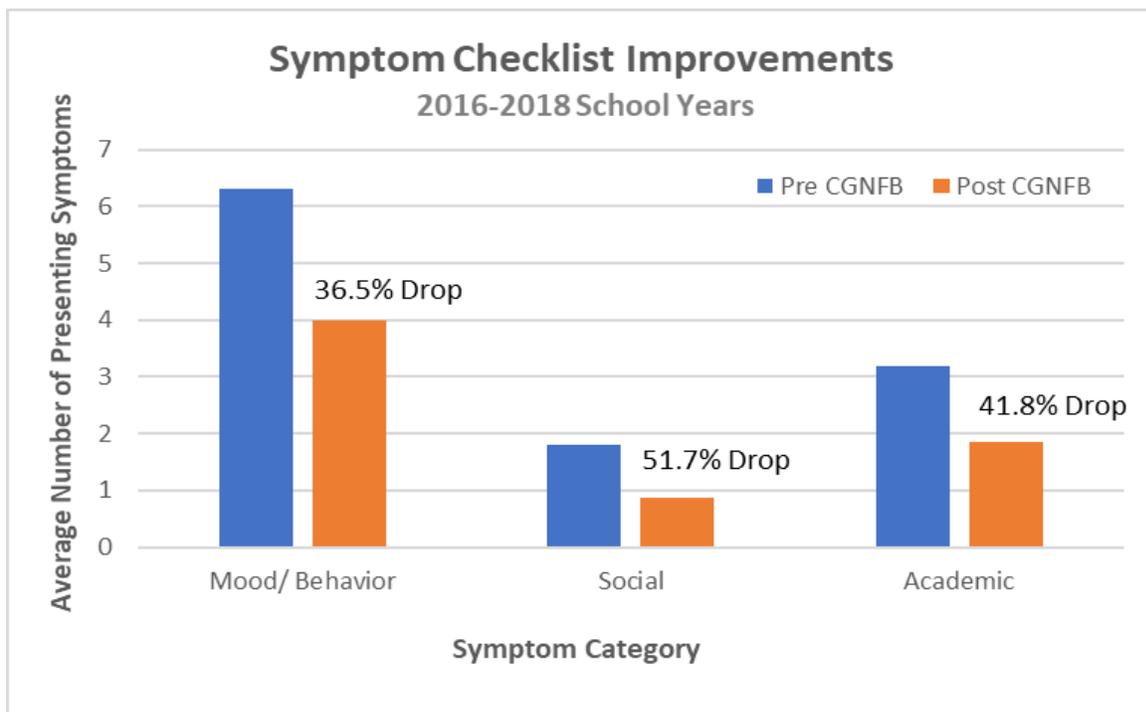
Thanks to the devoted efforts of The Neuroconnection and Harvest Christian Academy, students, parents, and faculty of HCA have experienced the benefits of in-school therapy with CGNFB firsthand.

For the past two years, in addition to providing quality, personalized care to our clients in-office, The Neuroconnection has also been providing state of the art neurofeedback training in the school setting. Students participate in individualized training sessions twice per week. Pre-and post-training outcomes are measured via several assessments along with parent

and teacher feedback gathered at regular intervals. This allows us to determine if and how well Connectivity-Guided Neurofeedback (CGNFB) is improving the academic performance of students trained with CGNFB. The following reports are based on Wide Range Achievement Test (WRAT) and computerized cognitive test scores of those trained with CGNFB at Harvest Christian Academy (HCA) during the 2017-2018 school year. In addition to these test score improvements, we've included information from parent reports of students' symptoms before and after CGNFB training.

Symptom Checklist Improvements

Before and after each protocol, parents fill out a "Symptom Checklist" on their child. This tracks 82 symptoms that can be grouped into three categories: mood/ behavior, academics, and social. The graph below represents the impressive drop in the number of symptoms parents reported before vs. after training. This represents all HCA students (n-56) who completed at least 1 protocol and provided a follow-up symptom checklist upon completion of their final session.

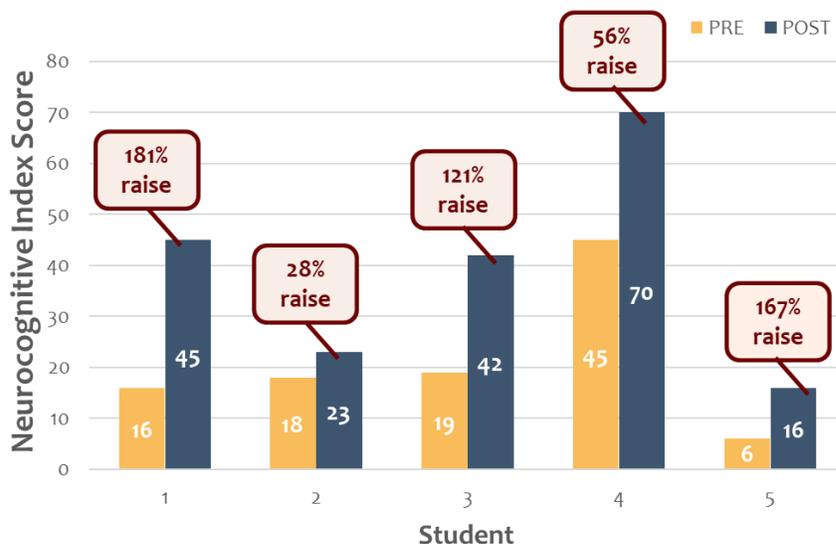


Computerized Cognitive Testing

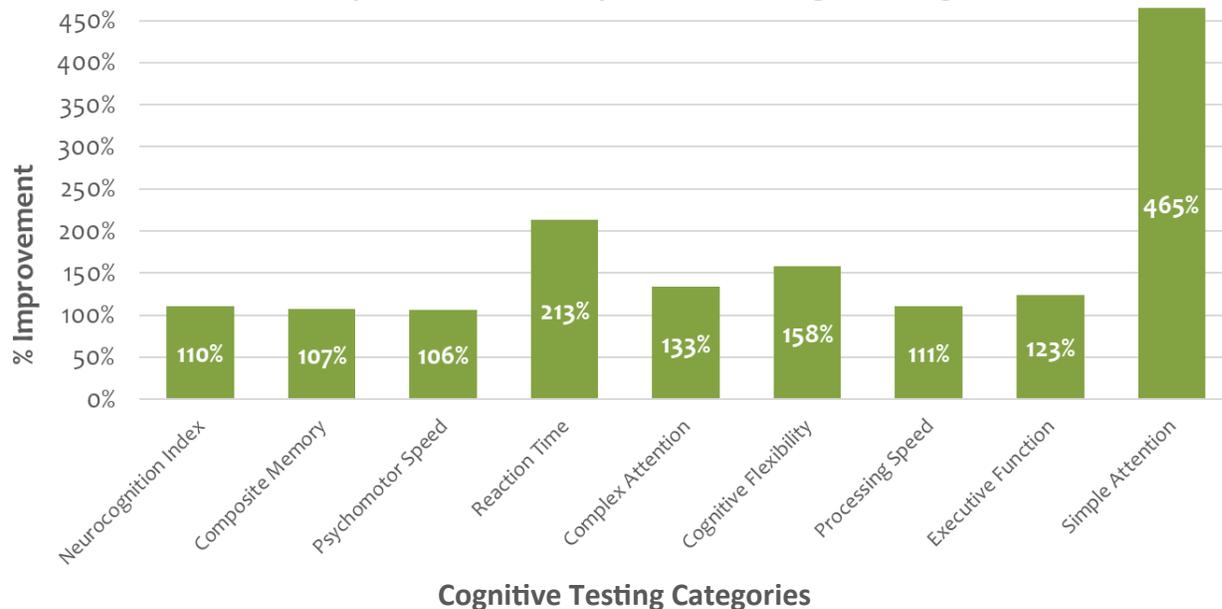
This neurocognitive assessment measures mental processes such as simple motor performance, attention, memory, and executive functioning.

The Neurocognitive Index is an average of five domain scores: Composite Memory, Psychomotor Speed, Reaction Time, Complex Attention, and Cognitive Flexibility. It represents a global score of neurocognition

Computerized Cognitive Testing: Neurocognitive Index Improvements



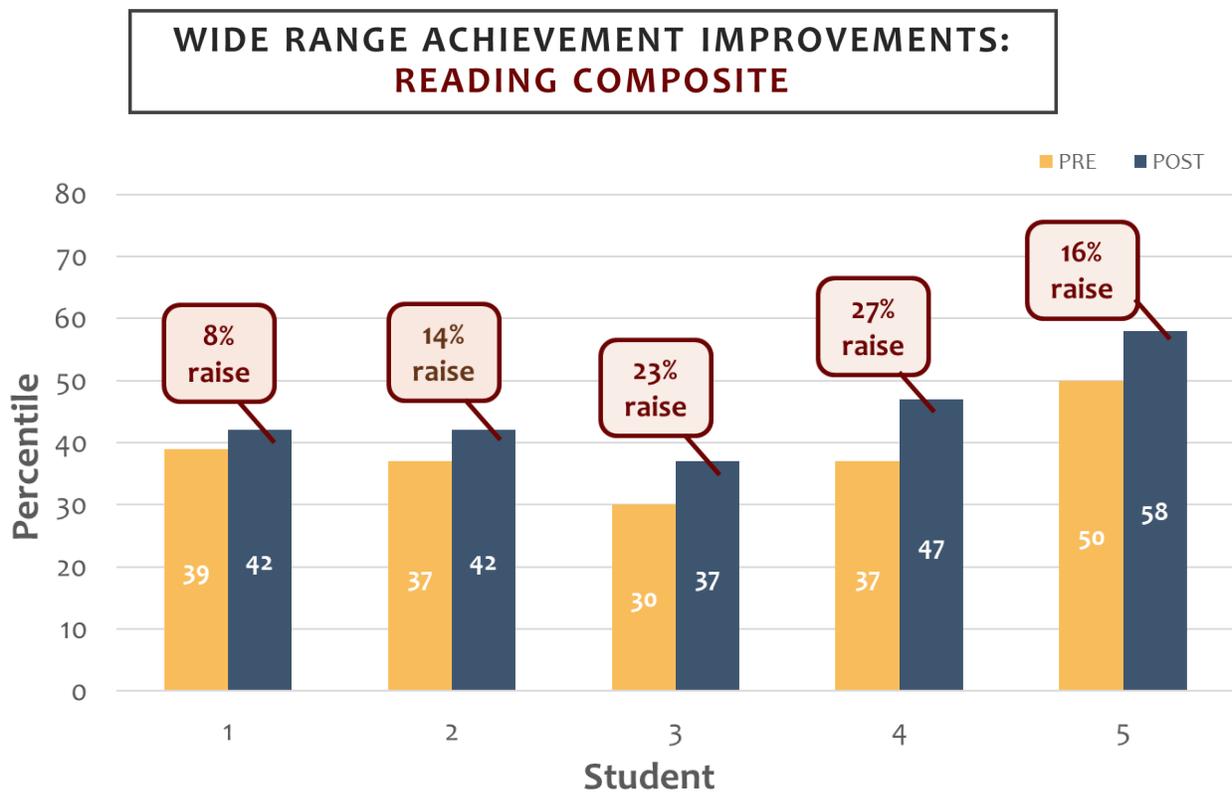
Improvement in Computerized Testing Subcategories



*These graphs represent 5 HCA students who completed at least 1 protocol between pre and post testing. These students presented with ADHD, ADD, or no formal diagnosis.

Wide Range Achievement Test Improvements

The Wide Range Achievement Test (WRAT) is an academic skills assessment. It measures reading, spelling, math, and comprehension. The following graph represents score increases for the reading composite portion of the WRAT for five HCA students. These students presented with below grade level academic performance in reading and/or language and they completed at least 10 sessions of neurofeedback training.



*This graph represent 5 HCA students who completed at least 10 sessions between pre and post testing.

Case Study: Long-Lasting Improvements with TNC’s In-School Training

While The Neuroconnection has witnessed success with many of our students participating in neurofeedback training at school, one particularly impressive case involves Caleb, an incoming seventh-grader enrolled at HCA. Upon reaching fourth grade, Caleb had begun displaying signs of Attention Deficit Disorder (ADD) and struggled to stay on par with his peers academically, especially in math and reading comprehension. At the time, his school-wide MAP evaluation scores placed him in the 17th, 31st, and 21st percentile for math, reading, and language use, respectively. Having seen significant progress with their younger son from Connectivity-Guided Neurofeedback (CGNFB) training, Caleb’s parents returned to TNC in hopes of prompting similar developments with a second child.

Upon their initial intake, his parents disclosed they had entered Caleb in early intervention at the age of 2 to address presenting speech delays. Progressing in school, they noticed an escalating strain on Caleb’s ability to attend for prolonged periods of time, as well as follow verbal instructions at home and in the classroom. Prior to beginning neurofeedback, computerized cognitive testing confirmed Caleb qualified below-average in a number of cognitive domains that were impairing his performance in an academic setting, including, complex attention, cognitive flexibility, and memory.

Caleb was then administered a QEEG to identify any neurological abnormalities present in connectivity and/or power that could be contributing to his cognitive delays. Analysis of his data revealed excess slow-wave activity, or *hypercoherence*, throughout the prefrontal lobe of the brain. Such results are often consistent in those who struggle with ADD and helped to provide a basis behind the symptoms Caleb was presenting in attention, transitioning, and memory.

To correct these irregularities, Caleb was assigned a bilateral training protocol individualized to help “downtrain” the hypercoherence, or excess slow-wave activity, across the right and left frontal hemispheres. Following this first set of 10 neurofeedback sessions, his parents already began to see improvements with Caleb’s academic performance, particularly with verbal cues/memory and attention. A remap QEEG supported the positive observations, revealing a decrease in slow-wave activity throughout frontal regions of his brain, with respective normalization in connectivity. While pleased with his progress thus far, Caleb’s parents were hopeful to further the gains that appeared to be reflecting in his school work and continued his neurofeedback training.

Approaching the end of his second protocol (total of 20 sessions), Caleb’s teachers began to remark on the strides he was making in an academic setting. By their account, Caleb was demonstrating noticeably better focus and communication, which was apparent through his assignments and engagement with his classmates. As his parents had hoped, Caleb was steadily proving a capability to keep up with his peers.

Following a third set of CGNFB (30 sessions total), school-wide standardized testing confirmed Caleb’s academic progress with scores now placing him in the 42nd, 52nd, and 40th percentiles for math, reading, and language use (SEE TABLE 1). With nearly a 50% average increase across all tested subjects, Caleb and his parents finally felt the strain from academic pressure begin to lessen.

As his training continued, they started to take note of improvements outside Caleb’s scholastic environment. According to his parents, Caleb was exhibiting a new sense of confidence, and was much less anxious than he had been prior to neurofeedback training. His insecurities, whether relating to school or social stressors, were no longer devolving into apprehensive ruminations or obsessive questioning. These behavioral improvements seemed to reflect in Caleb’s cognitive performance, which showed significant gains through his post cognitive testing as well (SEE TABLE 2).

After a break from training over the next few months, The Neuroconnection was pleased to observe the long-lasting effects of Caleb’s neurofeedback keep him on par with his peers in and outside a school setting.

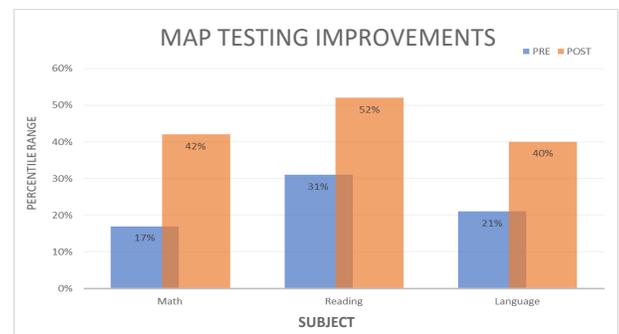


TABLE 1 – Caleb’s MAP scores before and after completing two protocols of in-school neurofeedback training.

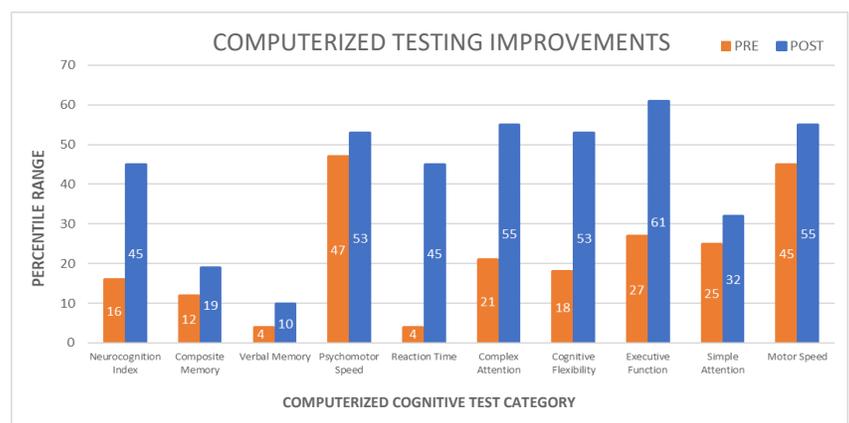


TABLE 2 – Caleb’s Neurocognitive testing improvements before and after in-school neurofeedback training

Video Games: Are they Harmful or Helpful?

(Continued from page 1)

Quite a few studies have been published on the benefits of video games. The majority reference improvements in visuospatial cognition which have been observed with as little as 10 hours of training. This may be explained because action games require players to respond quickly and accurately to changing stimuli.³ Other studies have suggested that cooperative games, those that encourage players to work together, may help to increase prosocial behaviors. Prosocial behaviors promote the well-being of another and include things such as helping, caring, and sharing. Unfortunately, things are not so simple. The same study also found that competitive gaming was correlated with a decrease in prosocial behavior and their results indicate that competitive gaming may be a better predictor of aggression than violence in games.⁴



Violent video games take quite a bit of heat in the media, and while there is little to no evidence that violent video games alone create delinquents or criminals, there is mounting evidence that these games cause an increase in aggressive cognition and a decrease in prosocial behavior. Researchers found violent video games to be highly correlated with an increase in hostile attribution, self-reported anger, aggressive intentions, and proviolence attitudes. They also found gamers to have less emotional reactivity to the distress of others and an overall decrease in prosocial behaviors. Some researchers go so far as to describe the effects of violent video game on a person as dehumanizing.⁵

In contrast to the external effect of violent games, non-violent video games are correlated with more internalized effects. Several studies linked video games with a negative influence on psychological wellbeing and have found that increased frequency of gaming was correlated with an increase in anxiety and depression symptoms. Some researchers think this is because real world problems seem difficult and out of control compared to the clear rules of a video game. Others believe that the rise in anxiety and depression is a result of social isolation or possibly a result of the negative emotions and frustrations games have been shown to evoke. Though it is unclear whether the effect on players' psychological well being is a direct or indirect consequence of gaming, the results remain unchanged.⁶

Non-violent video games also have a negative effect on cognitive control. This is often referred to as executive function, and it refers to a person's ability override their habits, reactions, and distractions in order to make goal-directed decisions.

"It's as if much of a child's social development is migrating from physical playgrounds to digital ones"

It's what helps us plan and organize the details of a trip, monitor and regulate our emotions, and control our impulses.⁷ These findings correlate with other studies that found gaming to be related to an increase in attention problems. Perhaps this is because video games feature high excitement with rapid changes in

focus, characteristics that are not always present in real life. Regardless, studies show that video games are correlated with above average attention problem and a decrease in cognitive control.⁸

Clearly there is much more research to be done, and these studies barely scratch the surface of a multifaceted topic. The benefits video games can have is certainly not insignificant, and individually these studies do not indicate that playing video games will do great harm. While no one voice in the conversation can definitively say that video games are "good" or "bad", those warning of the potential harms currently seem to outweigh the others in both strength and number. Is this a call to ban children from all video games? Certainly not. It is, however, a call to be mindful of what kinds of games they are playing and for what length of time. Our children may find them entertaining in the short term, but in the long term they are not without consequences.

¹Lobel, A. e. (2017). Video Gaming and Children's Psychosocial Wellbeing: A Longitudinal Study. *Journal of Youth and Adolescence*, 885.

²Bailey, K. e. (2009). A Negative Association between Video Game Experience and Proactive Cognitive Control. *Psychophysiology*, 1.

³Ibid, 1-2.

⁴Lobel, A, "Psychosocial Wellbeing", 886.

⁵Calvert, S. e. (2017). The American Psychological Association Task Force Assessment of Violent Video Games: Science in the Service of Public Interest. *American Psychologist*, 141.

⁶Lobel, A, "Psychosocial Wellbeing", 885-886.

⁷Bailey, K. "Negative Association", 1, 8.

⁸Swing, E. e. (2010). Television and Video Game Exposure and the Development of Attention Problems. *Pediatrics*, 215-219.



More on The Neuroconnection

Upon seeing such excellent results in the past 10 years with Connectivity-Guided Neurofeedback (CGNFB), our professionals aimed to extend access to training for those outside of our geographic area or inflexible schedules. As a result, The Neuroconnection designed an @ Home Training program to offer CGNFB

sessions in the convenience of your home. For five years, we have been able to provide our expertise and therapeutic treatment to families across the world. The opportunity for daily neurofeedback training at home has brought successful results for clients living as far as Russia and India.

Request more information from The Neuroconnection Website!
www.theneuroconnection.com

Meet Our Director

Ann L. Rigby, MSW, LCSW, BCN has over 30 years of experience in the mental health field. Ms. Rigby has been providing Neurofeedback services since 2001. She founded “The Neuroconnection”, a Brain Mapping and Neurofeedback clinic that provides an advanced, research-based form of Neurofeedback known as Connectivity-Guided Neurofeedback.

Ms. Rigby is a past Board Chair for the Autism Society of Illinois. She is a fellow and Board Certified member of The Biofeedback Certification International Alliance. She is also a field placement instructor for graduate students at Benedictine University and holds memberships with the International Society of Neurofeedback and Research (ISNR), the Biofeedback Certification Institute of America (BCIA), and the National Association of Social Workers (NASW). Ms. Rigby is a frequent speaker and exhibitor at many national and regional conferences throughout the year on topics related to the benefits of Connectivity-Guided Neurofeedback.

For more info about upcoming speaking engagements, go to our website www.theneuroconnection.com and visit our Resources tab.



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Brain Mapping and Neurofeedback

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