

# *the* Neuroconnection News

October-November 2015

Edition 2, Volume 4

## Jump into Fall with The Neuroconnection

It is around this time every year that we often think to ourselves, “Where did the summer go?”. Well, it has happened yet again. Summer has ended, just as quickly as it arrived. While many can agree it is difficult to say goodbye to the long and warm summer days, the end of summer also marks the beginning of the holiday season. The holidays are a very special time because it provides us with the opportunity to gather with family and friends. Often times, this involves building lifelong memories with loved ones and reminiscing on past memories already made.

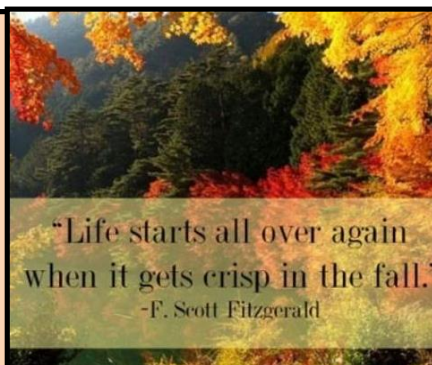
To many, the gift of time is one of the greatest gifts of all during the holidays. Moments with loved ones are cherished and we prioritize setting aside time for those closest to us. Yet, visiting with relatives over the holidays may raise questions about the physical and cognitive health of family members. As we or those around us grow older, it is common and even expected to experience difficulties with cognitive decline from a number of sources including memory loss as a result of aging, complications after a severe fall, or effects brought on by a disease, such as dementia. According to the World Health Organization, 47.5 million people suffer from dementia worldwide. As one of the major causes of disability and dependency among the older population, this chronic and often progressive disease may account for the deterioration in memory, learning, orientation, comprehension, language, and judgment we notice in our loved ones (WHO, 2014). Early recognition of dementia or other symptoms of cognitive aging is a vital step in getting proactive treatment to prevent further decline and addressing the issues at hand.

The professionals at The Neuroconnection understand the emotional impact and challenges that can come along with having a loved one who is experiencing cognitive declines, such as memory loss or dementia. However, with the use of state-of-the-art Connectivity-Guided Neurofeedback (CGNFB) training, we can successfully address the distressful symptoms associated with affected neurological processing. CGNFB serves as a modality to not only preserve, but also promote cognitive function for the elderly population. In this month’s newsletter we bring to you a descriptive overview of memory in the aging brain, falls among the elderly, and dementia. We discuss how CGNFB provides an effective modality for treating elderly either at risk for or experiencing cognitive decline, as well as evidence-based research demonstrating the positive results neurofeedback has previously shown. A case study on how CGNFB helped a specific elderly patient that suffered symptoms of cognitive decline as a result of a fall is also detailed as an example of success found with neurofeedback here at The Neuroconnection. Additional information about our @ Home Training option concludes this issue, explaining how CGNFB is made available to those outside of our area or with schedule inflexibility.

Upon reading this newsletter, if you have any questions or would like to request additional information, please feel free to contact us at (630) 858-5105. We are available to schedule a presentation at your convenience as well, tailored to address your further interests and needs.

### In This Issue:

- 1 Jump into fall with The Neuroconnection
- 2 Memory and the Aging Brain
- 3 Cognitive Decline and Dementia
- 4 Falls among the Elderly Population
- 5 CGNFB as a Modality for Cognitive Decline
- 6-7 Evidence-Based Results
- 8 Case Study
- 9 @ Home Training
- 10 About the Director



### Upcoming Events:

#### **Autism Seminar**

**Date:** November 14, 2015

**Time:** 2:30 p.m. – 3:30 p.m.

**Location:** Moraine Valley  
Community College  
9000 Old 88<sup>th</sup> Ave.  
Palos Hills, IL. 60465

## Memory and the Aging Brain

As we age, it is normal to experience a decline in memory capabilities for cognitive tasks. While the development of new neurons continues throughout our lives, blood flow and total volume in the brain begins to slowly decrease after reaching its maximum size in our early twenties. Studies have shown one long-term effect of this aging mechanism is impairment to working memory, which is responsible for the processing and storage of new and previously-stored information. The decline in these processes directly affects operation of priming, semantic memory, short-term memory, and especially episodic memory within the brain. We may start to see an indication of this memory loss due aging as the “what”, “when” and “where” of our daily lives become confusing or lost. Furthermore, difficulty shifting attention between tasks and slowed learning can be attributed to effects of normal aging as well.

Although memory loss can be recognized as an expected or normal result of aging, problems with memory may also be induced by other physical and psychological conditions. Complications from anxiety, depression, malnutrition, medication side effects, or infection can elicit changes in lifestyle or leave one feeling insecure, sad, and isolated. Coping with these stressors can leave some individuals more confused or forgetful than usual. In such cases it is important to address and treat these underlying problems in order to improve the regression in memory.



There is also a potential to improve and minimize memory loss as a result of the aging brain with simple social and cognitive exercises. Some of these include:

- **Socializing:** Engaging in social and community activities helps to improve mood and memory function
- **Exercise:** Physical activities like brisk walking or yoga can help boost and maintain brain
- **Regular check-ups:** Having your eyes and hearing tested regularly, as well as wearing your prescription glasses or hearing aids if you have them is vital to enabling one's ability to focus and learn
- **Memory aids:** Strategies such as keeping a to-do list, establishing a routine, not rushing with new tasks or information, or using associations can work to provide the regulation and structure helpful to gaining control and confidence in memory.
- **Keeping a positive attitude:** Studies have shown that keeping a positive outlook about aging can improve memory performance in older adults.

While the simple forgetfulness of normal aging may not seem to warrant immediate care or attention, it is still beneficial to incorporate these techniques into one's day-to-day schedule. Along with these strategies, experts have also found significant improvements in memory function with the use of treatments like Connectivity Guided Neurofeedback.

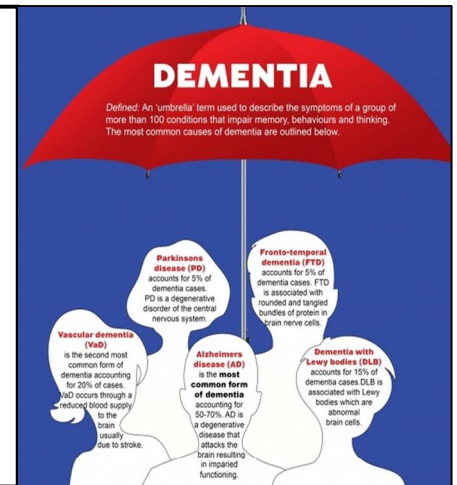
For more information pertaining to the findings noted above, please review the reference below:  
 Memory & Aging | American Psychological Association, APA. (n.d.). Retrieved September 14, 2015, from  
<http://www.apa.org/pi/aging/memory-and-aging.pdf>

## Cognitive Decline and Dementia

### About Dementia:

When memory loss and decline of other cognitive abilities occur at a greater rate than the “normal” stages of aging, it may be an indication of a neurological disorder known as dementia. Symptoms generally manifest after the age of 65, however, atypical loss of cognitive functioning may begin years prior as “early onset dementia”. Depending on the cause of the affected cognitive areas, dementia is classified as either reversible, or irreversible.

**The cause:** The cognitive decline seen with dementia is widely attributed to damage in the brain. The source of this damage can range anywhere from infection or interrupted blood supply to neurodegenerative disease. One of the most well-known neurodegenerative forms of dementia is Alzheimer’s disease, accounting for 60 to 80 percent of all cases. In such cases, degeneration and death of brain cells occur faster than expected with effects of normal aging and causes exponential damage over time. The progression of any cell damage within the brain can consequently block communication and disrupt connectivity necessary for the survival of the cells, ultimately leading to the memory failure, processing delays, and other disabling symptoms of dementia.



**The signs:** Although the cause and extent of brain damage lead to varying symptoms of dementia, the disease can be signified overall by an “ongoing decline of the brain and it’s abilities”. Since dementia may present as a progressive disease, it can be beneficial to diagnose and address the symptoms as early as possible to combat further cognitive decline. While early onset of the disease can oftentimes appear similar to symptoms of normal aging, when the following cognitive lapses begin to inhibit one from performing typical everyday activities, it may warrant concern for dementia:

- Memory loss
- Decreased understanding or ability to learn
- Reduced processing speed
- Attention problems
- Difficulties finding the right word
- Lack of judgment or reason
- Difficulties retaining or recalling past experiences
- Disoriented in time or place
- Lost of interest in social engagements
- Disorganized, restless behavior
- Sudden Mood swings
- Depression
- Anxiety
- Psychosis

Once recognized, it is important to contact a doctor as soon as possible. Intervention on an early dementia diagnosis will not only serve to treat the presenting symptoms but may also help to slow and prevent further deteriorating effects that can come along with the disease.

**CGNFB Training:** While there is no known cure for dementia, research has shown that CGNFB may operate as a possible modality for slowing the symptoms of cognitive decline experienced with the disease. Training with neurofeedback serves to address the root cause of dementia by strengthening damaged and maximizing healthy connectivity within the brain. Since existing medication is often limited to maintaining current symptoms with continuous dosing, investigation into the efficacy of CGNFB modulating a lasting positive defense against cognitive decline has recently expanded.

For more information pertaining to the findings noted above, please review the reference below:  
Neurofeedback treatment for Dementia and Alzheimer symptoms | BrainTrainUK. (n.d.). Retrieved September 25, 2015

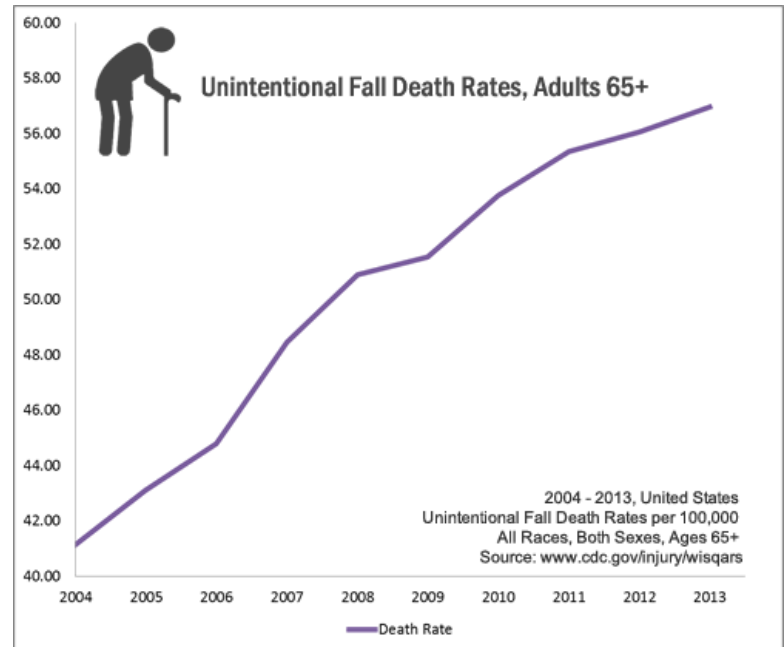
## Falls among the Elderly Population

According to the National Council on Aging, falls are the leading cause of fatal and non-fatal injuries for older Americans. Annually, 30-40% of elderly people living in the community fall and 50% of nursing home residents fall. Additionally, in the US, falls are the leading cause of accidental death and the 7<sup>th</sup> leading cause of death in people 65 years of age and older; 75% of deaths caused by falls occur in the 13% of the population who are 65 years of age and older. (Rubenstein, 2013).

While many falls do not cause injuries, it is estimated that one out of five falls do cause a serious injury such as a broken bone or a head injury (CDC, 2015). In fact, falls are the most common cause of traumatic brain injuries (CDC, 2015).

The Centers for Disease Control and Prevention indicate that researchers have identified certain conditions that contribute to falling. These risk factors include:

- Lower body weakness
- Vitamin D deficiency
- Difficulties with walking and balance
- Use of medicines, such as tranquilizers, sedatives, or antidepressants.
- Vision problems
- Foot pain or poor footwear
- Home hazard dangers such as broken or uneven steps, throw rugs or clutter that can be tripped over, and no handrails along stairs or in the bathroom



Falls with or without injury have a heavy impact on one's quality of life. After just one fall, older adults may grow to fear falling again and, as a result, limit their activity and social engagement. This can result in further physical decline, depression, social isolation, and feelings of helplessness. However, falls can be prevented. Listed below are some simple things one may do to keep themselves from falling:

- **Talk to your doctor** – ask your doctor or healthcare provider to evaluate your risk, review your medicines and discuss vitamin D supplements
- **Do strength and balance exercises**- make your legs stronger and improve your balance
- **Have your eyes checked** – visit an eye doctor at least once a year and update your eyeglasses if needed
- **Make your home safer** – add grab bars inside and outside of your tub/shower and next to the toilet, put railings on both sides of stairs, make sure your home has lots of lighting, get rid of items you could trip over

For more information pertaining to the findings noted above, please review the references below:  
 Falls Prevention Facts - NCOA. (2015, June 3). Retrieved September 23, 2015, from <http://www.ncoa.org/news/resources-for-reporters/get-the-facts/falls-prevention-facts/>  
 Important Facts about Falls. (2015, September 21). Retrieved September 23, 2015, from <http://www.cdc.gov/homeandrecreationalafety/falls/adultfalls.html>  
 Rubenstein, L. (2013, November 1). Falls in the Elderly - Geriatrics. Retrieved September 23, 2015, from <http://www.merckmanuals.com/professional/geriatrics/falls-in-the-elderly/falls-in-the-elderly>



## Connectivity-Guided Neurofeedback (CGNFB) as a Modality for Cognitive Decline

With the use of Connectivity-Guided Neurofeedback (CGNFB), research has demonstrated the power of neuroplasticity to improve cognitive functioning over time. Considering the effects of reduced volume and blood flow in an aging brain, quantitative EEG brain maps are helpful in revealing the positive impacts neurofeedback training can have on cognitive decline. Using these accessible representations of electrical activity, previous studies have shown a pattern of diminished activation within the frontal and temporal lobes of the brain associated with decreased cognition. In response to such research, experts have investigated how CGNFB can be used as a modality to preserving and promoting cognitive functioning for aging individuals.

For more information pertaining to the findings noted above, please review the reference below:  
Wang, Jinn-Rong, and Shulan Hsieh. "Neurofeedback Training Improves Attention and Working Memory Performance." *Clinical Neurophysiology* 124.12 (2013): 2406-420

Here at **The Neuroconnection**, similar practices with CGNFB are utilized to address cognitive decline due to aging. Treatment is non-invasive, with no adverse side effects that one might otherwise experience with medication. Using quantitative EEG analysis, our team is able to identify patterns of electrical activity that take into account both power and connectivity abnormalities between areas of the brain that may signify symptoms of cognitive decline. By training connections within these affected regions with neurofeedback, we are able to exercise and strengthen brain communication, thereby decreasing correlating symptoms. Our experts at The Neuroconnection recognize the significance of individual factors contributing to the impact on patients' cognitive changes and are determined to developing a comprehensive plan applying CGNFB, while also addressing environmental contributors.

**The Neuroconnection has achieved the following results, with respect to cognitive decline due to aging:**

Improved cognitive ability in the areas of:

- Memory
- Attention
- Verbal Skills
- Orientation

Improved mood and function by:

- Decreasing anxiety
- Decreasing depression
- Improved affect

*"A knowledge of brain science will provide one of the major foundations of the new age to come. That knowledge will spawn cures for disease, new machines based on brain function, further insights into our natures and how we know."*

From "The Soul Made Flesh, The Discovery of The Brain and How it Changed the World" by Carl Zimmer, 2004

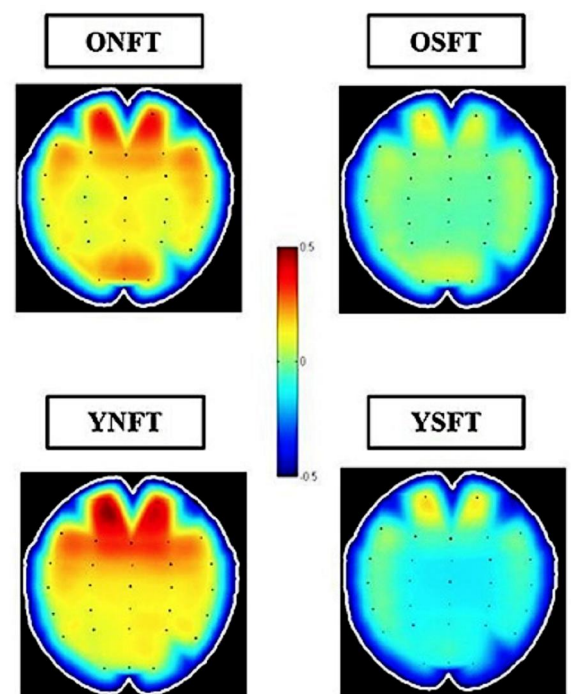
## Evidence-Based Results: CGNFB training improves attention and working memory in normal aging adults

For a further look into the efficacy of neurofeedback, Wang et al 2013, applied a specific CGNFB protocol, involving up-regulation of frontal-midline theta activity, in order to investigate effects training has on attention and memory in both younger and older age.

From the thirty-two participants recruited for this study, 16 subjects (ages 21-24) represented the younger sample, while the remaining 16 (ages 61-72) comprised the older sample. Each age group was then anonymously divided into two groups: 8 to receive neurofeedback training (NFT) and 8 to receive sham-neurofeedback training (SFT). Prior to any form of training, all participants were administered the Attention Network Test (ANT) and the Modified Sternberg test to establish cognitive ability, as well as a resting QEEG recording for initial brain activity. The four groups; older neurofeedback training (ONFT), older sham-neurofeedback training (OSFT), younger neurofeedback training (YNFT) and younger sham-neurofeedback training (YSFT), all proceeded with 12 sessions of their respective training over the course of 4 weeks. The day following their last session, an ANT, Modified Sternberg test,

Results showed significant increase in theta activity from pre-training to post-training for both groups receiving neurofeedback treatment. Figure 6 displays the increased electrical brain activity, particularly within frontal brain regions, for the ONFT and YNFT groups but no significant changes in theta amplitudes for the OSFT or YSFT groups. Analysis of the cognitive assessments supported these findings with observed improvements in executive function for only those participants receiving neurofeedback treatment. Furthermore, older subjects given neurofeedback performed significantly better in both memory-testing and orienting function following their training, while those given sham training did not indicate any significant changes.

Collectively these findings help to demonstrate the effectiveness of using neurofeedback to up-regulate frontal-midline theta, thereby serving to sharpen processes associated with attention and working memory.



**Fig. 6.** Maps of the average differences of eyes-open resting theta amplitudes after the NFT with respect to the pre-training phase in each group. OSFT: the older sham-neurofeedback training group; ONFT: the older neurofeedback training group; YSFT: the younger sham-neurofeedback training group; and YNFT: the younger neurofeedback training group.

For more information pertaining to the findings noted above, please review the reference below:  
Wang, Jinn-Rong, and Shulan Hsieh. "Neurofeedback Training Improves Attention and Working Memory Performance."  
Clinical Neurophysiology 124.12 (2013): 2406-420

## Evidence-Based Results with Connectivity-Guided Neurofeedback

### Efficacy of Neurofeedback in Elderly with Risk for Cognitive Disorder (Becerra et al 2011):

One study by Becerra et al. 2011 confirmed the efficacy of Neurofeedback (NFB) training on memory through an investigation with healthy elderly subjects who presented electroencephalographic (EEG) risk for cognitive disorder. In the current research, NFB training that reinforces decreased theta activity was applied with the intention of reducing the probability of posterior cognitive decline, which is thought to be associated with an EEG abnormality of high theta absolute power (AP). Fourteen subjects between the ages of 60 and 84 with high theta AP were randomly assigned into two groups: an experimental group that received NFB training with a reward (tone of 1000Hz) when theta AP was reduced and a control group that was given a sham NFB treatment with random administration of the same tone. Each participant received a total of 30 thirty-minute training sessions over the course of ten to twelve weeks. To analyze the effect of NFB on cognition and electrical brain activity an EEG recording along with WAIS and NEUROPSI tests were gathered from every individual before and six months after the first session of training.

Collectively, from the WAIS test the experimental

group presented significant increase the Verbal Comprehension Index, Verbal IQ and Working Memory Index, while the control group showed no significant increases in those parameters and a significant decrease in Executive IQ. The NEUROPSI battery, which measured both attention and memory, only indicated a significant increase in total score from the experimental group as well. These results suggest NFB may be associated with the development of cognitive function including verbal skills, attention, and memory. This was further confirmed by pre and post EEG recordings in which reduction in theta AP along the midline and frontal leads and an increase in alpha AP in the left hemisphere was observed. While the changes in midline theta AP are associated to improvements in attention tasks for the subject, the progression in verbal skills can be supported by the changes of theta and alpha AP within the frontal lobe. Together, the increased functioning of attentive and verbal processes observed in the elderly subjects suggests NFB may serve as a useful tool in preventing cognitive decline such as memory loss in health individuals.

For more information pertaining to the findings noted above, please review the reference below:

L., D., Becerra, J., Fernandez, T., Roca-Stappung, M., Galan, L., Bosch, J., . . . Harmony, T. (2010). Neurofeedback in healthy elderly humans with electroencephalographic risk of cognitive impairment. *Journal of Alzheimer's Disease*, 28(2), 357-367

### Efficacy of Neurofeedback on Dementia in Patients with Alzheimer's Disease (Luijmes 2013):

To take a further look at the effects on dementia, Luijmes et al 2013 conducted an analysis of Neurofeedback (NFB) on cognitive function in patients with Alzheimer's disease (AD). According to previous research, patients with AD are known to show greater theta activity in qEEG recordings when compared to those from typically aging individuals. This, along with increased delta and decreased alpha and beta served as EEG markers for selecting subjects with AD that could potentially benefit from NFB. Because NFB works to reward desired and inhibit unwanted electrical brain activity, treatment was hypothesized to function as a form of operant conditioning to facilitate corrections in the EEG abnormalities.

For the purpose of this study, 10 patients between the ages of 61 and 90 who presented EEG patterns for patients with AD were chosen to receive NFB training. The effects of their treatment were compared with progression examined in 123 AD patients who were instead receiving treatment as usual (TAU), or in this case cholinesterase

inhibitors. The patients selected for NFB were administered initial qEEGs to determine individualized protocols prior to training. Pre and post CAMCOG tests were given to determine a reliable change index (RCI) in eight measures of orientation, memory, and learning.

After fifteen weeks of 30 twenty-minute sessions, the NFB subjects showed significant improvement in learning memory, including recognition and recall of information, when compared to the collective group receiving TAU. On an individual level, RCI analysis indicated participants given NFB treatment maintained cognitive performance throughout the study while those given TAU had an overall decrement in cognitive function, with an exception of orientation in time. Collectively, the results showing a stability of cognitive performance and increased learning memory suggests NFB treatment may serve as an effective modality to address the progressive deterioration experienced in patients with Alzheimer's disease.

For more information pertaining to the findings noted above, please review the reference below:

Luijmes, R. (2013). The Effectiveness of Neurofeedback on Cognitive Functioning in Patients with Alzheimer's Disease.

## The Neuroconnection Provides Success for Patient after Fall

With the use of Connectivity-Guided Neurofeedback (CGNFB), the Neuroconnection is proud to share the success of a particular client who was suffering from symptoms of cognitive decline. Prior to complications, at the age of 86 years old Steve was high functioning - a retired chemical engineer who continued to work up until a tragic fall that led him to the Neuroconnection. After falling down 8 stairs Steve laid unconscious for 2 minutes. He suffered heavy swelling on the back of his head, however, an MRI showed no abnormalities. Following the incident Steve began feeling “foggy”; he started experiencing problems with recall, including trouble finding words he wanted to say and resulting in loss of fluid speech. Mood also became a concern as he reported unusually low motivation, depressed mood, irritability and high anxiety, which compounded onto additional new issues with increased sleep and poor organization and planning.

Steve approached the Neuroconnection less than a year after his fall in May 2015 with the hopes of addressing this cognitive decline. During Steve’s initial visits, a QEEG, or brain map, was administered in order to determine the protocol for his CGNFB training, which he received in bi-weekly sessions through the months to follow. Upon returning from his first CGNFB session Steve and his wife reported he seemed more like his “old self” after waking up the next day. Within the next few weeks he noticed improvements in memory and was once again able to speak fluidly without as much of a struggle with word choice.

By the completion of his first set of sessions, Steve was happy to announce his “fog” was gone. Those around him even remarked on his progress and sense of mental clarity. His mood felt significantly lighter, with lower anxiety and less susceptibility to feeling overwhelmed. While Steve mentioned speech and depression were better since the past two months of treatment, he also acknowledged room for further improvements with his stutter and sensitive emotional state.

In light of the promising results, Steve was optimistic for a second set of CGNFB sessions that was determined after a re-map QEEG. After less than two months of this training, Steve indicates gradual and lasting progress in both memory and mood. His mental “fog” has stayed clear and he has noticed a considerable improvement in his ability to recall the short term. He reports a **“tremendous change”** since his fall and remains resolute in his training in order to continue to build upon the cognitive development he has already experienced.

The Neuroconnection is pleased to share the ongoing success of Steve’s recovery of cognitive functioning during CGNFB treatment. We were delighted to see such a positive turnaround for Steve after his fall and look forward to seeing continual improvements in his speech and memory week to week.

*\*Names and dates have been changed to maintain confidentiality*



## @ Home Training through The Neuroconnection

Upon seeing such excellent results in the past 7 years with Connectivity Guided Neurofeedback (CGNFB), we wanted to find a solution to provide the training to those outside of our area or with schedule inflexibility. As a result, The Neuroconnection provides an @ Home Training program to conduct CGNFB sessions in the convenience of your home. For the past 3 years, we have been providing our expertise and therapeutic treatment to families all around the world. The option of training daily at home has been proven successful with our clients expanding as far as Russia and India.

The @ Home Training program first starts off with an initial intake, along with a QEEG or "brain map" in the office. A custom protocol is then made for the specific needs of the client. At this time, an extended training session is set up within the office to instruct you on how to run a session. We provide you with all the necessary tools and equipment including the neurofeedback system in addition to a laptop which is pre-loaded with all the software and protocols required to conduct training sessions at home. We also provide an Atlantis amplifier, electrodes, head cap to show correct placements, and an @ Home Training manual.

Following the training, we monitor you at home via Skype to verify that you are receiving CGNFB training correctly. Once you feel comfortable training with the software, you may then begin to run sessions on your own with The Neuroconnection monitoring your progress. One protocol consists of 20 sessions, with at least two sessions ran each week until completion of the set protocol. Once finished with the first protocol, you would then return to our office for a QEEG remap to allow for pre and post comparisons.

The  
Neuroconnection  
@ Home Training  
brings Connectivity-  
Guided  
Neurofeedback to  
the convenience of  
your home.

Call (630) 858-5105 now  
to find out more!



## Learn more about The Neuroconnection's director:

Ann L. Rigby, MSW, LCSW, BCN has over 25 years of experience in the mental health field. She has specialized training and extensive experience in the areas of Autism, Attention Deficit Hyperactivity, Anxiety, and Mood Disorders. 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 the Board Chair for the Autism Society of Illinois and is a field placement instructor for graduate students from Benedictine University. She holds memberships with the International Society for Neurofeedback and Research (ISNR), the Association of Applied Psychophysiology and Biofeedback (AAPB), 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. In the past year, Ms. Rigby spoke at the following conferences: The 46<sup>th</sup> Autism Society of America National Conference, The Special Needs Expo, The Family Time Magazine Autism and Special Needs Seminar, and the Autism Society of Illinois 10<sup>th</sup> Annual Parent and Professional Networking Conference.

To learn more about up and coming speaking engagements, go to our website [www.theneuroconnection.com](http://www.theneuroconnection.com) and visit our Resources tab.



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