

Innovative Therapies for ADD, ADHD, LD:

New Computer-Based Technology to Treat Attention Deficit Disorders

By Bob Gottfried PhD

Background

It is estimated that over 5% of all children in North America are experiencing at least one form of attention deficit disorder. Both ADD and ADHD are characterized by one or more of the following: inattention, hyperactivity, and impulsivity. Learning disabilities are characterized by one or more difficulties associated with attention, reading, writing, oral language, reasoning, memorizing, and problem solving. Further difficulties may include compromised organizational skills and social interaction.

The question of whether or not attention deficit disorders can be remedied has received significant attention from many researchers. Treating children and adolescents with stimulants (for instance Ritalin), has proven to be helpful but is limited by side effects and tolerance. The introduction of Neurofeedback (also known as EEG Biofeedback), has offered new hope for parents wanting to help resolve the attention related problems of their children without the use of medication. Neurofeedback research has shown that training brain wave patterns can remedy cognitive impairment associated with attention deficit related to ADD, ADHD, LD.

Brain wave activity and Attentional Shifting

The brain produces different frequencies for different levels of attention. They include the following:

Delta – sleep state

Theta – between sleep and awake, also a meditative state

Alpha – relaxed state

Beta1 – focused concentration

Beta2 – alert state

Beta3 – very alert, vigilant

Beta4 – Hyper vigilant

The ability to produce the right states, especially those associated with focus and attention is paramount to be able to perform a variety of cognitive tasks such as listening, learning and processing information, in general. In addition, the ability to shift from one state to another when required, offers tremendous mental flexibility, which results in enhanced mental performance in every area of life.

The Use of Neurofeedback in Treating Attentional Difficulties

Neurofeedback, which is a form of biofeedback, has been used for over 20 years to treat concentration related difficulties associated with ADD/ADHD and LD. In general, Neurofeedback is a modality which uses an EEG recording system along with training software to enhance brain wave activity that is instrumental for improving concentration.

The premise behind Neurofeedback is related to earlier findings which established that individuals with poor concentration lack sufficient levels of Beta1 (This band is also called SMR - short for sensory motor rhythms) brain waves to sustain attention. The findings also showed that individuals with attention deficits exhibit excessive amounts of slow brain wave activity, especially Theta waves. Joel Lubar, a pioneer in this field, demonstrated that treatment modalities focusing on enhancing the Beta1/Theta ratio have been very effective in treating children with attention deficits and learning disabilities, which usually resulted in improved school performance and better behavior control. During Neurofeedback sessions, the person wishing to enhance concentration and improve attention and focus, uses feedback coming through an EEG machine to enhance Beta1 and decrease Theta. After a certain amount of training, typically between 40 and 60 sessions, the individual is able to produce more Beta1 at will. Lubar also proved that all children experiencing any form of learning disabilities demonstrated low amounts of Beta1 waves and that many of the symptoms diminished after a process of brain wave training.

Neurofeedback treatment can also result in significant improvement of intellectual functioning, as measured by increases in IQ scores (Linden, Habib & Radojevic, 1996). Such improvement is most likely the result of the treatment's positive impact on the person's ability to concentrate. More recently, Monastra (2002) found that Neurofeedback has proven to be successful in long term improvement

of ADD/ADHD symptoms. In this study, 100 children, aged six to nineteen years, diagnosed with ADD/ADHD were monitored for one year. All children received parental counseling, academic support, and Ritalin. Half of the children also received Neurofeedback training. After 12 months, all children showed improvement in their attention. However, children who stopped taking Ritalin and did not train with Neurofeedback, lost the gains they had achieved, whereas those who also received brain wave training kept their gains even after they stopped using Ritalin.

Computer Assisted Programs

The use of computer-assisted programs in the treatment of cognitive deficits is not new.

Previous studies have shown the benefits of such cognitive training for treating attention deficits and learning disabilities. The National Institutes of Health (NIH) Consensus Development Conference Statement confirmed that "Computer-assisted strategies have been used to improve specific neuro-psychological processes, predominantly attention, memory, and executive skills. Both randomized controlled studies and case reports have documented the success of these interventions using intermediate outcome measures."

New Generation Software

Lately, a new generation of programs makes it much easier and faster to treat attention deficits. The most notable innovation related to these programs is that they can provide effective training without clinical supervision. One such program: SharperBrain has gained substantial recognition in the area of improving cognitive performance for individuals with cognitive deficits. This is a language independent program, which makes it easier for the brain to generalize the results. SharperBrain directly trains the brain to enhance all levels of attention in addition to a long list of cognitive skills. SharperBrain was developed based on research done with EEG based technology. The goal was to develop a program that can avoid the costly aspect of EEG instrumentation and to make it easy to use and more economical.

The program works in two ways. First, improve brain wave activity by enhancing the following three attentional levels:

1. Calm: Allows the mind to relax and get ready for different mental tasks. It is also a state important for contemplation and planning. In terms of brain activity, this is equivalent to Alpha state.

2. Focused: Allows paying attention to a specific task, while offsetting distractions. This is equivalent to Beta1 state.

3. Alert: Allows fast response when the need to react quickly is required. This is equivalent to Beta2 state.

In addition, SharperBrain trains the brain to develop a variety of cognitive abilities such as divided attention, multitasking, speed of processing, working memory, visual/auditory processing and coordination as well as higher executive skills such as decision making, organizing and prioritizing. It also trains the brain to offset distractions. Such skills are not part of the traditional Neurofeedback protocols. Another advantage of such program is that unlike Neurofeedback, which can be only administered by a clinician, it can be practiced at home after a very brief training. In addition, it does not require specialized equipment such as EEG, making it a very cost effective alternative.

With the latest research and news about side effects of attention deficit-related medication, the interest in this innovative technology has significantly risen in the past year and is expected to continue to draw individuals interested in utilizing a drug free approach to attention deficit disorders. Dr. Frank H. Duffy a Professor and Pediatric Neurologist at Harvard Medical School and an Associate Editor for Neurology, Clinical EEG Journal noted recently the following:

"In my opinion, if any medication had demonstrated such a wide spectrum of efficacy it would be universally accepted and widely used. It is a field to be taken seriously by all."

A lot has been written on the connection between nutrition and ADHD. The fact remains that ADHD is a neurological deficiency. Proper nutrition and supplementation may be helpful in better controlling this and many other health related problems, but it cannot fix the neurological aspect of the problem. Supplements and herbal remedies can have some calming effect on hyperactive kids, but they cannot teach a child with attention deficit disorder how to neutralized distractions around them and how to consistently pay full attention to the teacher while learning material that is not so exciting for the student.

With the new technology, Sharper Brain is offering children and adults an effective option to be able to make the necessary neurological changes so that they can, perhaps for the first time in their lives, focus and concentrate when they need it and for as long as it's needed.

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