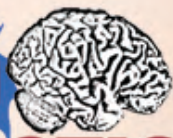


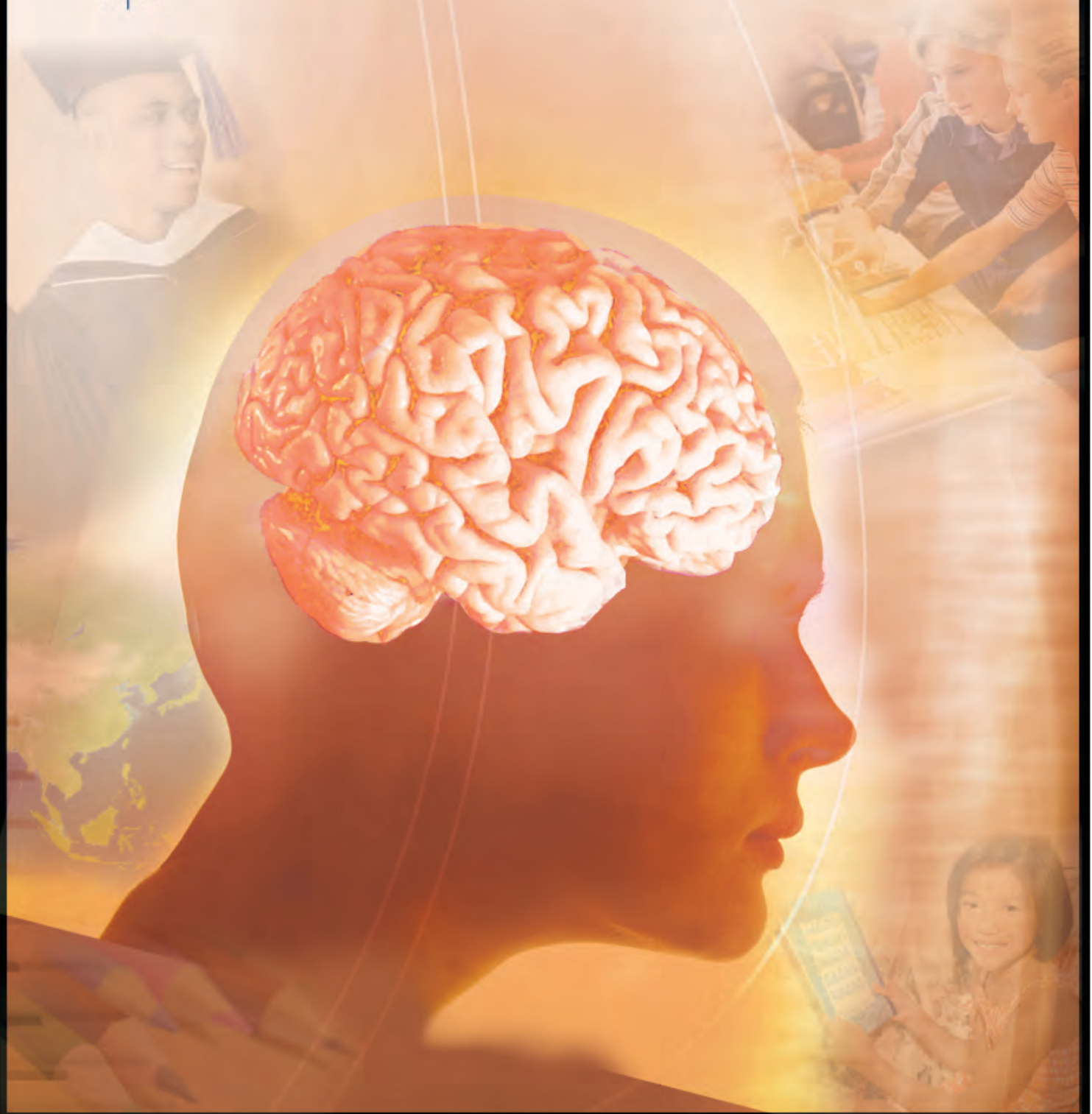


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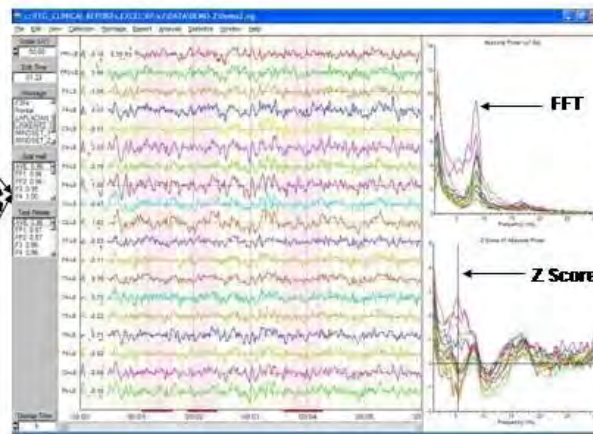
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NeuroConnections is published four times a year and will consider all materials pertaining to the practice and/or promotion of neurofeedback.

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LETTER FROM THE ISNR PRESIDENT



As I inherit the mantle of ISNR's Presidency I feel a certain amount of humility, looking at the many predecessors whose shoes I must fill. This is

hardly the organization I knew when I served as Treasurer of the fledgling SNR many years ago. It is now well into its adolescence, with all the problems that term implies, and I am deeply grateful to Past President Judith Lubar and her Board who worked so diligently to develop the governing principles and policies that help keep a robust adolescent out of trouble. While there is still more work to do in this area, it remains that, largely by their efforts, you and I inherit a sound foundation on which to build a future.

I sincerely believe that on this foundation it is time to take ISNR to the next level. Perhaps, as we see unfolding events, it may be beyond time to begin expanding this organization's horizons and securing the future of our field.

Certainly it is beyond time for us to turn away from tearing each other down, joining hands instead to build a pervasive acceptance of Neurofeedback as treatment of choice for the range of conditions on which it works so well. It is beyond time for us to let go of our provincial penchant for uniqueness, calling less attention to our individual selves and earning more attention from the world toward the healing power of Neurofeedback. It is beyond time for us to stop whining about the reluctance of the medical and insurance establishments to understand and accept the capabilities of Neurofeedback, appealing instead to centers of influence directly for a rightful place at table. In short, now, today, is the time for building the case and laying the groundwork for public awareness and engaging the medical, financial and political establishments.

To do these things will require immense amounts of commitment and teamwork on the part of both the membership and its leaders. It must be an ongoing commitment of time and effort - and it will take a certain amount of money as well. In that connection, if you have read some of the emails on the ISNR list-serve, a number of

Continued on page 6

LETTER FROM AAPB NEUROFEEDBACK PRESIDENT



THE EPIDEMICS OF CLOSED HEAD INJURY

The Response of the Neurofeedback Community and How It Needs To Be Improved

There is an epidemic of closed head injury in the U.S. The incidence of significant closed head injury is at least 500 per 100,000 annually. This means that the risk of an individual sustaining a significant head injury in his/her lifetime (average of 70 years) is about 1 in 10. The annual medical costs of traumatic head injury are approximately 9-10 billion dollars (NIH Consensus Panel, 1999). Head injury is a very significant cause of missed work, missed school, and missed military duty. Even those who return to work, school or military duty have impairment in their functional abilities such as short term memory and attentiveness, with chronic anxiety, irritability, stress, depression and learning difficulties.

HEAD INJURY IS A VERY SIGNIFICANT CAUSE OF MISSED WORK, MISSED SCHOOL, AND MISSED MILITARY DUTY.

Chronic pain commonly complicates the picture (e.g. headaches, limb pain, TMJ dysfunction). One cannot adequately calculate the suffering of these individuals. The economic cost of missed work for these problems is enormous. It has been estimated at billions. Over the last few years, the war in Iraq has resulted in great numbers of head-injured patients who develop chronic dysfunction and suffering as a result of their persistent brain injuries. The military services and the Veterans Administration have not yet responded adequately to this crisis. In part, this is because the condition is often not recognized. Neurologists and family doctors and psychologists often do not recognize that a mild head injury can cause serious and lasting cognitive problems, and attribute the symptoms to emotional or psychological causes.

The diagnostic tools commonly used to diagnose head injury (skull x-rays, CT scans, MRI scans, raw EEG) are ineffective in making the diagnosis, unless there is a severe head injury, with impaired con-

sciousness and neurological deficits. These tests are usually normal in mild to moderate head injury. The imaging studies can be normal in a brain dead person. The terms "mild" and "moderate" were developed by trauma neurosurgeons, and do not reflect the fact that chronic disability often results from "mild" or "moderate" closed head injury. There is also the common misconception that most patients with a concussion recover quickly and completely. In fact, the post-concussion syndrome occurs rather frequently, and if it lasts for more than a few months is likely to persist for years or a lifetime, unless the brain injury can be rehabilitated with neurofeedback.

Cognitive rehabilitation and psychotherapy may be used to help these persons learn to adapt to their problems and disabilities, but do not usually remediate them. Neurofeedback, on the other hand, usually promotes a relatively rapid recovery, with elimination of symptoms and relatively rapid return to work, school, or military duty within a few weeks. Neurofeedback can accomplish this rehabilitation at a fraction of the cost of inpatient or residential treatment

programs. Hospitalization or residential treatment is usually not necessary. The need for drug therapy (pain medications, headache medications, antidepressants, tranquilizers, muscle relaxants) is usually eliminated. Even if the person has epilepsy, they usually cease to have seizures and no longer require anti-convulsant medication. Long-term disability costs are usually completely eliminated.

A common complication of head injury is often overlooked, which is that head injured patients are at risk for criminal behavior. Most murderers, rapists, and pedophiles are brain-injured. Neurofeedback is a powerful way to remediate the anger, aggression, poor judgment, and impulsivity which give rise to the criminal behavior.

The quantitative EEG is the gold standard for the diagnosis of mild or moderate closed head injury. Furthermore, it serves as a valuable tool for guiding neurofeedback therapy in the patient with closed head injury. The usual findings are focal excesses in amplitude/power in one or more areas, as well as one to many phase and


coherence abnormalities. Each abnormality is usually remediated with 5-7 sessions of neurofeedback training. Training can usually be accomplished in 20-60 sessions, using a combination of power and coherence training. Relatively few neurofeedback providers are involved in training head-injured patients. I believe this is primarily because they have not seen head-injured patients in their training programs. The second main reason is that organizations that care for head injured patients do not realize how powerful and effective neurotherapy is for actually normalizing brain functions. There are few publications about treating head injury in the neurofeedback literature, and they are in neurofeedback journals (mainly the *Journal of Neurotherapy*), which are not read by those who are usually involved in head injury rehabilitation (neurologists, rehabilitation physicians, and neuropsychologists, for the most part).

We need to respond to this crisis. We need to educate the health care providers for these persons about this powerful and effective approach to remediate the effects of the head injuries and return these people to an active and symptom-free life. We need to attend their meetings and give courses and workshops. We need to publish in the neurology, rehabilitation, and neuropsychology journals. We need to contact those in the military services and the VA who are caring for these patients, to provide literature to them, and to offer them our expertise in training them to do QEEG's and neurofeedback, or to provide those services ourselves. We need to educate personnel in the legal and criminal punishment communities that many, perhaps the majority, of criminals are brain injured, and would benefit from QEEG diagnosis and neurofeedback therapy, which would likely prevent a recurrence of their criminal behavior. Society would benefit from a reduced need for housing those individuals in prison, as well as a reduction in criminal recidivism.

Some of our members have already made contact with the military services

and have begun to provide neurofeedback training for our Iraq veterans. Lanier Fly in Newport News, Virginia, has been working with all three service branches and the VA in his area, and is treating them with neurofeedback for their head injuries, and their PTSD. If providers call him at 757-873-8566, he may be able to advise them on how to develop these relationships.

Our societies (the ISNR and the AAPB) are poised to provide a critical impact on helping patients with closed head injury to return to health and to reduce the tremendous costs associated with their impaired ability to work, learn, and serve. Please commit to do your part to move this effort forward.

Jonathan E. Walker, MD 

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LETTER FROM ISNR CO-EDITOR



As the autumn is upon us and the beauty of the fall surrounds us the needs of our clients continue to be the focus. The ISNR conference in September was again

filled with valuable information, re-connecting with friends from around the world and examining the latest in new equipment/techniques/theories. Personally, I was happy to receive, at the banquet, in the San Diego Park no less, a Presidential Award of Merit for the work on the newsletter. The award looks really good on the wall! This issue continues with articles regarding assessment and training. Dr. Len Ochs gives us a fine report of a case of a Tourette's syndrome client and the careful steps he takes to prepare the client and support system for the changes that take place. This case is informative and well worth the read.

Leslie Sherlin provides updates on the student committee workings and an article about the Student Advocacy committee workings. Our support of the students is so vital to the growth of neurofeedback research that I hope you will enjoy these informational articles Don DuRousseau provides a thoughtful article on connections—electrode to scalp that is very much worth the read. He discusses signal processing applications for real time monitoring and assessment within closed-loop brain-computer systems. Dr. Roger deBeus brings us up to date on the research study regarding AD/HD and Neurofeedback which will investigate the efficacy of neurofeedback on EEG brain function, cognitive performance, clinical symptomatology and behavior. This is one of the latest research

Continued on page 6

ISNR MISSION STATEMENT

To promote excellence in clinical practice, educational applications, and research in applied neuroscience in order to better understand and enhance brain function. Our objectives are:

- Improve lives through neurofeedback and other brain regulation modalities
- Encourage understanding of brain physiology and its impact on behavior
- Promote scientific research and peer-reviewed publications
- Provide information resources for the public and professionals
- Develop clinical and ethical guidelines for the practice of applied neuroscience

AAPB NEUROFEEDBACK DIVISION

MISSION STATEMENT

To improve human welfare through the pursuit of its goals. The specific goals are:

- The encouragement and improvement of scientific research and clinical applications of EEG technology and neurofeedback.
- The promotion of high standards of professional practice, peer review, ethics, and education in neurofeedback.
- The promotion of neurofeedback and the dissemination of information to the public about neurofeedback.
- The division is organized for the purpose of carrying on educational and scientific objectives and is not to be operated for profit.

LETTER FROM AAPB CO-EDITOR



Welcome to the fall issue of *NeuroConnections*. With the beginning of the school-year well underway, the focus for this issue is on children and youth, and the contributions of our practice to their success in the classroom.

An all-too common neurochemical barrier to classroom success is the abuse of alcohol and other drugs among young learners. Drs. Peter Smith and Marvin Sams offer an encouraging account of their multi-year collaboration to develop neurofeedback protocols for this challenging yet rewarding population. Their contribution to this issue is at once highly personal and heartwarming, yet scientifically rigorous. I am sure that you will agree that it is compelling reading.

Elizabeth Stroebe is a pioneer in pediatric biofeedback who has taught thousands of children and families to utilize biofeedback as a bridge to optimal health and learning readiness. A master clinician who trained under some of the leading founders of the field, she herself has mentored hundreds of us into the pediatric biofeedback arena. In her contribution to this issue, she reminds us that, while biofeedback instrumentation may continue to evolve, it is important not to lose sight of certain foundation principles which reflect our scientific heritage as clinicians.

In a tribute to another founder of the field, Jon Frederick reports on his replication of some of the earliest research in neurofeedback, pioneer experiments conducted by Dr. Joe Kamiya and his graduate students at University of Chicago. Jon discusses the underappreciated implications of these still-important studies, and their relevance to current questions in neuroscience.

Never content to rest on his laurels, Tom Collura has earned a well-deserved reputation as a scientific and technical innovator in the field. In the current issue we have the rare privilege of taking a glimpse, through Tom's eyes, into the next 100 years of innovation in neurofeedback science.

As this issue comes to press, the deadline for submissions to the spring AAPB Conference is upon us. If you plan to submit a paper, please don't delay in making your submission at <https://www.tbccom.com/AAPB/>.

[tbccom.com/AAPB/](https://www.tbccom.com/AAPB/). We look forward to seeing you in Daytona Beach May 13-18, 2008 for the annual conference.

Roger Riss, PsyD 

ISNR CO-EDITOR CONTINUED FROM PAGE 5

studies to be undertaken with appropriate controls for this population using NF as the focus of intervention. Dr. Gail Durgin continues her search to find other uses of EEG to move objects, run trains and do all kinds of interesting activity. Do read her report on what Microsoft is doing with EEG. Finally, on line at the Web site <http://www.isnr.org/2007ConfRecap.cfm>, I have tried to capture some of the activity at the ISNR conference in a recap. Forgive this author in advance if your favorite presentation is not mentioned, there were just so many excellent presentations that one could not drink it all in. Have a very happy autumn and prepare for the winter!!

Warmly,

Merlyn Hurd PhD, BCIAAC/EEG Fellow 

ISNR PRESIDENT CONTINUED FROM PAGE 5

interesting and potentially workable ideas already have surfaced in response to my remarks on this subject at the Conference banquet. They seem to evidence a concern for cost relative to prospective benefit and the Board and I will evidence similar concern as we move forward with the ISNR staff on the development of programs well-conceived enough that future Boards can update and continue to execute them

I invite your input and your active support for a direction that can provide no less than immense benefit to us and to those who follow us. In my next letter I expect to elaborate more on specific initiatives the Board is considering. This could be an exciting year indeed.

Nancy White, PhD

nancy@enhancementinstitute.com 

LETTER FROM ISNR EXECUTIVE



With our conference behind us and summer over, I look forward to the next year with the society. We're already planning the 2008 conference. Leslie Sherlin writes about what we have already done and

what we intend to do.

We're also looking into ways in which we can add to your membership value. Our Web site committee is working to further improve the site. I appreciate the help of Leslie Sherlin, Cory Hammond, Joseph Barr and Steve Rothenberg. We hope it'll attract more prospective clients for our members and further interest people into the field. The more we inform others about the field of neurofeedback, the better our members can navigate within it, adding to your practice and visibility.

It seems whatever project we embark on, it reveals a bigger underlying project. With your vote, we amended the By Laws, but we are now taking on the Policy and Procedures Manual. We consider revamping the member section of the Web site, but this advises us that there is a bigger issue involving licensure, certification, and the appropriateness of the qualifications of those practicing neurofeedback. We consider working with a public relations firm, but are asked, "What do you want to promote." At every juncture, we are making decisions that we hope are the right ones for the members, the society and for the field.

I hope you have a wonderful fall, holiday season and New Year and that you enjoy this issue of *NeuroConnections*. We'll see you again in January.

Cynthia Kerson
office@isnr.org 

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LETTER FROM AAPB EXECUTIVE DIRECTOR


**BIOFEEDBACK
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We are seeing biofeedback in the news with delightful frequency. Just last week while traveling, I picked up the in-flight United Airlines magazine, *Hemisphere*, only to find an article featuring Brain Music Therapy. A few weeks earlier, AAPB carried an item in their magazine on hand-held relaxation devices.

We are very excited to see this type of information being packaged for the consumer. Pharmaceutical companies have been taking their products to the public marketplace for years and, like it or not, they provide a prime example of "push-pull marketing." By taking their message to the public, they created a market for new products. This is a great lesson for the biofeedback profession and it is great to see this

starting to happen with more regularity.


Paramount to this is the understanding of what is, and what is not, biofeedback. To that end, the Association for Applied Psychophysiology and Biofeedback (AAPB) has established a task force, bringing together representatives from AAPB, the Biofeedback Certification Institute of America (BCIA) and ISNR, to develop a definition upon which we can all agree and support. The end product is intended to be a definition that will become the collective brand for our profession. We urge you to watch the AAPB Web site at www.aapb.org for periodic updates on this project.

Another reason to keep a watch on the www.aapb.org site is that we are in the process of establishing a Clinician's Tool Kit. This new web section will bring together articles, white papers, web links, coding advice, and sample letters that can be used in contacting insurers, state licensing boards, and others groups to promote the efficacy of biofeedback.

Speaking of efficacy data, did you know that AAPB's book, "Evidence-Based Practice in Biofeedback and Neurofeedback" is now available free at www.aapb.org? The purpose of the publication is to demonstrate that biofeedback is an effective means of treating a wide variety of disorders.

Biofeedback is increasingly recognized within the medical community, the media, and the general public for its therapeutic benefits. We urge you to play your part in helping to spread the word. Use the media wherever possible. And watch the AAPB Web site for more tools to help you in that pursuit.

We extend our congratulations to Dr. Nancy White for her recent election as President of ISNR and Dr. John Nash as the new ISNR President-elect. We are pleased to note that Nancy also serves on the AAPB Neurofeedback Division Board.

David L. Stumph, IOM, CAE 


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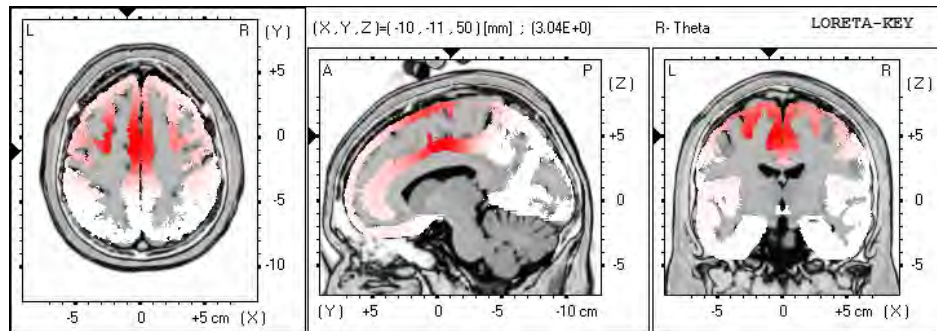
Ann Marie Horvat,
ISNR Membership and Conference Coordinator

This year ISNR achieved record numbers in both membership and conference attendance. We need your help to continue this exciting growth by renewing your membership. As ISNR membership year runs from January through December, the time to renew is coming soon. Next year's membership rates are the same as this year, so your membership is a great value. You can save even more with a two-year membership renewal. To renew online go to www.isnr.org and click on the link "Membership Application."

Benefits include subscription to the *Journal of Neurotherapy* and online access to all past issues of the journal. Membership also includes a subscription to *NeuroConnections*, the quarterly newsletter that is a joint effort between ISNR and the AAPB Neurofeedback Division.

Reduced conference registration rate for members at the ISNR annual conference, to be held from August 28 to 31, 2008 in San Antonio, Texas, is another benefit.

On the redesigned ISNR Web site, members can input their own profile, advise potential clients of their qualifications and specialties, and add additional contact and practice information. This is an important web presence for potential clients to locate a practitioner in their area. Additionally, on the new site, you can renew your membership, register for the conference, purchase books and DVDs, or access the Yahoo.com member's forum, which is a moderated list exclusively for ISNR members. Renew your membership before the busy holiday season so you don't forget!



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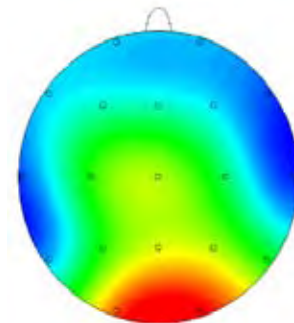
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BRAIN, MIND, AND NEUROFEEDBACK: THE NEXT 100 YEARS

Thomas F. Collura, PhD, PE



Where are we headed? What is the future of the human experience? How do the previous 10, 100, 1000, or 100,000 years relate to our ongoing journey? In particular, where do consciousness, the brain, the mind, and neurofeedback fit into the big picture?

In order to look forward, it is instructive to look back, and to view our work in the context of our historical and anthropological development. Suppose an anthropologist visits earth from another planet, and is assigned the task of making a brief summary of human technical and cultural development, up to the current time. Something like the following graph might result.

This graph roughly summarizes the major revolutions that define the human experience over the last 100,000 years, using "order of magnitude" estimates of times and growth. It shows the appearance and rising of successive revolutions and reveals a broad view of the past, as a guide to extrapolating into the future. Note that in successive revolutions, the "doubling time" has become shorter and shorter. Whereas the hunter/gatherer phase lasted on the order of 100,000 years, agriculture grew significantly in just a few hundred years. Industry

grows on the order of 100's of years, and information revolution is characterized by doubling in periods of only 10's of years. The consciousness revolution may be doubling every year, and is accelerating daily.

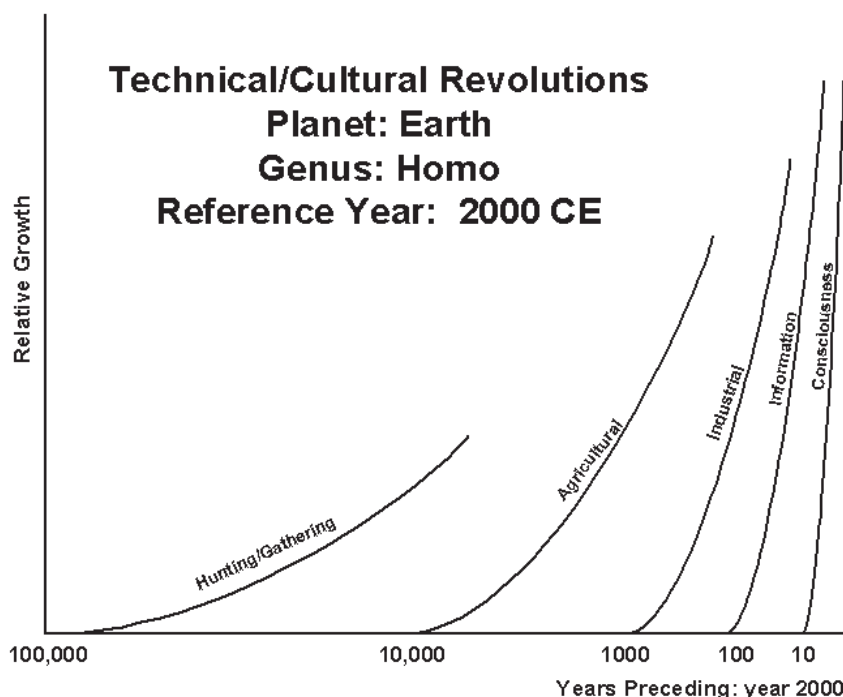
Approximately 100,000 years ago, humans were hunters and gatherers. Skills involved traveling, searching, trapping, killing, transporting, and using simple weapons and tools. Basic teamwork became essential to survival. Successful hunters were hyper-vigilant, being occupied with both finding dinner, and making sure they did not become something else's dinner. It was essential to constantly be on the lookout, finding game, chasing it down, and catching it. Those who survived in this environment had many of the qualities we now associate with "attention deficit disorder" and "hyperactivity." But these are useful skills, in the right context.

About 10,000 years ago, agriculture was discovered. People learned to stay in one place, watching the stars, clouds, moon, and weather. It was necessary to carefully study plants and their environment, recognize good things to eat, and recognize things that were not good to eat. It

was necessary to cultivate, remove weeds, and know when planted foods were ready. Preparation of food by grinding, cooking, and preserving became important. Calendars and timekeeping, hence mathematics, now had survival value. The mind-set associated with these activities were in strong contrast to the previous 90,000 years. This mind-set now predominates in education. We are expected to sit still, study, concentrate, and be quite happy without stimulation, excitement, or adventure. If we are not happy with this, there are drugs we can take to stifle our need for novelty and exploration. We classify our more restless individuals as sick, disabled, and suffering from a disease.

We see further that there was an industrial revolution characterized by wheels, machines, factories, and cities. Following that, an information revolution was brought about through communications, computers, and automation. Many of us have seen the information revolution firsthand. From room-sized computers that could barely handle a few thousand calculations per second, we now have powerful processors in our handheld personal computers, wireless telephones, televisions, and music players. Within 5 years, these appliances will merge into one. After that, something wearable or even implantable will appear, that plays directly into the ears and eyes of the user. We will be able to communicate, do business, be entertained, and study using an implanted device that might respond to subtle muscle activity, subliminal vocalizations, direct nerve signaling, brainwaves, or other inputs.

We are all hunter/farmers, making our way in a new world that we have created, and are continuously recreating. We have within us all of these qualities, and any given individual may adopt a hunter mentality, or a farmer mentality, at any given time. Our very genes contain the seeds of both of these modes, and we can express either of them whether we know it or not. We are flexible in this regard, though some may lack certain task-switching skills. It is an insult to take those with a strong hunter inclination, and marginalize and medicate



Continued on page 11

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THE NEXT 100 YEARS
CONTINUED FROM PAGE 9

them. We are drugging our Alexanders, our Henry Fords, and our Thomas Edisons, into submission. Rather than “solving” the “problem,” we should be teaching the flexibility and appropriateness needed for specific tasks, and inculcating an adaptive style that serves a broad base of needs, not just the classroom setting.

So these hunter/farmers, who learned to make machines and then built themselves an information-based world, are now engaged in a self-created consciousness revolution. In the 1960's and 1970's it became common to question and look into the mental realm using a variety of techniques and agents; it became acceptable to look into new religions, belief systems, and other mentally focused pursuits. The U.S. Congress declared the 1990's the “Decade of the Brain”, awakening interest in the brain. We have seen increased interest in meditation, spirituality, mental development, and similarly empowering pursuits. We see the widespread practice of reading, going to counselors or workshops, training classes and seminars, group processes, personal experiences (Outward Bound, survival experiences, religious retreats). An increasing number of people are aware of and accept the importance of “the inner”, as being as important, or more important, than “the outer”. We are seeing record amounts of psychoactive medications being used, as the chemical treatment of depression, anxiety, and attention problems alone represent a multi-billion dollar industry, motivated by some of the strongest advertising and lobbying forces in history.

So where are we headed? Where will today's brain science, individual and collective consciousness, and the roots of neurofeedback, lead us during this century? What is neurofeedback? In the broadest sense, it is a means to precisely navigate inner space. What the compass, sextant, and gyroscope did for navigation and exploration of the outer world, neurofeedback can do for the inner world. Imagine systematically exploring and discovering inner lands, worlds, and dimensions that are now only fleetingly glimpsed by a select few. That flash of insight that today characterizes the occasional mental breakthrough can become something that is reached over and over, transforming individual and collective consciousness.

Let us look at some of the things we now take for granted, that would have been

unthinkable only 100 years ago. Men have walked on the moon. It is routine to travel across the country, even around the world, in a single day. We have decoded the entire human genome. We know the mass of the electron to 13 decimal places. We can see and interpret events that happened 13 billion years ago. We can replace an entire human heart with a manmade device.

With this point of view, we can look forward 100 years, and envision things that are today unthinkable. Imagine that the study of consciousness enters the world of physics, and we have a true science built around the phenomena of mind. Imagine equations similar to Einstein's field equations, but which include consciousness as a physical field. It is likely that these fields will involve other dimensions, giving rise to a sound physical basis for “other-worldly” phenomena. We may come to look upon intention as a force, similar to physical forces. We may come to understand the physical phenomena that give rise to consciousness, and may even learn to create artificial consciousness. We will understand the physical underpinnings of subjective experience, an area that is entirely mysterious to us now. 100 years ago, no one had even heard of a radio or a computer. Today, even schoolchildren can be “computer wizards” who can run circles around their parents in installing, using, even creating computer programs. So what will the “brain wizards” of the future look like?

Imagine a scientific basis for direct mind-to-mind communication. Imagine that it is possible to systematically teach clairvoyance. Imagine that we learn how to train psychokinetic ability. Imagine that we learn to develop the mind with the same zeal and specificity with which we currently develop the body. Look at a professional body builder, and ask yourself what might happen if an individual could apply the same level of determination and knowledge to the development of the brain and mind. What would a 21st century brain-builder be like? Might psychokinesis someday become as systematic and well-understood as physical exercise is today?

Imagine a world in which the cell phone is an artifact of the past. Direct mental communication is possible, for those who want to develop the ability. Instead of going to the store to pick up a cell phone, you go to a neurofeedback trainer who specializes in providing this ability. There may be some physical aspects such as implants, chemical treatments, special dietary supplements, and so on. But the individual will be

trained to develop and employ abilities that today lie latent in all of us.

Imagine a system in which you put on an EEG hat (or not), and the system immediately takes over from there. It scans your brainwaves, makes analyses and comparisons, figures out what you “need”, and proceeds to configure and control the training. The feedback is based upon a complex, adaptive analysis of your brain, and does whatever is needed to move you wherever you want to go. Training involves the entire head, with global or localized training being done automatically. No more separate QEEGs, no waiting, no using separate protocols, no setting up the system, choosing settings, making changes. The system sees your response to the feedback, and adapts instantly. In a single session you might experience 2, 3, or 100 different training protocols, depending on how you respond. The displays include virtual reality, sensory immersion, abstract sights and sounds, whole head maps, real-time tomographic analyses, and statistical results, all in a comprehensive and easy to understand format.

Imagine a world in which eating medicine for psychological problems is considered obsolete. Our great grandchildren will laugh when they say “Grandma told me people used to eat serotonin uptake inhibitors to feel better.” In the future, people will be empowered to self-regulate their own mental health and stability, and it will no longer be necessary to tolerate side effects in order to deal with depression, anxiety, attention disorders, or other mental challenges.

Imagine a world in which a significant journey can be taken without physical transport, but by working with neurofeedback-guided transformation. You go into a full sensory immersion world, in which your internal state is reflected in your external world. You are free to explore, work, create, and relax in your personal reality. Feedback includes sound, sights, tactile sensations, even smells. The feedback can give rise to genuine out-of-body experiences, remote viewing, and direct mind-to-mind communication, which spring from the neurofeedback world as new dimensions in consciousness and experience. Shared experiences are even possible, giving rise to entirely new ways of being with others, transforming relationships and entire social structures.

We can envision a future in which a brainwave elite emerges. These are the individuals who have the aptitude and inter-

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THE NEXT 100 YEARS

CONTINUED FROM PAGE 11

est to develop mental powers well beyond those we know today. They may be called “heads,” “brainmasters,” “electric gurus,” or “cybernauts,” in reference to the emphasis they put on the use and development of the brain and mind. Not everyone will have the time, ability, or inclination to develop these skills. Building the mind in this way is sure to become controversial. New political, social, legal, and medical issues will arise. Perhaps those who are not part of this elite will continue to be relegated to eating medications, experiencing mental strife, and pursuing “old fashioned” therapies to address their mental woes.


Imagine a world in which millions, perhaps billions, of brains, are in a state of continual connectedness. A new form of consciousness emerges, in which individual brains take on the role of individual neurons, in a global brain. The next major revolution may indeed be by one of “hyperconsciousness” brought on by these changes. We may find ourselves exploring other dimensions through the power of the mind, thus circumventing the anticipated challenges of space travel, supplanting it with direct travel at

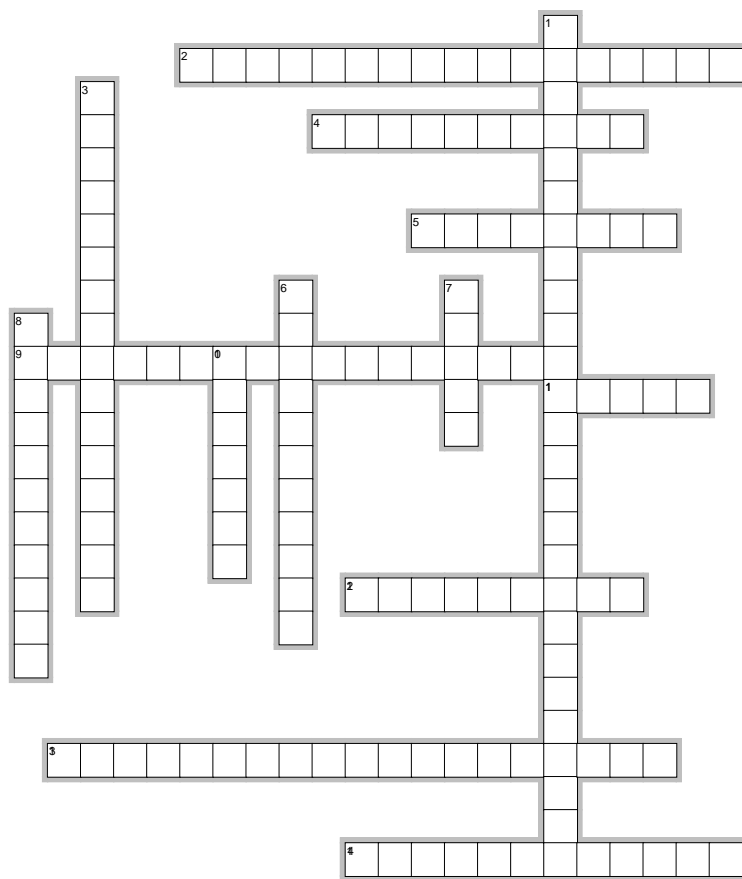
the level of consciousness, not merely at the level of space, time, and matter.

Scientists believe that the sun will explode billions of years in the future, and that our entire solar system will be vaporized. How will humanity persist after this cataclysm? What will happen even further into the future, when the universe meets its fate, be it eventual expansion into a black void, or compression into a “big crunch”? Will consciousness itself have the ability to persist beyond the physical reality we cling to? It is possible that, through advanced development of the mind, we will find ourselves living in an entirely different realm, one that looks back on our entire 3-dimensional universe as a distant relic of the past, much as we now look back to the Olduvai Gorge and the Mesopotamian watershed, the birthplaces of our earthbound experience.

We can now see that to consider neurofeedback solely as a means to relieve specific maladies, or to do a brain tune-up, is to ignore its true power and potential. In that view, the best that can be hoped is that some people suffer less from specific distresses, but that humanity becomes no different in the whole than it is today. To

view neurofeedback strictly as a “fixer” is to say that our consciousness status quo is just fine, and all that we need to do is stamp out the aberrations. That would be like seeing the value of the automobile in running local errands, and saving a few minutes here and there. But in much the way the automobile gave rise to roads, suburbs, shipping and industry, thus transforming our world, neurofeedback will be no less a transforming agent. When neurofeedback reaches its full potential, the meaning of the human mind will have changed, and the most significant phase in human evolution will have taken place.

Hopefully, “The Decade of the Brain” will be looked upon in future years as the seed from which emerged brain mastery, consciousness exploration, and precise mental navigation. We will have learned to use that “90%” of the brain we are supposed to be ignoring, and we will use it well. These developments will have lead to a global hyperconsciousness that will be a first step toward a true supercivilization. We will reach beyond the stars into other dimensions, and beyond. We are truly poised to change the universe – one brain at a time. 



ACROSS

2. Greens' '77 book title (two words)
4. Seven plus or minus two, if I remember correctly (two words)
5. Per Kaiser, necessary for awareness
9. Hemoencephalography; AKA (two words)
11. Extreme synchronization
12. Usually reflects cortical deactivation
13. For Stroebe, this describes biofeedback (three words)
14. Addition research team (three words)

DOWN

1. Helps keep whale pod in synch
3. 1990's (four words)
6. "A way out, and the healthy way in"
7. This research study is not insane (abbrev)
8. ADHD research sites: USA, Holland, Australia and (two words)
10. Developed a LENS for viewing the brain (two words)

Crossword puzzle answer is on page 30.

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THE ROLE OF MIND-BODY MEDICINE IN THE MIND-BODY PROBLEM

Jon A. Frederick, Ph.D., Director of Clinical Research, Quietmind Foundation, Lafayette Hill, PA



The mind-body problem, as it is usually stated, is the question of how the properties of the mind interact with or can be explained by the properties of the body. Most discussions of the problem begin with Descartes, who conceived of the mind as purely spiritual, and outside of space and time, and the body as material and mechanical. The problem Descartes never solved was, given that we do mentally perceive or exert our will upon the material world, exactly how do these distinct substances interact?

Kupfermann and Weiss (1978) described how scientific research can only demonstrate three types of relationships between biology and psychology. *Correlation* between biology and behavior can be shown by recording experiments, such as fMRI, EEG, or single-cell studies. Meanwhile, stimulation experiments, whether stimulating electrically or with an agonist drug, can demonstrate that activity in some region or system is *sufficient* to evoke a given behavior or experience. Finally, lesion studies, by removing a brain region or administering an antagonist drug, can show that some physiological system is *necessary* for some psychological process to occur.

Modern science has succeeded in showing many causal relationships between the mind and the brain. However, philosophers like David Chalmers (1995) argue that showing causal relationships doesn't solve the "hard problem" of explaining qualitative phenomena or *qualia*. Qualia are defined as "what it is like" to experience particular feelings or perceptions, such as pain, or the color yellow. "It is widely agreed that experience arises from a physical basis," Chalmers argues, "but we have no good explanation of why and how it so arises."

For example, suppose we noticed that a 40 Hz evoked rhythm was always observed in the visual cortex EEG when "yellow" was experienced (correlation); that applying a 40 Hz stimulus to the visual cortex evoked an experience of yellow (sufficiency); and that blocking all 40 Hz waves in the visual cortex prevented every subject tested from experiencing yellow (necessity). Would we really have a complete explanation? Something still seems to be missing. In Maxwell's reduction of heat

to molecular motion, it is easy to imagine how boiling water feels painfully hot to the touch because rapidly moving water molecules are damaging the skin. There is, however, nothing intuitively obvious about why neuronal membranes depolarizing 40 times per second is somehow "exactly the same as" the experience of yellow—even if this neuronal process is correlated, necessary, and sufficient for the experience. The "yellowness" seems to be missing!

Given that the goal of biofeedback is to increase conscious awareness and voluntary control of otherwise subconscious and involuntary physiological processes, it is surprising how unpretentious workers in this field are about the potential for biofeedback as a research method, to advance our understanding of the mind-body relationship. How do mental processes arise from a material substrate without possessing innate knowledge of that substrate? The mysterious and often pathological nature of this transition is what creates demand for biofeedback therapists, who are uniquely trained and equipped to study this essential question.

In *Beyond Biofeedback*, Elmer and Alyce Green (1977) made an important contribution when they proposed the Psychophysiological Principle. They said, "Every change in the physiological state is accompanied by an appropriate change in the mental-emotional state, conscious or unconscious; and, conversely, every change in the mental-emotional state, conscious or unconscious, is accompanied by an appropriate change in the physiological state. . . this principle, when coupled with volition, allows a natural process—psychosomatic self-regulation—to unfold." Green and Green documented the diversity of physiological processes that were known to be trainable through biofeedback at the time, supporting an optimistic view that essentially any bodily process which can be measured can be subject to some degree of self-regulation. This view continues to influence the field to this day, where every clinical practitioner has their favorite physiological measurement or measurements along with some rationale for why training its self-regulation helps their particular clients. In fact, most published research in biofeedback is

focused on the problem of demonstrating its efficacy as a therapy. This emphasis is understandable, but I think that more basic research into biofeedback's mechanism of action could potentially pay off in the form of more precise and targeted therapies.

To me, the most important contribution the biofeedback field can make both theoretically and clinically would be to characterize not just how the mind and brain are related, but the mechanistic details of how this relationship is limited. A variety of considerations lead me to believe that what awaits us is not just more effective behavioral medicine, but the discovery a specific organ system that regulates the flow of information between conscious and subconscious systems, where the permeability to specific kinds of transmission is determined by learning, development and evolution. I postulate the existence of a "mind-brain barrier," whose functional existence is no less real than the "blood-brain barrier" that regulates the flow of dissolved substances between the blood and cerebrospinal fluid.

In an influential essay, Ramachandran and Hirstein (1997) argued that qualitative phenomena or *qualia* have three properties: (1) they are irrevocable on the input side; (2) they are flexible on the output side; and (3) they must last long enough to be maintained in short term memory.

By *irrevocable*, they meant that qualia have an involuntary nature. While we might be able to imagine how our sensations might be different, all existential optimism aside, we can't willfully change our visual percept of a red fire truck into a yellow one. This property of qualia, their involuntary construction by preconscious systems, makes it clear how conscious and subconscious processes are not mutually exclusive, but inextricably linked. The most successful "reduction" of qualia would simply represent them in terms of other, more interesting, preconsciously-generated qualia. Similarly, "self-control" is paradoxical because volition itself arises involuntarily.

The second property of qualia is that their *output is flexible*. We can choose any

Continued on page 32



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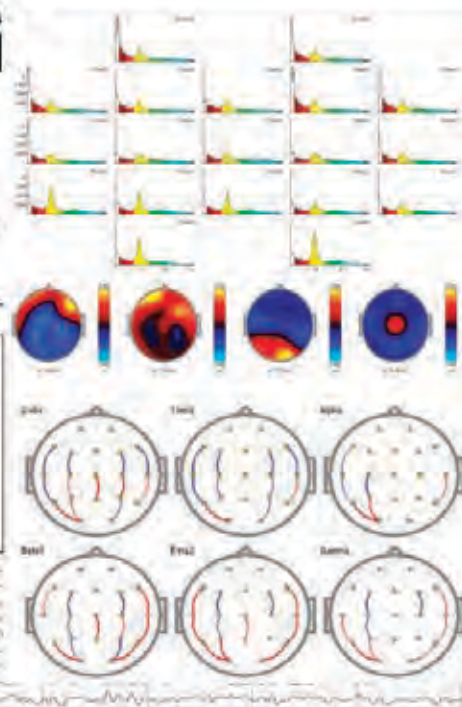
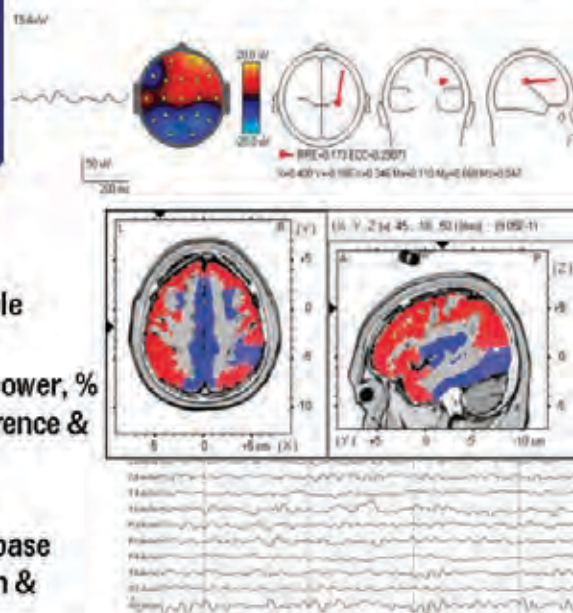


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MINDFULL

To Know No It

David Kaiser, PhD



Cortical synchrony and behavioral synchrony are both forms of inactivity that enable effective response. Behavioral synchrony is critical to mother-child attachment and emotional development (Bernieri et al., 1988; Feldman et al., 1999; Preisler, 1995). Weeks before birth an infant begins to move to the tune of his mother's voice; and the synchronies set in motion at the beginning do not fade with time (Austin & Peery, 1983).

Most social interactions require behavioral synchrony. Conversations rapidly deteriorate unless accompanied by a nonverbal dance. Would-be lovers remain "would-be" when they do not mirror the object of affection. Communications with strangers can be fruitless until we achieve joint behaviors. Behavioral synchrony is not unique to our species. Killer whales maintain pods by diving and breathing in unison, the cetacean approach to yawning and nodding. Herd animals herd; they synchronize movements day and night. Synchrony is a fundamental law of the universe -- in all planes, physical, biological, as well as social.

Healing rituals may induce a psychological synchrony between individuals (Freckska & Kulcsar, 1989). The ritual of rhythm, with trance, dance, and fellowship, produces emotional harmony between healer and afflicted. But nowadays where's a good shaman when you need 'em? Television and films now substitute for our source of ritual and rhythm. Half-hour voyeuristic excursions unite millions of us across continents (Kanazawa, 2002), synchronizing a vague vacuum of a group. And where does the self exist in such a group?

My self answers to the name David. It would be better to call this experiment a group self, because there is no private self outside of psychosis. Self is contextual. Self is Relation. Who we are, what we are, how we are, why we are -- these are answers we provide members of our group. When you think of what makes up your self, you are thinking socially. You are grouping.

Like baseball or Pokemon, the Self is a product of human ingenuity. It is the most effective form of behavioral control ever invented. We teach school children to honor our group by granting them a unique

self. Self is how each of us signs the social contract. Our behavior is our signature for everyone to see. Historically, the concept of self emerged during the psychosocial transformations of the early Greeks and Hebrew (Jaynes, 1976). Self was a new way to understand strangers, people who looked like us but spoke gibberish. Comment t'allez vous? Qu'est-ce que c'est? was unintelligible but assumed to be meaningful by the two thoughtful tribes. The opaque behavior, never before seen, must come from inside the strangers. And this inside was not inside of us. Self of an Other was born. Then Socrates and Moses turned the weapon upon themselves.

We have spent about 2,600 years evaluating and expanding upon our newly discovered intimacy, a shared auto-projection. That others have done most of the heavy lifting for us, before we even appeared on the planet, speaks to its cultural origin, acquired through example, interaction, and book learning.

Members of the modern age are all expected to construct a Self, but the question is, how much self? Where does self end and world begin?

"Boundaries, David, boundaries," a friend reminds me, chiding me on my recreational trespass into her territory, her possessions, an emotional and behavioral realm that is hers alone. Boundaries are the central abstraction of life, human or otherwise. Healthy individuals gratify themselves; mentally ill individuals preserve themselves (Laing, 1985). In other words, healthy people steadily expand how much they mean to others, and are well served by such efforts, while unhealthy individuals retreat and spend much of their energy questioning who they are to the group. They falsely believe they lack the courage to cross another's DMZ (demilitarized zone).

So when did the cage come down? When was I bounded? At what point in life did iron bars separate me and world? As a fetus I was my mother. Oxygen and nutrients flowed, and I knew no it. But somehow it did not last and I was forced into the light. It must have been after this passage that boundaries came into play, caging my world.

Boundaries amount to control: what do I control and what do I not. As infants we believe we are All, all that Ever could be... until a sibling or boo-boo intervenes. And as long as reward remains firmly and delusionally under neonatal (subcortical) control, the boundary between toddler and environment is scarcely discernable. Toddler behavior is known to all, both mental and physical. Anyone can inspect our wares - God, Mom, Dad, even Fifi the neighbor's cat. I am not yet outside the cage. No vantage point yet exists. There is I, only I, no me. Mental privacy exists ontologically but not epistemologically: it is but is not known. At this point in our journey we are transparent, pure subject, no object, All. We are without self, within love. Within Allah.

But times move on. As experience shakes us up and reduces our ability to control reward, collaboration begins. We collaborate with others. Awareness kicks in, separating us from them. We negotiate a space for us and a space for them. During our early years we adjust ourselves from All to Center, which is a promotion, not a demotion. We now imagine the non-I, an agency more beautiful than our own, worthy of attention. For some of us these are egocentric years, to others, years of autonomy and premature attempts at self-governance.

As we age and the forms of synchrony flourish beyond our understanding, our sense of centrality is challenged, and quite often. Ironically the science of cosmology has already matured to the point where we now know that every particle of matter is center. From every point, matter or void, photon, atom, or tau neutrino, comes more. But we the conscious, the sole ongoing Negotiation, we the contract of light and time, we are asked to throw in with the lot. As kindergarteners we are told to move on, don't bogart the middle. The very reason why there is Is-ness, why there is anything at all to be perceived, is expected to make room for the Perceived.

By our second decade most of us have made some elbow room for the rest of Creation. We allow other galaxies to pass through our orbit and in doing so we enrich

Continued on page 18

ISNR 2007 CONFERENCE

For those of you who missed ISNR in San Diego or were there and, like most of us, couldn't be in all places at one time, please visit <http://www.isnr.org/2007ConferenceRecap.cfm>.


Merlyn Hurd has written a nice review of the conference. Did you miss the members' meeting? Those minutes can be found there as well. And, I hope you enjoy the pictures taken at the awards ceremony and elsewhere. If this doesn't make you feel remiss about not having come to the 2007 ISNR conference, we hope the comments from Leslie Sherlin, Conference Chair for 2008, at <http://www.isnr.org/2008Conference.cfm> will do so.



2007-08 ISNR board members: L to R: Nancy White, Rob Cohen, Mike Cohen, Judith Lubar, Richard Davis, Leslie Sherlin, John Nash and John Carmichael. Missing is Al Collins

MINDFULL CONTINUED FROM PAGE 17

ourselves. We entertain the proposition that others are like us. We believe in others as much as in ourselves. As any social species, we are members of something larger than what we started with. We exist equally; though as Orwell might put it, some more equally than others.

Life is membership. And when you think about it, membership is simple; ownership is hard. 

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EEG CONTROLLING VIDEO GAMES

Gail Dugrin PhD



The use of EEG to control video games and other electronic devices was reviewed in a previous newsletter. While several companies are researching this process, possible problems involved in this technology

have not been addressed. This follow-up article discusses additional information pertaining to this area of research.

MICROSOFT

Microsoft Research is researching EEG technology. Desney Tan is using algorithms to analyze the EEG to discover ways to convert the EEG signal into an input that the computer can use as it now uses the keyboard or the mouse. He hopes to improve

productivity at work, enhance video game play and simplify how people communicate with computers. His objective is to design a small EEG device that can easily be attached to the head and communicate wirelessly with the computer.

Tan is aware that the data bases show that different people's EEG can vary widely. He hopes to avoid this problem by training machine-learning algorithms to learn individual EEG patterns and to screen out unwanted noise and artifact. Subjects spend 10 to 20 minutes performing either a high or low concentration task. This information is fed into a computer and mathematically analyzed to find "features." That information is then fed through the learning algorithms to determine the subject's concentration levels. According to Tan, he and his collaborators at the University of Washington, Seattle, and Carnegie Mellon University are able to predict concentration

levels with 99% accuracy. Tan expects the first use of this technology will be video game control. His objective is to make EEG interface simple enough for the masses to use in a variety of ways.

HITACHI

Hitachi has developed a new neuroimaging technique that allows its operator to switch a train set on and off using thought alone. The system uses near-infrared light to map blood concentration in the brain. Changes in brain blood flow are associated with mental activity and the system translates those changes into signals that control external devices. Test subjects were able to turn a toy train on and off by doing mental tasks. Hitachi has successfully manufactured a lightweight, portable brain scanner. The system, which consists of a headset and a controller worn on the waist, is a

Continued on page 20

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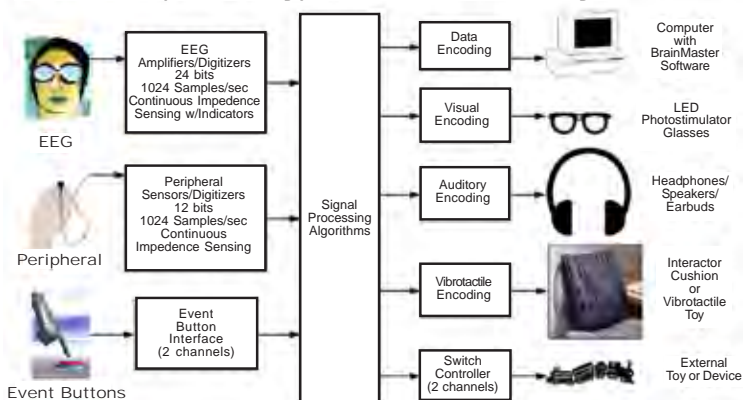
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EEG CONTROLLING VIDEO GAMES CONTINUED FROM PAGE 19

result of Hitachi's efforts to make the brain scanner a familiar everyday item that anyone can use. The mind reader uses "optical topography" technology (see Hitachi link below), to interpret mental activity based on subtle changes in the brain's blood flow. Since blood flow increases to areas of the brain where neurons are firing, changes in hemoglobin concentrations are an index which can be used to measure brain activity. "To measure these hemoglobin concentrations in real time, eight small surface-emitting lasers embedded in the headset fire harmless near-infrared rays into the brain and the headset's photodiode sensors convert the reflected light into electrical signals, which are relayed to the controller." Hitachi foresees the device being used to operate electronic devices with one's mind as well as applications in health, medicine, psychology, education and marketing.

Information in this article has been collected from several Web sites including: <http://www.technologyreview.com/TR35/Profile.aspx?Cand=T&TRID=629>,

http://blog.wired.com/gadgets/2006/11/hitachi_commerc.html, <http://www.hitachi-medical.co.jp/info/opt-e/genri-2.html> and <http://www.pinktentacle.com/2007/05/walkman-style-brain-scanner/>.

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International Neuropsychological Society; 36th Annual INS Meeting; February 6-9, 2008; Waikoloa, Hawaii, USA

Biofeedback Foundation of Europe, 12th International Biofeedback Conference, Holistic Approaches to Health, SALZBURG, AUSTRIA, February 19th - 23rd 2008

Society of Applied Neuroscience, 2008 Annual conference; May 7th-11, 2008; University of Seville, Spain;

Deadline for Symposia and Roundtables: December 1st 2007,

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January 1st 2008; <http://www.applied-neuroscience.org>

Association for Applied Psychophysiology and Biofeedback; 39th Annual Meeting - Expanding the Boundaries of Human Potential; May 13-18, 2008; Hilton Daytona Beach, Deadlines for abstract submissions is October 14, 2007; <https://www.tbccom.com/AAPB/>

International Neuropsychological Society; Mid-Year meeting; July 2-5, 2008; Buenos Aires, Argentina. Abstract Submission October 1, 2007 - January 31, 2008; <http://www.the-ins.org/>

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BENEATH THE SENSORS

Elizabeth L. Stroebe, Ph.D., BCIA-C

INTRODUCTION

The metamorphosis of an egg into a caterpillar, to a cocoon, to a butterfly is an awesome phenomenon because it is relatively rapid; maturity is achieved in a few weeks and it can proceed full circle in complete view of the observer. The changes occurring within a child are equally cataclysmic, but are cloaked by a deceptive surface appearance of a "cute miniature person." Many adults are prone to expect, first: that given food, support and time, this miniature adult will grow up; and, second: that there is little reason to expect significant variation and marked individual differences in the *speed and nature* of the developmental process, although while questioning the truth and reliability of the adult world, much substantive research in childhood development has shown otherwise.

However, under the observable superficial behavior, the "still water" of the engaging child runs very deep indeed and on many structural levels. Truman Capote's novel *Other Voices, Other Rooms* captures the child's challenge to interpret voice intonation and intention, as he questions the truth and reliability of the adult world and the enigma of the surrounding environments outside his own inner world. Observe the child who ultimately travels alone and leaves us in his search of *self* through the *maze* of this universe and beyond.

Curiously, thus begins the process of the very foundations of biofeedback and structural constructs, as they are intrinsically intertwined in this child's internal milieu. In reviewing the field of structuralism relative to self-regulation, structuralist theory in general promotes the belief that underlying the immediate conscious experience, there is a complete network of components which pervades all human intellectual, emotional, ideological and self-actualization. (Claude Levi-Strauss).

Within a child's ever changing view of his world, structural constructs dominate this internal milieu as codes operating at many levels: the *symbolic* representing the 'depth and secrecy' of knowing how a thing should be; the *hermeneutic* sorting and siftings the ambiguity of events and interpretations between the child's internal and external environment; the *semantic* assigning the child's own descriptive language and context; and the *active* playing

out in motion ones physiological, emotional, mental topography. Children absorb themselves into an alliance with the natural world where they establish their connection and importance in the larger scheme of things. *I am I and who are you?*

What is there about children?

Children are uniquely human, individual, poetic, and infinitely complex. While the child may not understand these complex dynamics, nonetheless, the child experiences his own unique physical sensations in response to the vibrations within his environment. Like long tangled string, the child bobs and weaves along his little journey into the larger scheme of things and is driven by an internal highly sophisti-



cated cross current of signaling systems that sometimes go awry. Heretofore, these covert interactions were not observable to the outside except through overt behavior and communication.

Biofeedback: the healthy break through and the way in-The Biofeedback process facilitates a time-travel adventure and is the "way in", states one adolescent, and "then I can do it by myself on the way out." Biofeedback is a two-way express ticket to inner and outer space. With concrete evidence, the youngster *observes and negotiates with his organism* by self-regulating his breathing patterns, quieting the heart rhythms, hand warming, reducing inappropriate muscle tension, dyspnea hits the spot (Stroebe, E. 2005), interrupting hyper vigilance, etc. Another youngster described biofeedback as a "Traveling road show where I am the star and can get inside myself and see on the computer screen what's going on so I can change it!"-a pragmatic translation that says, "This is healthy for me."

Small kids love the idea that they can *run the show* and organize a trip inside to



talk to their blood and guts, converse with their brain, and to send messages through the nerves to the cells-the red anger and angst, light blue sadness and hurt, and the yellow soothing talk all traveling down the integral highways from the brain to the heart and other places of choice-a *back and forth shuttle*. Kids are empowered to sooth the physical and emotional spots that hurt. The *Voice of the Child* is now recognized in healthcare as the essential key to developing interactive strategies for wellness and a substantive quality of life. Thus *the child's more silent spring within nurtures an intuitive sense of body-knowing just how a thing should be*.

Explanations for parents and caregivers-Biofeedback is a safe and enjoyable non-invasive process, which involves a partnership between the child, the computerized equipment, and initially the guide. One youngster described this partnership as "The way to zip inside and peek at the mechanics so you can fix them with a "tune up!"

Step one-Sophisticated technical equipment monitors and displays for observation the constantly shifting interactions between the child's signaling systems in the brain from his thoughts, emotions, feelings, and with his self report about his physical bodily sensations and overall physiological activity.

With a clear goal that individuals have healthy power to make changes and along with child oriented instructions, the child is spurred on by his own inquisitiveness and curiosity. The child learns specific experiential and cognitive skills, which he uses to *fuel his own control tower* for change. Neurofeedback with its multi monitoring capability records brain wave activity and subsequently shapes change with tailored training protocols. Peripheral Biofeedback facilitates changes in skin temperature, muscular activity, heart rate vari-

Continued on page 26



A CASE OF ADULT WITH TIC SYMPTOMS TREATED WITH THE LOW ENERGY NEUROFEEDBACK SYSTEM (LENS)

Len Ochs

While much of the material in this paper may appear foreign, time and space permits only a brief discussion of it in order to point out some of the issues and thread that span this twenty-session treatment. The reader is asked to consider how long might be the treatment with traditional neurofeedback. The writer used traditional neurofeedback in both analog and digital form for 15 years prior to starting work with the ancestors to the LENS approach.

A 45 year-old man sought treatment for tics secondary to Tourettes syndrome, a lifelong problem for him. This was an extremely bright software engineer/sales vice president of a high technology company in Silicon Valley, CA. He was unmedicated. He was married. He was able, with great effort, to consciously suppress his tics, which took the form of shoulder, neck, and facial tension accompanied by a snorting guttural sound. When I asked him how his wife reacted to his tics he replied that "it isn't an aphrodisiac." It was worst when he was confined with his wife to long hours driving in a car toward vacation spots. He owned to no other physical problems. He told me he had read quite a bit on Tourette's and that his expectations for progress were guarded.

He signed an informed consent indicating that he had been told about the potential benefits and risks of the treatment with LENS and that he had been apprised of alternative treatments and that he could withdraw from treatment at any time without prejudice. I further told him that he could expect his tics to increase in sharpness and decrease in duration, at first, but then decrease in sharpness as they passed more and more rapidly. This pattern, I added, was also typical of seizure-like phenomenon such as seizures, explosive outbursts, and migraines. I told him about this for the specific reason that if he had left a session to find his tics increasing in severity he would likely want to terminate treatment – a very reasonable desire if he didn't understand the normal change in the topography of his episodic tics. We discussed the need to look at the decreasing duration of the tics, rather than the increasing intensity as a sign of progress. I then equipped him with a symptom duration record calendar

sheet to support his attention to the duration of the episodes of tics. I also told him that if his arms and legs became involved in his tics, he might run the risk of falling and hurting himself or have problems driving his automobile – running a risk of endangering others as well as himself.

In response to questions about the nature of the feedback I told him both that the EEG measured small signals from the brain that traveled to the EEG amplifier. The feedback traveled back up the same wires to the head. I told him that there was no measurable voltage or current coming down the wires; so he was not getting "zapped." The feedback, in some form, might be encoded into that electromagnetic field; but this was still extremely controversial. While we don't really know how it works, I said, we do know that the strength of the signal is less than the field that comes from digital watches that are commonly worn; as per an unpublished study of the system made by Lawrence Livermore Laboratories in 2000. At the end of that first session, he agreed to be treated. By signing the consent he was accepting the possibility that he might have a bumpy ride through the treatment in the form of potentially increasing severity of tics.

At that time, without entering any treatment or further evaluation I sent him home to assess whether his relatives, friends, and physician would support him in this process with the understanding that if he looked worse to them, they might urge him to discontinue treatment; and that his physician might insist on medicating him. He needed to enlist the understanding of others to provide him with the support he needed during this treatment. Other reasons for providing him (and his support system) this information were to impress upon him/ them the potential power of this process, to stimulate discussion among others in his support system as to how best to help him under potentially difficult situations, to provide him a road to help shape both his expectations and observations, and to give him information to protect him from me in case the treatment effects took an unexpected turn, allowing him to query me more intelligently about what was happening and what might be done.

Other goals of the first session are to take a history, evaluate patient goals, assess which neuropsychological functioning skills are most impaired, assess the patient's relative sensitivity and reactivity, assess the patient's hardiness and vitality, as well as the degree to which there may be suppressed behavior and physiological problems that may manifest during the treatment process. The assessment of functional problem areas gives us symptoms to track. The sensitivity/reactivity/hardiness/suppression questionnaire gives us information about how much feedback to use, perhaps how frequently to treat, and which characteristics of the feedback to use. This questionnaire helps to determine what kind of evaluation to use during the first session, i.e., whether to use one that has greater or less challenge to the patient's physiology.

The first session's evaluations suggested that he was quite sturdy, energetic, and bright. His tics were his major interest, second to relatively high background levels of anxiety. Since his tics were quite evident, which they would not have been if they were evident earlier in his life but absent now, suppression was not a problem. Nor did he report any other problem earlier in life that was absent now, reducing the probability that other problems would suddenly make their appearance during the LENS treatment. That having been established, the first evaluation session was devoted to a 10-minute procedure that tried out different offsets, called the Offset Evaluation. The result of this showed that an offset of 15 minimized the amplitude of Delta at Fz more than did any of the other three offsets tried. After the offset – a clinical trial of the LENS feedback – patients not infrequently show a marked reduction in symptoms that does not last for more than 3 or four days. Thus he was told to expect a wearing off of any potential beneficial effect because he had received only one session; and the durability of these effects are dose-related. As he received further sessions the results will last longer and longer. However he was also told that the "dose" of feedback he received may also be either an overstimulation or understimulation. The

Continued on page 24

The LENS system can dramatically decrease the number of treatments for many of your clients. You can learn more about the Low Energy Neurofeedback (LENS) approach in *The Healing Power of Neurofeedback*, by Stephen Larsen, and issue 10/3-4 of the *Journal of Neurofeedback* devoted entirely to the LENS. Training DVDs are also available for purchase on our website: www.ochslabs.com.



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ADULT TIC SYMPTOMS CONTINUED FROM PAGE 22

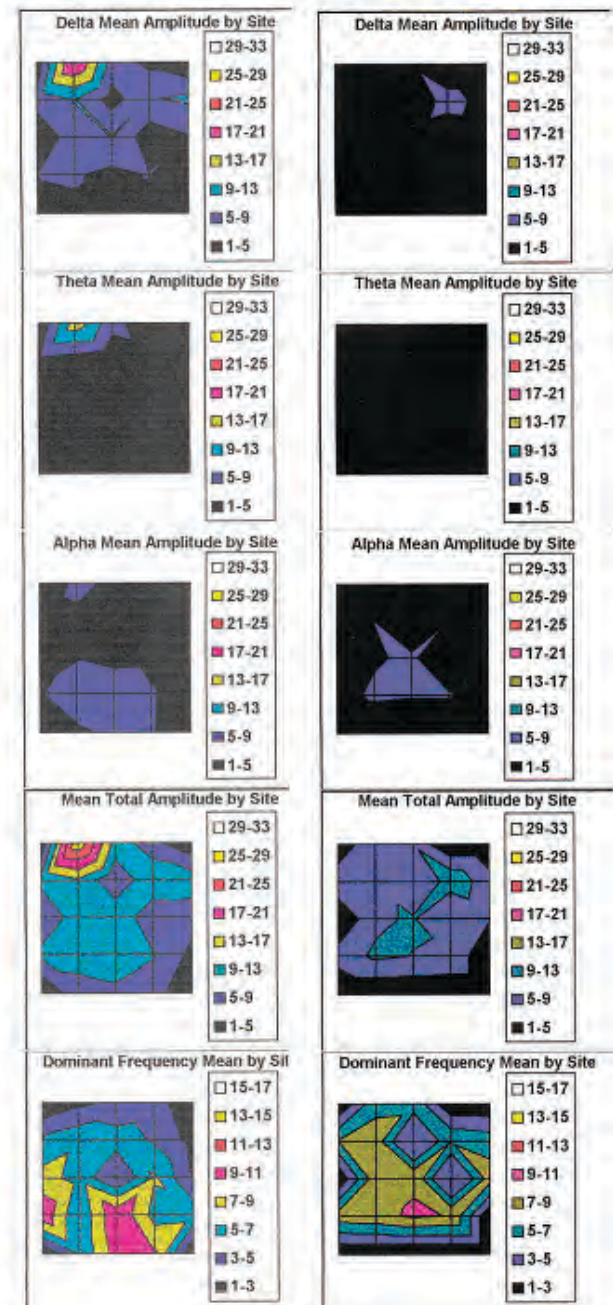
overstimulation effects may be fatigue, restlessness, or no effect at all, he was further told. If any of these symptoms occurred, they would typically wear off in a few hours or over night, and would be informative about selecting how long the feedback exposure should be. He was further invited to call me even if he was in a debate with himself about calling me.

The second evaluation, a week later, was a topographic map. The LENS maps are done with a single active sensor that is rests at each of the 19 10-20 sites for four seconds at each site, then moved to the next site successively until the EEG at all 19 sites has been sampled. There are three different levels of strenuousness of the mapping process. One kind of map offers feedback at each site that is an EEG measurement, insuring that the patient receive a very mild form of treatment even during the measurement process. The other two types of maps don't offer feedback; instead, they have different levels of background and baseline electromagnetic fields; and the one with the weakest electromagnetic fields reserved for the most sensitive patients. The sensitivity is determined by the sensitivity/reactivity/hardiness/suppression questionnaire. The maps are constructed by importing the data into the LENS Report Generator from the J&J USE3 program, selecting the Map report, and either previewing it on the screen, or printing it. Not present in the Figure 1 maps below are the bar graphs that ordinarily appear to the right of the surface maps. There is one bar for each sensor site, representing both the amplitude in microvolts and standard deviation atop each amplitude bar. The bars are ordered for each band from left to right, i.e., the lowest sum of the amplitude and standard deviation to the highest. The bars with the lowest sum of amplitude and standard deviation often represent those areas of that are functioning most highly and most inhibiting the subcortical potentials that cannot, at these sites, appear at the scalp. These are also the darker areas on the surface maps shown below. The bars with the highest amplitude and standard deviation represent areas of relatively lowered functioning that cannot exercise an integrative effect on the subcortical amplitudes, allowing the potentials to "leak through" the cortex and appear at the scalp to be read by the EEG. These areas are the relatively brighter areas on the surface maps below.

Figure 1 is a set of two topographic

EEG maps, the first and last maps in this 20-session treatment. In each surface map, the top is the front of the head; the bottom is the back of the head; the left is the left side of the head; and the right is the right side of the head. As mentioned above, the darker areas correspond to lowered amplitudes, while the brighter ones correspond to the higher amplitudes. While the bar graphs have standard deviations; the surface maps represent amplitudes only. When the bar graphs show standard deviations less than 25 – 30% of the amplitudes at any particular site, our experience suggests that the amplitude and standard deviation are suppressed. The consequence of the suppression is that its presence lets us predict to the patient that those amplitudes will tend to markedly increase. While this used to worry us because we learned that higher amplitudes imply pathology, when they suddenly appear after being lower with disproportionately lower standard deviations *in the context of higher functioning*, they suggest that the suppression attributed to that site has released. Less fatigue is a frequent occurrence at this time, which we attribute to the higher functioning and less effort needed to function at these newly increased levels. Less effort to suppress connectivity seems to correspond to greater availability of energy.

A novel aspect of the topographic mapping is that the ordering of the bars from least-to-highest amplitudes also gives us an approach path for working with the sites, from those with the best functioning to those with the most impairment. When we have worked with each site in this order, and completed working with all 19 sites, we re-map and extract a new site-sort-sequence. The surface map data that actually directs the site selection is the Total Amplitude map, the fourth one from the top of each set of maps. Total amplitude represents the amplitudes



that are found from 1 – 30 Hz, subsuming Delta, Theta, Alpha, Low Beta, Beta, and High Beta.

COMMENTS ON THE TWO MAPS

The right-hand set of maps is incomplete because of lack of time to complete the evaluation, as evidenced by a band of darkness across the occipital region and blackness at Fp1 in both the Total Amplitude and Dominant Frequency maps. It is important to repeat here that the data from the above

maps was collected from each site in *succession*: that is, the data was not collected from all sites simultaneously. The sequential collection of data from each does not permit description and evaluation of the interrelationships among the multiplicity of sites as one is able to do with a QEEG. However one can still describe the electrical activity at each site, and use those data to help construct a treatment plan.

While incomplete, it is clear that the focal elevation over the left eye (not clearly associated with any eye-lid flutter or movements) is completely absent in the second map. The amplitudes in the Theta, Alpha, and Total Amplitude maps are also cleaner. Note that the scale maxima in the amplitude maps is 33 uV, well above the typical scale maxima of 17 uV. The upper limits of the two sets of maps is the same for consistency's sake; however, the need for such a high scale maximum in the right-hand set is clearly absent since the reason for that elevation, the focal elevation at FP1, is gone.

The bottom map in each set of maps in Figure 1 describes the dominant frequency in Hertz at each sensor site, with a scale maximum of 17 Hz. The colors reflect the peak frequencies at each site. It is not possible to judge amplitude by looking at the Dominant Frequency map. There is both lower dominant frequency activity and higher frontal Total Amplitude activity in the second (final) set of maps.

The LENS maps cannot be used for diagnosis, as a basis for making statements of a medico-legal nature that require data-based distinctions, or even as a means of judging progress. The most significant reason for these statements is that I have seen too many exceptions to the rules about what is a normal vs. pathological EEG. Further, having seen enough low-amplitude EEG with restricted variability that significantly rose in amplitude with major improvements in functioning, my trust of EEG amplitudes as a measure of anything is nearly gone. This is why I persist in my advice to use the EEG amplitude and variability as a treatment planning tool rather than as

an assessment tool.

The structure of sessions that allowed the above electrophysiological changes to happen is as follows:

The 45-minute sessions were typically divided into three parts:

80% Review of symptom changes, validation, contextualization and perspective, instruction on how some process works, and interpretation

10% Treatment or evaluation

10% Processing data, pointing to changes in data, discussing implications, if any, and reviewing what to watch for.

How different the LENS is from traditional neurofeedback is rarely felt more acutely than when considering that during a session the patient may be connected to the EEG an average of only four minutes, with the feedback running perhaps an average of four seconds of the four minutes, this for a maximum of seven sites, and typically once a week. The seven site limitation is a philosophical one: I want the therapist attending to what the patient is saying, helping the patient understand what is the treatment is bringing and putting those experiences into some kind of context for him or her, and answering questions. I generally allocate

no more than ten minutes of any session for the "treatment"; and generally, with the exception of mostly adolescents, there is rarely enough time in a 45-50 minute session.

It is reasonably consistent to say, at least for me, that the bulk of the time I spend during each LENS sessions is spent mostly questioning, observing, providing context for what has been noticed by the patient, clarifying patient experience, and providing a map of what to expect in the future. I personally do not process experiences. Rather, I ask the patient to keep track of the nature and duration of experiences to facilitate their comprehension of how their problematic experiences change (and improve).

At three and six months post treatment I recalled and interviewed the patient. To summarize, at three months post treatment he said that the tics were completely absent without any of the previous attempts to consciously control them. At six months he said things were even better because of subsequent palpable reductions in anxiety – which may at least partly have been a function of the decreases in his tic activity.

While it may be tempting to speculate on both practical and theoretical grounds what is actually happening with the LENS approach, I believe, at this early

stage that it may be destructive to do so. To me, premature engagement in theory tends to blind the observer and narrow the possibilities considered. This is especially important when our evaluation and treatment technologies are still changing rapidly due to the contributions being made by talented individuals becoming skilled at the use of the LENS approach. However we are just beginning to understand enough about what we are doing, and the procedures are becoming stable enough, to allow many different kinds of studies that we hope will further both the science and art of using these approaches.

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BENEATH THE SENSORS

CONTINUED FROM PAGE 21

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Step two- simultaneously, the data is fed back in real time in age appropriate non-threatening audio and visually fun graphics for the child's viewing.

Step three-Through an enjoyable process, the youngster can assess, discuss, and redirect 'brain messages' with therapeutic strategies for internal changes, i.e., self-regulate over-breathing, interrupt sustained muscle tension, or refocus impaired concentration. With practice, he can achieve an 'alert mind and calm body' to reduce or eliminate physical discomfort, control anxiety, improve concentration and enhance performance.

Step four-The child learns how to transfer assisted biofeedback self-regulation skills into his daily life. The outcome is that this process actively impacts physical health, social behaviors, performance, achievement and overall sense of self esteem.

Biofeedback: the internal frontier- Biofeedback has opened up a once unfathomed "internal frontier" for unlimited healthy emotional and physical growth. Biofeedback applications for the classroom beginning in pre-school already have a positive track record since the early eighties (Stroebe, E 1981) for increased performance, self-confidence in ability to learn and enjoyment in the process. Pediatric healthcare in general has twenty plus years of efficacy in prevention and in healing. The emergence of integrative medicine promises even greater potential for the prevention of illness and impact on the disease process, along with effective strategies in pain management and for repair. For children whose lives have been damaged by a childhood too harsh, biofeedback offers a way for them to trust in an observable safe process where they have positive internal control. They can rediscover the goodness of self and emotionally and physically heal from trauma. Self-regulation empowers the child to initiate healthy change from *what hurts to what feels better* by self-induced learning and transfer skills as an automatic part of his responses.

The challenge- Pediatric biofeedback challenges us to teach self-regulation as a life long skill. Even amidst the expected rapid physical and emotional develop-

mental changes, the child benefits. As the child's life vacillates between joyous times, normal daily stressors and unexpected traumatic experiences, the learned response to these can shape for life the individual's choice of *how* to manage these challenges either in a healthy or destructive way. With biofeedback, the child has additional strategies in place for healthy solutions no matter what the challenge.

Life long skill- Some youngsters feel there isn't any solution, no way out, as their distress invades every aspect of life. Biofeedback is not only *a way out*, but an *on-going* healthy life long tool. Not exempt from strain on their organism, and not always able to self-correct without assistance, children possess a native sense of order which seems in contradiction to the sometimes outward appearance of disorder. Their physiology is affected by the relentless demands from the external and internal environment which overrides the inherent basic body safety mechanisms for self-regulation.

The empowered child-A seven year old with a chronic illness calls biofeedback "serious fun when things are yucky." Affirm to parents that the child has a magnificent self-tool to reaffirm his importance in his treatment plan and in a wellness model to exchange dialogue with healthcare providers and family. Tangible strategies empower the child to deal with both the *invisible invaders* of illness-chronic and acute pain sensations (Carter, B. 1998), life-threatening conditions and accompanying grief; and children suffering from neglect and abuse, seemingly uncontrollable anxiety, attachment and abandonment issues, defiant/oppositional behavior, aggressiveness, learning disabilities and attention deficits, hyperactivity, struggling families to improve communication, and school and peer related difficulties.

Healthy power within- Adults ask if young people can really understand and implement the biofeedback process. Kids are autonomic biofeedback whizzes. With eyes open, they whiz up and around the learning curve of self-regulation of their body safety mechanisms, i.e., adjusting breathing patterns, slowing down inappropriate racing feelings, calming upset stomachs, interrupting tension headaches, warming cold hands, interrupting faulty bracing and managing pain sensations. And that is just the beginning. They teach You!

Children show a remarkable capability of intrinsic and kinesthetic understanding of complex physiology and behavior without all the definition. Their *Kiddie Physie*

is a bag full of healthy tools, metaphors, stories, strategies and *sixteen healthy body friends* (Stroebe, E (2006) as biofeedback buddies to help lead the way. Kids engage in unlimited safe pathways with visualization, guided imagery, and self-talk. Biofeedback calls upon all sensory capacities, imagination, and always grounded with safe exits.

Parent's role- Most parents hurt when their child hurts. Telling youngsters "not to worry" or to "just take it easy" without strategies to do so doesn't help long term. And often increases anxiousness. Biofeedback provides a family partnership in wellness and enhanced communication.

Benefits-Biofeedback is important to an enhanced quality of life.

CONCLUSION

The last word- "I like biofeedback. It listens to me and I listen to it." (Child age 6)

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ABOUT THE AUTHOR

Elizabeth Stroebe is an internationally known lecturer and specialist in the field of applied psychophysiology for children and adolescents and co-chair of the Education Section Assoc. for Applied Psychophysiology and Biofeedback. A parent of three children and former high school and university teacher, Liz has additionally been allied with the field of applied psychophysiology for thirty years. For twelve years, she worked in the UK with Professor Linford Rees, past president of the British Medical Association and contributed to developing programs in medical settings in London, Israel and Paris. One of her major contributions to both healthcare and education is *The Kiddie Quieting Response: A Choice for Children*, revised 2007. She is currently authoring a program incorporating the *Quieting Reflex* techniques for children with chronic pain and life-threatening illness.

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WHAT IS THE INTERNATIONAL STUDY OF AD/HD NEUROFEEDBACK EFFICACY?

Roger de Beus

The International Study of Attention-Deficit/Hyperactivity Disorder (AD/HD) Neurofeedback Efficacy (iSANE) will investigate the efficacy of neurofeedback (NF) on EEG brain function, cognitive performance, clinical symptomatology and behavior in at least 500 AD/HD participants. Participants, ages 6 to 17, will be recruited from various clinics throughout the world (i.e., USA, Holland, South Africa, and Australia) that have access to or utilize a Brain Resource Company (BRC; www.brainresource.com) NeuroLab. Each NeuroLab will collect the following data: EEG (eyes open and closed), event-related potentials (ERP) using various tasks, FFT data from these tasks, autonomic measures (heart rate and GSR), neuropsychological measures, and various questionnaires. These data, all compared to a large normative reference group, will be collected before and after a 40-session neurofeedback intervention.


The primary objective of this study is to determine the overall efficacy of NF treatment with AD/HD children. More specifically, the study will examine how NF training significantly improves EEG brain

stability, cognition and behavior. Interactions with psychostimulant medication will also be examined. In addition, changes in objective endpoints (neuropsychological, QEEG and autonomic) will be related to subjective clinical ratings of improvement and behavioral monitoring ratings provided by parents and teachers. Further objectives will include an "integrative neuroscience" exploration of the EEG and related data.

The BRC from Australia will help underwrite the project. That is, they will be the central hub for automated data scoring and data collection. In addition, BRC will provide scoring of the data at a 50% cost reduction for the pre-intervention measures and post measures scoring will be free. The goal for giving free scoring is to improve the collection rate of the post measures. The data collected from this study will be made available to researchers by application to the independent iSANE Scientific Advisory Committee through BRAINnet (www.brainnet.org.au). By making the data from this study available to the NF scientific community and others across the world, it will also help to further the visibility of the field of NF. EEG Spectrum

International (www.eegspectrum.com) has also offered their services with respect to providing free software for sites participating in this study.

In closing, the iSANE project has far-reaching potential for the field of NF. First, it will be the largest trial conducted with NF so far. This will lay the groundwork for studying different clinical populations as well as future funding opportunities, and possibly future FDA approval for specific applications beyond stress reduction. Second, by utilizing standardized assessment procedures, the project can be conducted across multiple sites while increasing data integrity and reliability. Third, data will be made available to the NF scientific community and others to help increase the potential for more publications.

The project start date is anticipated to be January 2008. We would like to thank all the individuals who have contributed their thoughts and recommendations in making this project a reality. If you have any further questions or comments, please contact Roger deBeus, PhD, Chair of the iSANE Scientific Advisory Committee at roger.debeus@att.net. 

ISNR STUDENT ADVOCACY COMMITTEE *Leslie Sherlin*

Everyone recognizes the importance of fostering student development in the organization and the field of neurofeedback both clinically and academically. For this reason and because of my particular interest in student affairs, I volunteered to take on the important task of developing and chairing the ISNR Student Advocacy Committee (SACom).

The new Student Advocacy Committee acts as a liaison between students and the Society by sponsoring special meetings and activities and maintaining a student web forum. The SACom works to increase both domestic and international student membership, to foster a lifetime affiliation with the ISNR, and to advocate for the issues and concerns of student members of ISNR.

The SACom goal is to help make the society of more value to students. The committee aims to create an extended and distributed community of students working in

neurofeedback and related fields along with resources for these students.


The SACom is working to enhance the student awards to recognize student excellence in academic and research work in the field of neurofeedback by supporting student travel to the ISNR annual meeting. This conference is a venue for students to present their work in an open and supportive atmosphere. The organization encourages all students at both graduate and undergraduate levels to apply for these awards.

The SACom worked closely with the 2007 program committee to plan the student events for the recent ISNR conference held in San Diego, California. A brief ISNR student advocacy committee meeting was held during the conference as well. The student social, where students and professionals interacted in a relaxed environment, exceeded my goals. Special thanks

to Rebecca Sherlin, Ann Marie Horvat, and Noland White for their assistance with this event. The success of the student committee will depend on volunteer involvement. Below is a list of updates and topics that are still to be addressed:

- Defining "Student"
- Student Awards
- Event planning
- Web Forum development
- Committee outreach

While I am very pleased with the progress of the committee so far, I would like more widespread participation to provide more resources to students. The main challenge in doing this is getting the word out to students about the existence of ISNR and the SACom and its activities.

For more information and ways you can help develop this important committee, visit www.isnr.org. 

RESEARCH NOTES

David L. Trudeau MD, Research Committee Chair

This is the first in a series of columns I will be writing for NeuroConnections over the next several issues. Having just returned from a two day course "2007 Current Issues in Clinical Research" co-sponsored by the University of Minnesota and the Mayo Clinic, I've got some ideas about how ISNR might be more effective in its mission of promoting and fostering clinical research. In this column I'd like to talk about research practice networks, and what we can do in ISNR to promote large randomized controlled trials within our own organization by enlisting practitioners to participate in an ISNR research network. But first I want to mention briefly what will be covered in forthcoming columns.

CURRENT RESEARCH AND FUNDING

In a future column I will write more about the status and progress of our own ISNR funded research. Currently there are five projects funded by the ISNR Research Fund. In the realm of ADHD we have Beauregard and LeVesque "*Effects of Neurofeedback Training on Spatiotemporal Patterns of Response Inhibition in AD/HD Children: A Magnetoencephalography Study.*" In the area of ASD we have two projects: Knezevic "*The Effectiveness of Neurofeedback and Training in Metacognitive Strategies on the Executive Functioning in Children with Asperger's Syndrome,*" and Coben "*A Randomized Double Blind Placebo Controlled Clinical Trial of Neurofeedback for Autistic Spectrum Disorder.*" In addictive disorders we have Sokhadze "*Neurofeedback and Motivation Enhancement Therapy Based Bio-Behavioral Treatment in Psychoactive Substance Use Disorder (PSUD)*" Finally, ISNR is funding a multicenter RCT of neurofeedback for TBI by Walker and Horvat. These are all excellent projects that advance the science of neurofeedback.

We are fortunate to have these excellent studies currently funded. Because several of them are ongoing studies over several years, I project that they will use up the research budget for the immediate future. There are many good proposals that go unfunded, and unfortunately this year the Committee is unable to consider any new proposals at all.

Even though we had a good turnout at this year's ISNR meeting, our fundrais-

ing fell short of its goal of \$20,000. We were able to raise nearly \$10,000 with our raffle due to the generous donations of our vendors and all those who bought raffle tickets, and the hard work of all our volunteers. These efforts are much appreciated. Each dollar donated goes a long way—these dollars are multiplied three to four fold in our grants due to the in-kind effect, and our funded projects are serving as springboards to larger grant applications. It's important to recognize that in each case the funding provided by the ISNR Research Fund is only a small portion of the total expense for the funded study. In kind contributions of time and equipment and clinical and diagnostic services typically make up one to five times the amount of the ISNR grant. While the Research Committee takes a hard look at every dollar it awards, and ensures the money is distributed only when performance standards are met, the Committee is limited in what it can do by the funds available.

WHY REQUIRE INSTITUTIONAL REVIEW BOARD (IRB) REVIEW?

Beginning in 2006 all proposals for ISNR research funding must include an informed consent and approval by an IRB. While the research committee carefully reviews and discusses the scientific merits and performance and financial aspects of each proposal that comes before it, there is another review required that has to do with ethics and subject safety. This is the realm of an IRB. Increasingly funded and published research is required to have IRB oversight and approval. The process of grant approval and award by the ISNR research committee, including a discussion of the role of the IRB will be detailed in a future column.

RESEARCH PRACTICE NETWORKS

Now we go to the main point of this column – a research practice network for ISNR. At the 2007 ISNR meeting in San Diego, I moderated a clinical corner on practice research. One of the foci of this informal discussion was the possibility that practitioners who are members of ISNR collaborate in a multi-center trial of neurofeedback. Multi-center trials, sometimes referred to as collaborative or cooperative trials, offer

advantages over single center trials. These studies involve multiple data collection sites and a coordinating center to receive, store and analyze the data. Among the advantages are the ease of obtaining large sample size, faster enrollment, increased ecological validity due to generalizability, improved credibility, and the involvement of more clinicians in the research process. A sample size (let's say for purpose of illustration) of five hundred subjects, would be daunting for one neurofeedback center, but if fifty centers participated with each recruiting ten subjects over the course of a year, it would be much more easily achievable. (Also, it would be within the realm of possibility that each center would be able to contribute clinical time, overhead, and recruitment effort substantially decreasing the cost of the study.) Getting five hundred subjects enrolled in a year, and getting data in – let's say - eighteen months would be speedy work, and make it possible to answer the research question much more quickly. The diversity of sites, patients and practitioners would also add to the generalizability of the findings. Even though the same exclusion and inclusion criteria would be used across all the sites, the inherent geographic and practice style variabilities would enhance the ecological validity of the findings. Each site – with all of its uniqueness – will be a replicate, and thus add to the study's credibility. Needless to say, the study design will have to be straightforward and relatively simple to allow for standardization, and more attention will have to be paid to standardization. The study will not necessarily be expensive if clinicians are willing to donate their collaborative services as a contribution to advancing the science of neurofeedback. Having more clinicians involved in research will be good for clinicians and consumers as well.

At the clinical corner, Rex Cannon kindly took notes. The meeting began with discussion by Joe Horvat on the logistics of a multi-site TBI study now in process. This study involves twelve sites and has uniform testing and equipment much of that either donated or supported through ISNR research funding. Lonnie Nelson discussed his recent publication (Nelson, L.A. (2003) *Neurotherapy and the Challenge of*

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ADULT TIC SYMPTOMS CONTINUED FROM PAGE 22

Empirical Support: A Call for a Neurotherapy Practice Research Network. Journal of Neurotherapy 7(2) 53-67) regarding the need for large N studies utilizing standardized protocols. Some themes of this discussion included: getting neurotherapists into the realm of neuroscience; neurofeedback practitioners as researchers; standardization of protocols; efficacy and other domains; use of a single coordinating site for data analysis and processing; development of the practitioner/research network; goals to be comparable to other disciplines. To see an amplification of all these points revisit Lonnie's paper at the Haworth Press, Inc Web site archives of Journal of Neurotherapy. Don Bars was then invited to speak regarding his recent letter to NeuroConnections. Don encouraged all members of ISNR to submit case studies and other research to the International Congress of Clinical Neurophysiology to promote neurofeedback and demonstrate its efficacy through data driven research. The next meeting will be in Kobi, Japan in 2010. Don again emphasized that demonstrating scientific credibility for neurofeedback is the responsibility of neurofeedback professional organizations.

Discussion then ensued related to forming a committee for a multi-site ADD/ADHD study. Much of this discussion skirted specifics of research questions, study design, quality control and standardization. Some questions and concerns were issued relating to the quality of care given and how standardized protocols and the funding of contributors might impact it. Both issues were addressed, the first by informed consent (and IRB review and approval) and the second by encouragement for voluntary participation for scientific advancement of the society and possible funding from ISNR and other sources once the study is developed. The medication model was discussed and it is unlikely without a controlled environment that a double blind randomized study will be conducted of neurofeedback. However, a large N of clientele receiving a standardized protocol to treat a specific subtype of ADD/ADHD (i.e. high theta to beta ratios) with proper adherence to the agreed upon protocol would be a significant contribution to the advancement and credibility of neurofeedback. It could also be the pilot necessary for generating future grant applications (operant learning or cognitive operant conditioning). Don expressed concerns about obtaining FDA approval or some other regulatory approval before physicians might develop an interest in neurofeedback.

Initial concerns about publication, i.e. brain mapping, statistical modeling and the fundamental aspects of publishing such a work in the most reasonable, yet influential manner possible was discussed.

We ended our discussions by forming a committee of sorts, with participants agreeing to send an e-mail so we could form an ongoing group, under the leadership of Lonnie Nelson. A name was suggested "Committee for the scientific advancement of neurofeedback." For this committee, the primary initial concerns and goals are:

1. Identify the specific treatment and specific problem to be addressed
2. Inclusion/exclusion criteria
3. QEEG requirements (Pre – post; set during training, 1, 5, 10 etc. . .)
4. Type of study: Within-Subjects/Between Subjects or both
5. Brain mapping/topographical/coherence or all
6. Standard measures for pre and post training outcomes assessment.

Further considerations will need to be given to human subjects protection issues of informed consent, IRB approval and oversight by both the institutional IRB and ISNR as a sponsoring organization.

Since the committee was suggested we have become aware of the International Study of ADHD Neurofeedback Efficacy (iSANE) project (<http://www.brainresource.com/features/index.php?id=148>) sponsored by the Brain Resource Corporation of Australia. This study incorporates many of the features we discussed and may serve as something of a model. It is also an opportunity for collaboration or cooperation by individual practitioners or professional organizations.

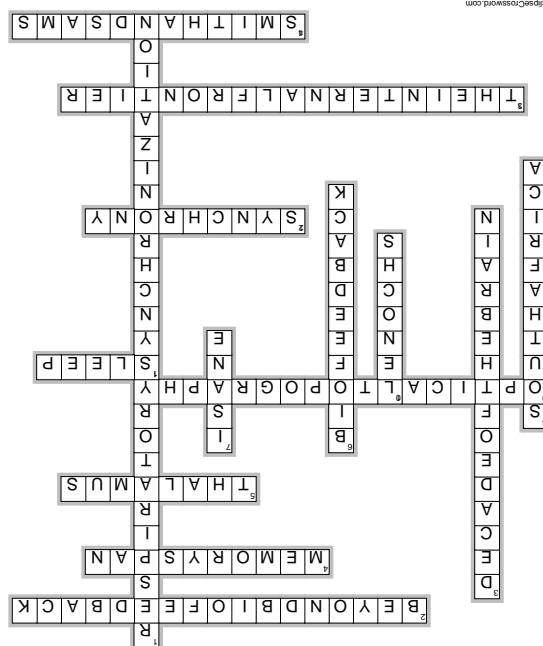
Everyone in ISNR and AAPB is invited to join the committee for the scientific advancement of neurofeedback – to do so e-mail Lonnie.Nelson@va.gov. Since the formation of the ISNR research committee in 2003 and since the publication of Neurotherapy and the Challenge of Empirical Support: A Call for a Neurotherapy Practice Research Network in 2003, this concept has begged for implementation. It can only happen with wide spread participation. Let's hear from you.



DO YOU HAVE PICTURES OF YOUR CUTEST CLIENTS?

ANN TRECHAK IS LOOKING FOR PICTURES OF YOUR CLIENTS (ESPECIALLY SOME CUTE KIDS) FOR ANOTHER SINGALONG COLLAGE SHE HAS IN MIND FOR THE NEUROFEEDBACK DIVISION'S "TALENT SHOW" AT AAPB IN DAYTONA BEACH NEXT MAY 15-18. HER EMAIL ADDRESS IS: TRECHAKAA@CS.COM HER PHONE NUMBER IS 316-652-8989.

Crossword Puzzle Answer



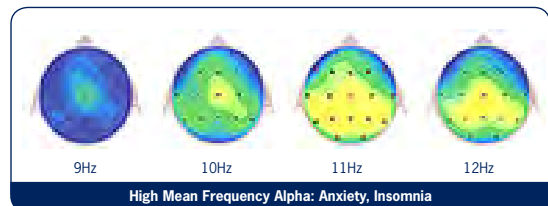
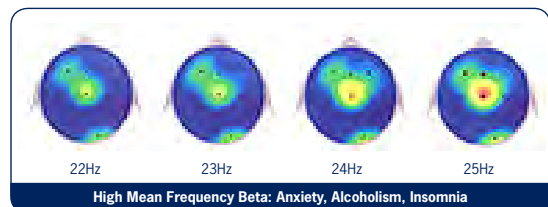
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| B. Eyes open - Weighted average, Z-scores, Magnitude, % power, LaPlacian, Avg. Spectrum | \$60.00 |
| 4. Nova Tech EEG - Loreta/QEEG analysis system and adult normative database eyes closed | \$60.00 |
| 5. Thatcher TBI and LD discriminant analysis and severity index | \$60.00 |
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THE ROLE OF MIND-BODY
MEDICINE
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of a wide variety of responses to most stimulus situations. By contrast, reflex reactions have only one possible output. Consciousness appears to have evolved, among other reasons, as a system for making choices in situations for which reflex reactions do not present adequate options.

Finally, *qualia must be present in short term memory long enough for executive processes to act upon them.* These two properties help us to understand why qualia have the property of irrevocability on the input side. Executive processes, like attention and working memory, are famously limited in their capacity. For executive processes to make effective decisions, they must at some level have premises that are not subject to further questioning and uncertainty.

Bernard Baars (1993) explained how consciousness is a limited resource. For instance, studies have shown that most people can only hold “seven plus or minus two” independent items in working memory. You can only attend to a subset of your sensory field. It is generally accepted that attention has a “center” and a “surround,” or a focus on the most important or relevant information and a periphery of less important information that can become the focus if internal or external factors warrant a shift of attention.

Secondly, consciousness operates serially. Divided attention experiments have shown that even the most skilled individuals are not truly “multitasking” but rapidly shifting their attention between tasks.

Finally, consciousness is integrated—we seamlessly attribute the many different aspects of an object to the same object. The subconscious nervous system, by contrast, is a distributed, parallel system of enormous capacity. Hundreds of millions of receptors simultaneously represent discrete pieces of the sensory field, of which only a tiny fraction are processed consciously. One of the essential functions of sensory systems, then, is to *exclude* information from consciousness. Studies comparing the sensory neurophysiology of different animal species have shown that the phenomenal field of animals is specifically limited to forms of energy that are relevant to survival.

So, the irrevocability of qualia is a clue to their adaptive function. The limited capacity of consciousness as an executive system creates an adaptive requirement for it to operate on finite number of assump-

tions, and to orient, allocate, and focus on novel problems whose solution is not already hardwired by millions of years of evolution. So, one could argue that our pre-conscious systems construct our qualitative experience more from a perspective of “efficiency” than from a concept of “reality.”

Meanwhile, the flexibility of qualia on the output side suggests another reason to insulate physiological processes from mental ones. That is, if a system is designed to specialize in open-ended problems, then it is adaptive to prevent that system from controlling processes requiring regular, predictable operation. There is a reason why we pass out if we hold our breath long enough. The wide-open flexibility of consciousness makes its reflection back on its physiological basis not only perplexing, but in some ways, dangerous. I claim, then, that the boundaries between the mind and brain are too mission-critical to be left to chance. I predict that psychophysicists will discover a system policing this boundary whose intricacy and elegance will rival that of known organ systems.

To understand this system, we need to systematically study and document which physiological processes can be subjectively discriminated and controlled, and why some are easier to discriminate and control than others. The first step would be to measure how many training sessions are required to achieve a minimal level of discrimination or control, and what mean and maximal levels can be achieved for each physiological variable of interest. The next step would be to measure which physiological discrimination and control skills would generalize to each other, such that training in one would result in a shorter required training time in the other. Such discriminative stimulus generalization experiments would generate taxonomies or maps of the relationships among the internal representations of the varieties of physiological signals that can be fed back externally (similar to the way psychoactive drugs are categorized based on discriminative stimulus generalization studies in laboratory animals). The interesting question would be, how do the similarities and differences in the discriminative stimulus properties of various physiological signals relate to their structural (location, time and frequency) and other functional similarities and differences. For instance, would 18 Hz amplitude discrimination at FP1 generalize better with (a) 18 Hz amplitude discrimination at O2; (b) 25 Hz amplitude discrimination at FP1; or (c) 18 Hz coherence discrimination

between FP1 and O1? Prior knowledge will inform this research, but we should expect some results to be provocatively hard to reconcile with what standard neuropsychological experiments would suggest.

My contributions to this program of research began two years ago when I started my study of the “Psychophysics of EEG State Discrimination” at the University of Minnesota (Viebrock and Frederick, *in press*; Frederick, 2006). One of the earliest and often cited studies in neurofeedback was a discrimination learning experiment by Joe Kamiya (1968), who reported success in training human subjects to discriminate alpha from non alpha states. In this study, subjects were asked to respond “A” for alpha and “B” for non alpha when the experimenter rang a bell. The experimenter waited for distinct alpha and non-alpha states, in random order, to appear in the raw EEG and then rang the bell when they appeared. Kamiya reported that 9 out of 12 subjects reached a significant proportion of correct within seven one-hour sessions.

Interestingly, nearly all research on human learning of brainwave states since this study have focused on training and measuring voluntary control of EEG constructs, rather than discrimination. However, given the frequent assertion by biofeedback therapists that training people to control their EEG increases perceptual acuity for subtle internal signals about their EEG state, it is remarkable how few EEG biofeedback studies have actually measured whether trainees can correctly identify their internal state. One study (Cott, Pavlski, and Black, 1981) failed to demonstrate discriminative learning of the alpha rhythm, but differed substantially from Kamiya’s original study in defining an alpha state as one-half second of high alpha power. Kamiya (personal communication) suggested to me that a half second was too short for subjects to discriminate from the background variability. Therefore, we attempted to demonstrate alpha state discrimination using one-, two- and four second intervals.

With the approval of the University of Minnesota Institutional Review Board, we studied 22 participants, age 18-55. A 150-second eyes-closed baseline EEG was recorded at frontal (F3 or Fz) or posterior locations (Pz, O1, or O2) with a linked ears reference. Each epoch was ranked among a percentile distribution of alpha powers of the most recent 150 seconds initially derived from the baseline recording. A tone sounded whenever the alpha band power exceeded a critical difference from the me-

dian of the baseline. This critical difference varied continuously between 0 and the 30th percentile for “low” alpha trials, and between the 70th and 100th percentiles for high alpha trials. Subjects responded “high” or “low,” and received feedback about whether the response was correct or incorrect after each trial.

Only sessions where performance exceeded a criterion of binomial $p < .01$ for percentage correct were included for analysis. Eleven subjects had at least one session above criterion with a median of four sessions to reach criterion. The remaining eleven subjects did not reach criterion with a median of three total sessions. The graph of average session performance showed a clear pattern of improvement from over the course of 13 sessions ($R^2 = 0.736$).

When trials were segregated into 10-percentile bins, an analysis of variance clearly showed differences between performance at different signal intensities ($F = 3.99$; $p = .004$). Post-hoc tests showed that participants performed significantly better in the “very low” 10th and “very high” 100th percentile bins compared to the more moderate 30th and 80th percentile bins.

The duration of the discriminative stimulus interval also affected performance, where participants scored significantly higher on four second epochs (mean 71%) than one second epochs (63%; $p = .005$), with an intermediate performance on two second epochs (66%).

Given that discrimination accuracy increased with both the duration and inten-

sity (percentile difference from the median), it is tantalizingly hard not to conclude that we have characterized the psychophysical properties of an introspective sensory modality. The word “interoception” is used to describe the brain’s reception of signals from the visceral organs, where the primary sensory cortex for interoception is on the insula (Cameron, 2001). However, there is not yet a word for the mind’s discrimination of the brain’s electrical state. It would be of interest, however, to do fMRI and quantitative EEG studies to see if this sensory modality has a primary sensory cortex and, if so, whether there is an anato-topical map like the somatosensory cortex or a frequency-topical map like the primary auditory cortex.

The interactions between discrimination and control (awareness vs. volition) in EEG biofeedback are vastly unknown, and may have important clinical implications. Insofar as discrimination and control are related, measuring discrimination could serve as a more precise experimental model of control training. Learning is difficult to measure in EEG control training because therapists often adjust thresholds to maintain an optimum percentage of reward, and effects of training are often smaller than the baseline variation. By contrast, a direct measurement of success is intrinsic to every trial in discrimination learning. Thus, if control and discrimination skills generalize to each other, taking EEG state discrimination measurements could be a useful method of assessing client progress for neurothera-

pists who train control, and discrimination training could potentially improve the extent and rate of learning in control training. Meanwhile, training discrimination could also have therapeutic value in its own right, just as insight-oriented psychotherapy can have value above and beyond behavior-modification psychotherapy.

Future studies should utilize this method to characterize the psychophysics of other EEG constructs, including coherence, phase, ERP amplitudes, peak frequency, and amplitude in frequencies other than alpha. Identifying the discriminative stimulus properties of physiological states and their relationship to control of these states is, in my view, essential to the development of more specific and efficacious therapies and—while I don’t believe the Hard Problem of consciousness can be solved empirically, I do think that the practical insight gained by the use of biofeedback toward an introspective science of neurophysiology will make the problem less problematic. My software, *Introspect*, is available to any Brainmaster user who wishes to join me in this mission.

ACKNOWLEDGMENT

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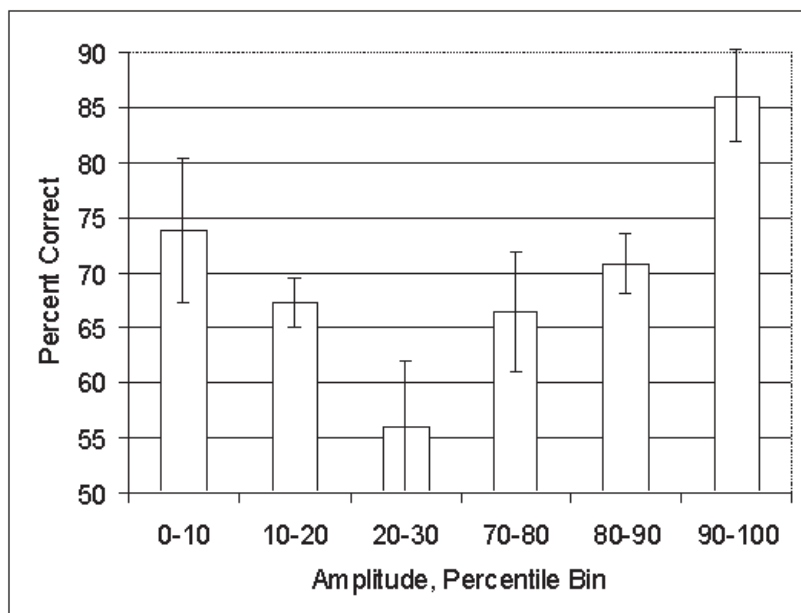


Figure 1. Effect of signal intensity on EEG alpha state discrimination performance

THE MARRIAGE OF NEUROTHERAPY AND THERAPEUTIC COMMUNITY: HAS ADDICTION MET ITS MATCH?

*Peter Smith, Psy D, BCIAC-Fellow,
with contributions by Marvin W. Sams, N.D., R. EEG T, BCIAC-Fellow*



The story of my professional career is like so many others. There are elements of “unfinished business,” good timing, and what I call “Grace.”

I started with a small private practice in a mill town outside of Portland, Maine. Since I was trained to do Child and Adolescent therapy, my practice became loaded with ADHD youth in foster care. I did everything from play therapy, to testing, to parent guidance groups. At the same time, I had the good fortune to provide services to a small general hospital with a mental health unit. The mental health supervisor approached me one day and indicated the hospital was completing a million dollar Certificate of Need to start services in alcohol and drug addiction. He asked what a Psychologist can do other than assessment. While I did not know it at the time, it was this question that began my journey into Neurotherapy.

My first step began by reading everything I could find on new treatments for alcoholism. Being oriented as a kid ADD therapist, I serendipitously kept running into articles about Neurofeedback and Attention Deficit Disorder. Intrigued, I started reading everything I could find in these areas. Despite my growing interest in the subject, I had questions and fears. How would I get the training if I decided to go into Neurotherapy? What about all the extra expense involved? Would people be interested in and actually pay for this kind of service?

That’s when I began dreaming about a different future. I had lost several people I cared about in my life to alcoholism, and many of the families I served had lost one or more members of their family to addictions. Neurotherapy kept coming to me as a solution. I remembered the quote from the movie, *Field of Dreams*: “If you built it, he will come.” So, I committed.

My journey began with Alpha-Theta training for alcoholics. It was nothing short of a miracle! Exploration into working with my ADD children took a little longer as I danced between family therapy and EEG work. But the results with the alcoholic

population drove me and I was inspired with the possibilities.

Shortly thereafter, I moved to Arizona and took a position with an eating disorder center. Soon, I was using Neurotherapy for those with eating disorders. In a short time, I seemed to have hit a brick wall. While the results were OK, I didn’t have the drama of my earlier experiences. In a word, I felt disappointed.

“Grace” soon intervened. I gave a paper at the ISNR conference in Scottsdale on my early results with the eating disorder group. Unbeknownst to me at the time, Neurotherapy was about to take an interesting turn. Marvin Sams, hearing my paper, approached me after my talk and ask if he could take me to lunch. He said he had something he wanted to talk to me about. Not being one to turn down a free meal, I said “Sure.”

Over lunch, Marvin explained that he had been working for several years on unique neurofeedback protocols. These had remained in his center, and, as he explained it, he was interested in exploring how his protocols would work in the hands of someone other than himself. He was intrigued by my work and presentation, he continued, because from an EEG perspective, eating disorders are an extremely pathological group neurologically and I had obtained such good results! Being a bit disappointed with my eating disorder group compared to my earlier results, this was fascinating input. I said yes to his proposal, and, as been oft repeated, the rest is history.

Marvin came to Tucson and spent a few days with me. His approach was quite different than what I was use to. For one thing, all training was done under task, the most common being playing Tetris on Game Boy. And, he had several types of training that all needed to be done. He described this as weaving a tapestry. “You have to lay in all the threads to see the entire picture.” There was both increase and decrease training, different electrode sites than I was use to, certain specific frequencies in various combinations, and high pitched tones that required adjustment. Another major differ-

ence was that he used an electrode cap on everyone, and everybody had a multi channel EEG baseline before every session. In those days, he also required both cerebral blood flow and heart rate variability training. It was a lot to remember.

One of my first people I worked with was a medical doctor I was training to be my assistant. A few sessions in, he stopped his antidepressants and began reading and comprehending *a book a night*! He did not inform me of his decision to stop the medication until some time afterward. Good thing, because I would have done everything in my power to talk him out of it. As a side note, now three years later, he is still depression and drug free and working full time in the field.

The results of our early work with eating disorders, which we presented at ISNR in Fort Lauderdale, compared the results of three different Neurofeedback techniques. What we found, based on medication usage, is that all Neurofeedback improved outcomes in these severely compromised women. Marvin’s work, however, produced results that were significantly better than the other two neurofeedback approaches.

While I was still at the eating disorders center, we also worked with a small group of juvenile offenders at an Arizona Department of Corrections facility. This study was also presented at the ISNR in Fort Lauderdale. The results were equally impressive with three of the five offenders we were able to track not re-offending in the months after their release. Two of these were sex offenders.

Leaving the eating disorder center for greener pastures, I knew that if I wanted to continue using Marvin’s protocols, which I knew I did, I would need to find a new opportunity. Here is where the stroke of luck or grace came in, and a new courtship began.

A small addiction recovery center to be operated as a therapeutic community had just gotten off the ground. As a sort of introduction to what the future could yield, one of my first clients was a teen with ADHD and stimulant as well as crystal metham-

phetamine abuse. Placing her on Strattera, a new class stimulant, her response was to become both suicidal and homicidal. She would be my first of many youth at the facility to be weaned from psychiatric medications and to show academic achievement beyond what she or her family ever thought possible.

By her 20th session, all medications had been discontinued. Chart 1 shows her IVA scores at pre treatment and then again after 20 sessions. As a child, this youth was told by school officials that due to her severe ADD symptoms, she would not be able to get into college and might not even be able to hold down an unskilled job. Proving these officials wrong, she returned to school after some 60 Neurotherapy sessions and went from a "D" average to honors! She also became a peer leader in student AA groups and someone the teachers depended on to help other youth impaired by substance abuse.

My second case was a young woman who had become psychotic after several years of methamphetamine and stimulant abuse. She had initially been referred to the center after a drug related arrest. The owner of the treatment center was so frightened of and for her (due to her psychotic symptoms), she and other staff members stayed awake at night to keep an eye on her. She was confused, disoriented, with little or no emotional control. The staff was so afraid she might commit suicide or take off to be found wandering the streets in down town Tucson, she was watched like a hawk.

She started Neurotherapy several months after arrival, after being somewhat stabilized on antipsychotic and anticonvulsant medications. Her parents were highly skeptical that Neurofeedback would benefit her, but, having witnessed the improved attention and other benefits of the first resident had received through Neurotherapy, gave the go ahead.

It's fortunate for all concerned that they did. In less than 18 months, she had gone from jail to a therapeutic community to graduating. This was with 40 sessions of Neurotherapy. After leaving the treatment center, she discontinued her psychiatric medications without incident. She is now an Honors student at a university, working, and a Sponsor in the 12 Step community. See chart 2 for her IVA scores.

Like any marriage, no matter how good it looks going in, relationships have their ups and downs. While Neurotherapy was making a major difference, getting the service funded was very difficult and I was

only able to treat a handful of the residents. Those that took advantage of Neurotherapy had to pay extra for the service and it proved to be a tough sell.

Along the way, to encourage parents, I offered testing and brain mapping to each new resident. Most families did not take advantage of this offering.

As I began to track all residents coming into and out of the center, I discovered something that will surprise no psychologist or social worker with neurofeedback experience in the addiction field: The residents that received Neurotherapy stayed in treatment longer and were more likely to graduate from the program.

Addiction research for youth show strong correlation with longer stays, successful outcomes, and abstinence. The following graph shows our three groups: Waiting list with no Neurotherapy; some Neurotherapy; and a third group that received at least 24 sessions of Neurotherapy. I demonstrated that those receiving Neurotherapy were more likely to stay longer. With this new documentation, my relationship with the center grew stronger. Neurotherapy was added as a contract service, and, along with the AA meetings, became a key component of the treatment center.

After a year, I was also better able to track the changes. Marvin's task activated Neurotherapy protocols clearly helped ease depression and anxiety. My clients' love these sessions and crave the mild calming effects. Also, because of the game action, complaints of boredom are rare.

The following chart shows group depression changes on the Beck Depression Inventory. The average scores at intake fall within the Moderate range (25.1). After 6 weeks of treatment, the scores drop into the average range (11).

After seeing the results of these unique protocols with the eating disorders group, I felt we were likely to get reductions in the use of psychiatric medications. This proved to be true. The chart below shows medication use for both past participants and current trainees. Reductions generally occurred during the training itself with but one exception.

We also compared IVA test scores at intake and at session 24 for the neurotherapy group, and found robust improvement in all attention indexes (see figure 4). While a few residents in the no-neurotherapy wait-list group showed modest cognitive improvement, apparently created by drug

Figure 1: First case-Improvement in IVA attention scores after 20 sessions

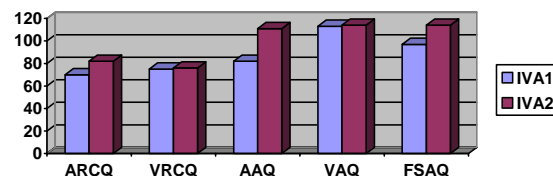


Figure 2: Second case-improvement in IVA scores after 20 sessions

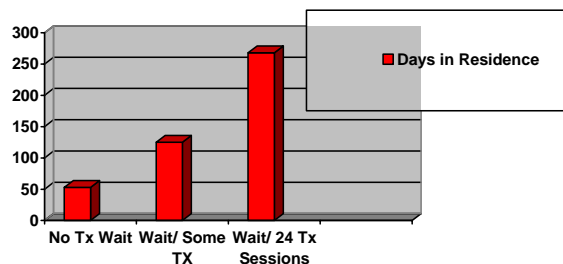
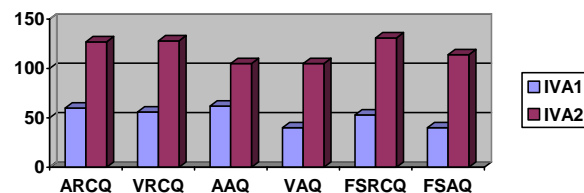


Figure 4: Improvement in depression following 24 neurotherapy sessions

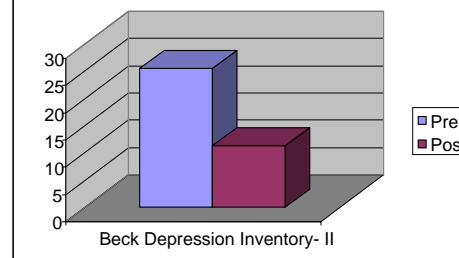
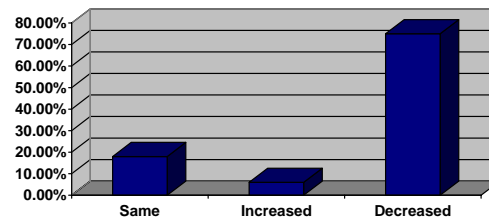


Figure 5: Change in medication usage after 24 neurotherapy sessions



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abstinence and support of the treatment environment, others in the wait list only group demonstrated lingering problems with attention and mental efficiency despite drug-abstinence.

This was especially true in the stimulant/methamphetamine abuse group.

As a Psychologist, I have come to rely on the MMPI for information about both personality characteristics and how different treatment groups respond to Neurotherapy. From my work in eating disorders, I found that changes in introversion were correlated with successful outcomes. Testing from my early work with addicts suggested that key changes in measures tapping suspiciousness, distrust, and anger would need to occur for improvement. In both groups, significant changes in both anxiety and depression are expected if the individual is heading toward abstinence. The chart below shows averaged data from Neurotherapy clients treated at the therapeutic community.

Neurotherapy services in the program now start shortly after admission.

As the data reveals, key clinical scales have moved toward a healthier orientation, with major improvement in factors that contribute to substance use and dependence.

From my perspective as a psychologist, I want to point out three factors that appear to be keys for success in this program. First, there is a focus on the traditional Alcoholic Anonymous (AA) 12 Step program. While many think of AA as an organization for alcoholics, it provides a model for recovery that is proven to be effective for all types of addictions. Psycho-educational materials for this program, for example, come directly from AA resources. Also, each resident has a sponsor he or she meets with each week. As dual addictions are common in this group, a sponsor is selected that matches both the residents' primary and secondary addictions. Second, because this is a service-based program, graduates are already prepared for work

or school when he or she leaves the program. Many of the new graduates chose to work or go to a school close to the community. This allows important social ties to be maintained. Also, the local AA community is familiar with these young people and keeps a watchful eye on new grads as they leave for school and new jobs. Those that return to college in other areas also stay connected to the support system already in place at the recovery center and join local AA groups. In other words, no matter where life takes them, there is an established support system in place. The third key factor for success is family support. Family therapy is a very intense and vital aspect of this program. During the 12 month stay, four weekend workshops are devoted solely to healing family dynamics. In my experience and the experience of others, the years of family system support for the addictive behavior must be reworked for the addict to truly break free and develop a new way of being. In these working workshops, the family is challenged to find a new order, one that can no longer operate with or in the cycle of addiction. From my experiences, for healing to be complete, it must take place not only on physical level but on a spiritual level as well. We must face our dark side and discover that, despite our self perceived flaws, we are still loved and have support from those that know us best. This program accomplishes this.

Were these positive outcomes influenced by the Neurotherapy? Scientifically, we must study this to know. From a practical point of view, however, we know the drugs of choice of these young people cause major brain dysfunction, including "permanent" brain damage. The dysfunction will negatively impact the life if not corrected. The improvements in IVA, MMPI-1, and EEG scores in the 24 session group, certainly lend encouragement that Neurotherapy can only help these people lead a more productive, and happy life.

Relationships bear fruit, sometimes good, sometimes bad. The fruit of my re-

lationship with the therapeutic community has developed from one of curiosity to a warm welcome and appreciation. Together—the resident program combined with Neurotherapy—more than 90% of the graduates are now clean and sober, and following a path that leads him or her away from a world of addiction and toward a satisfying and productive life. The few graduates that have had minor slips have quickly gotten back into recovery activities. They continue to report that they are doing well. This is a life that these young people and their families, and to a certain extent, myself, could not have imagined when I put the Electro-Cap on to do their first brain map.

All have been blessed.

My thanks to the editors of Neuro Connections for allowing me to tell my story, and to Marvin Sams for his support in this project. This work would not have been possible without the love and support of the V3 TUCSON Directors and Community.

Information on V3 TUCSON is available at www.V3TUCSON.com.

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Figure 6: Average gain in IVA attention scores following 24 neurotherapy sessions

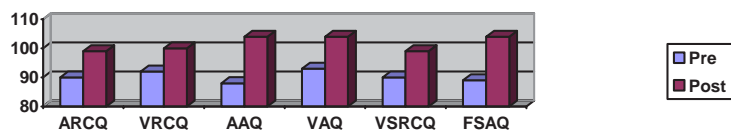


Figure 7: Average reduction in MMPI T-Scores following 24 neurotherapy sessions

