

THE OPTIMIZATION OF BRAIN FUNCTIONING

Paul G. Swingle, Ph.D., R. Psych.



There are many things we can do to enhance physical and mental performance. And all are important. These include proper exercise, good diet, nutritional supplements, disciplined work ethic, positive mental attitude, rehearsal, and good sleep hygiene. The present article focuses on an additional procedure that optimizes brain functioning – neurotherapy.

Simply stated, neurotherapy changes brain functioning by modifying brainwave activity. Research over the last four decades or so has identified brainwave activity that is not only associated with conditions such as depression, attention deficiencies, addiction, sleep disturbances, emotional volatility, and the like, but also those brainwave states that are associated with peak or optimal performance.

However, identifying brainwave patterns associated with specific symptoms and conditions was not the key breakthrough. The pivotal discovery was that of brain plasticity! As early as the 1940s researchers at McGill and Brown Universities demonstrated that brainwaves could be conditioned, That is, just like Pavlov did with conditioning a salivary response in dogs, these researchers were able to accomplish with brainwaves. Later, in the 1960's researchers at Columbia and University of California showed that animals could learn to control autonomic (heart rate) and brainwave activity. Subsequently many additional researchers have shown that the brain can change. This has had huge implications and toppled our incorrect notions of how the brain functions. For example, when I went to school, medical and graduate schools taught that the brain had limited capacity for recovery. This is simply wrong! Sufferers of brain injuries were lead to believe that recovery after eighteen months would be limited at best. We now know that substantial recovery is possible long after the brain injury.

Further, the discovery of the extent of the brain's capacity for functional change has lead to the development of very efficient non-drug methods for treating depression, attention problems in children, age related cognitive declines, anxiety conditions, and, in fact, all conditions that are associated with brain activity.

It's All in Your Head!

Stella¹ limped into my office. She seemed to be in pain and clearly emotionally distressed and distraught. After she got settled and dried a few tears she blurted out “everyone thinks I am making this up – my doctor said it’s in my head!” I smiled and said “Of course it is, where else would it be? You are in pain and you are suffering emotionally. That all takes place in your head and that is where we are going to treat it.” A brainwave assessment, the standard initial mapping of brainwave activity that takes about six minutes, revealed that Stella had a common pattern found with clients with fibromyalgia. She had brainwave patterns associated with exposure to emotional trauma, poor stress tolerance and depression.

Optimal Performance Training

What does Stella have to do with optimal performance training? All conditions are associated with the brain not functioning in an efficient or optimal manner. Basically then, all neurotherapy treatment of any disorder is focused on making brain functioning more efficient. The treatment of conditions as varied as depression, cancer, and age related cognitive declines are all premised on correcting brainwave anomalies followed by optimizing those brain functions that mitigate the condition under treatment. Hence, if you want to cut a few strokes off your golf score, or mitigate age related dementias or help fight cancer the same methodology applies. Correct what is wrong and then optimize those brainwave features associated with most advantageous brain performance.

This reminds us that those “one-size-fits-all” franchises offering brain brightening or brain gym treatments are of limited value because they miss the specific areas of the brain that are problematic and compromising brain efficiency. Rather like having a client ride a stationary bicycle to treat a neck pain.

Optimal performance training has emerged as an extremely useful and cost effective procedure for facilitating efficient functioning. It has application for athletes, CEOs, performers, artists, elite military forces, crises management, severely stressful occupations, in addition to facilitating recovery and survival. There are many examples of effective use of neurotherapy for optimal performance that have become known to the general public including Canadian Olympic gold medalists, the 2006 World Cup soccer champion team, Olympic medal archers, Broadway performers, Fortune 500 top management, and military elite Special Forces. Even the Vancouver Canucks are getting setup for optimal performance training.

How Does it Work?

Brainwave optimal performance training is not a standalone procedure. For golfers, the training includes training on swing, mental attitude and focus. For baseball, batting includes reaction time training, learning to incrementally commit, as well as mental attitude and focus. For CEO’s, learning methods for monitoring and self-regulation of performance is vital. For those struggling with cancer, working with their oncologists, nutritionists and learning self-regulation is essential. Cognitively declining elders must include activities that vitalize mental and physical functioning and avoid mind numbing activities.

The first step is to have a basic brainwave assessment. These procedures are very efficient and require only six minutes of recording time. This procedure is so efficient that in clinical settings it allows the therapist to tell the client why they have sought treatment! In the optimal performance situation, this procedure allows the therapist to identify areas of brain activity that may compromise efficient brain functioning. For example, many athletes and performers suffer from poor stress tolerance, a condition that is associated with a deficiency in brain functioning at the back of the brain. In such cases correcting that condition markedly improves performance that is further improved with optimization brainwave training.

Once the brain inefficiencies identified in the brainwave assessment are corrected, the optimization training commences. This can include a variety of different brainwave functions at different brain locations. A fundamental procedure is to speed up the frequency of the Alpha brainwaves. Alpha brainwaves are between eight and twelve cycles per second. Alpha "slowing" refers to a condition where the strongest Alpha brainwaves are in the low frequency range. This condition is found in age related cognitive decline, drug induced cognitive "fogginess," and developmental delays. Alpha frequency has been shown to correlate positively with IQ and immune functioning so that by increasing the speed of the Alpha peak frequency, IQ and immune functioning improve.

Fine tuning of the brain involves having the client be mindful of brainwave status as reflected in such subjective states as mind "chatter" and perseveration of thought patterns. In the former, clients (CEO's in particular) will decide on how much background cognitive activity they like. In the latter they decide where they want to sit on the flexible-indomitable dimension.

How is it done?

There are three general classes of treatment in neurotherapy and in optimal performance training. The first, brainwave biofeedback or neurofeedback is the form most people are familiar with. It involves attaching some electrodes to the client's ears and head and measuring specific brainwave activity. When the brain is doing what we want it to do, such as increase the strength (amplitude) of particular brainwave, then the client will hear a tone or see something move on the computer monitor. For children (and of course for adults if they wish) we set it up so that the child is playing a video game with her or his brain. When the brain is responding as we want, Pac Man gobbles up dots, or space ships fly through complicated mazes. This procedure allows the child to self-regulate brain activity. It is particularly effective for treating attention deficit disorders in children.

The second class of treatment procedures are the braindrivers. Based on the procedure first reported in the 1940s, mentioned above, specific stimuli such as flashing lights or special sounds are presented to the client based on moment to moment brainwave measurement. For the child with an attention problem, for example, we might measure the strength of slow frequency brainwaves and when the strength exceeds a particular threshold we turn on the sound which, in turn, suppresses the slow frequency amplitude. This procedure is particularly effective for helping children become more efficient readers. It is also an effective treatment for those who cannot comply with the neurofeedback treatments such as severely demented elderly, clients in coma, and severely autistic children.

The third class of treatments are those that clients self-administer in their home. These treatments include cranial stimulators, specific harmonics that we have pretested and know how they affect brain

activity, relaxation exercises, etc. A principal purpose of these self-administered procedures is to maintain gains made in treatment and to stabilize the changes.

Do the Improvements Last?

Some are relatively permanent others have to be maintained with booster sessions. For example, a client who has a deficiency in an area of the brain associated with stress tolerance will likely find that the improvement in brain functioning is stable. An elderly person who is experiencing declines in cognitive functioning, on the other hand, will usually have to have three or four maintenance sessions per year after the initial brainwave slowing has been corrected to mitigate this age related decline.

Children who have learning challenges are the most gratifying to neurotherapists because once their learning problems improve the developmental process kicks in and does the maintenance work for us. They get interested in learning and the brain just continues to improve.

CEOs, athletes, and performers, on the other hand, need to have ongoing neurotherapy to sustain peak functioning. The best analogy is body building and fitness. If you want to keep fit, you might have a period of intensive fitness training followed by a maintenance schedule of perhaps three visits to the gym per week. If you want to be a professional fighter you had better work out several hours per day during your entire career. If you want to compete in body building contests, hours of muscle training per day is needed to maintain the muscle mass.

John, CEO of a medium size Vancouver company, arrived for his monthly optimal performance session a few days early. He said he pushed up his appointment because he had an important meeting later that day and wanted to be "sharp as a tack." I did a rapid mini assessment that takes less than three minutes. There was a mild disparity in the frontal cortex. I said to John, "have you been more irritable than your usual disagreeable self and are you having some mild lags in information retrieval recently?" After some kibitzing, John acknowledged the conditions I identified. I used braindriving to balance the frontal regions and then did a treatment designed to help quiet the brain. The later helps with efficient functioning in stressful situations and also improves many clients' ability to be mindful of the more comprehensive implications of proposed courses of action.

Summary

Although we tend to think of optimal performance training as being limited to athletes, performers and CEOs it is clear that the concept of optimal brain functioning is relevant to other circumstances as well. Any condition that is associated with brain inefficiency can be treated with neurotherapy. Optimal performance training can be thought of as the last phases of such treatment in which the brain becomes more efficient. The child with attention problems, for example, may be successfully treated by decreasing excessive slow frequency amplitude. The child's learning can be further enhanced with optimal performance training to speed up the Alpha brainwaves thus improving IQ.

We have been expanding the concept of optimal performance to include the use of such procedures to optimize group wellbeing. Consider a couple whose marriage is in jeopardy because of brainwave conditions that are discordant. For some time now, we have assisted marriage and family counsellors by correcting brainwave features of family members that are related to interpersonal strife. This is

simply an extension of the oft stated truism that all problems are family problems. A depressed parent, for example, seriously affects the children's wellbeing. An emotionally volatile spouse also clearly compromises family harmony. Similarly, a couple where one spouse is passive and the second is excessively indomitable can experience marriage threatening explosive discord that can often be significantly improved by balancing the neurological predispositions. Further, in this context, two person neurotherapy sessions have been found to enhance couple harmony as well as efficiency. This intriguing procedure involves the training of two brains in concert to establish brainwave simultaneity.

So, whether it is improving your golf game, hitting the high notes when singing Aida, improving your executive acumen, delaying the "Old Rocking Chair" getting you, winning gold for freestyle, enhancing strike force efficiency, helping to stay healthy, or sweetening marital harmony, precision optimal performance training may well be the treatment of choice.

1. All names used in this article are fictitious although the situations described are contextually accurate.