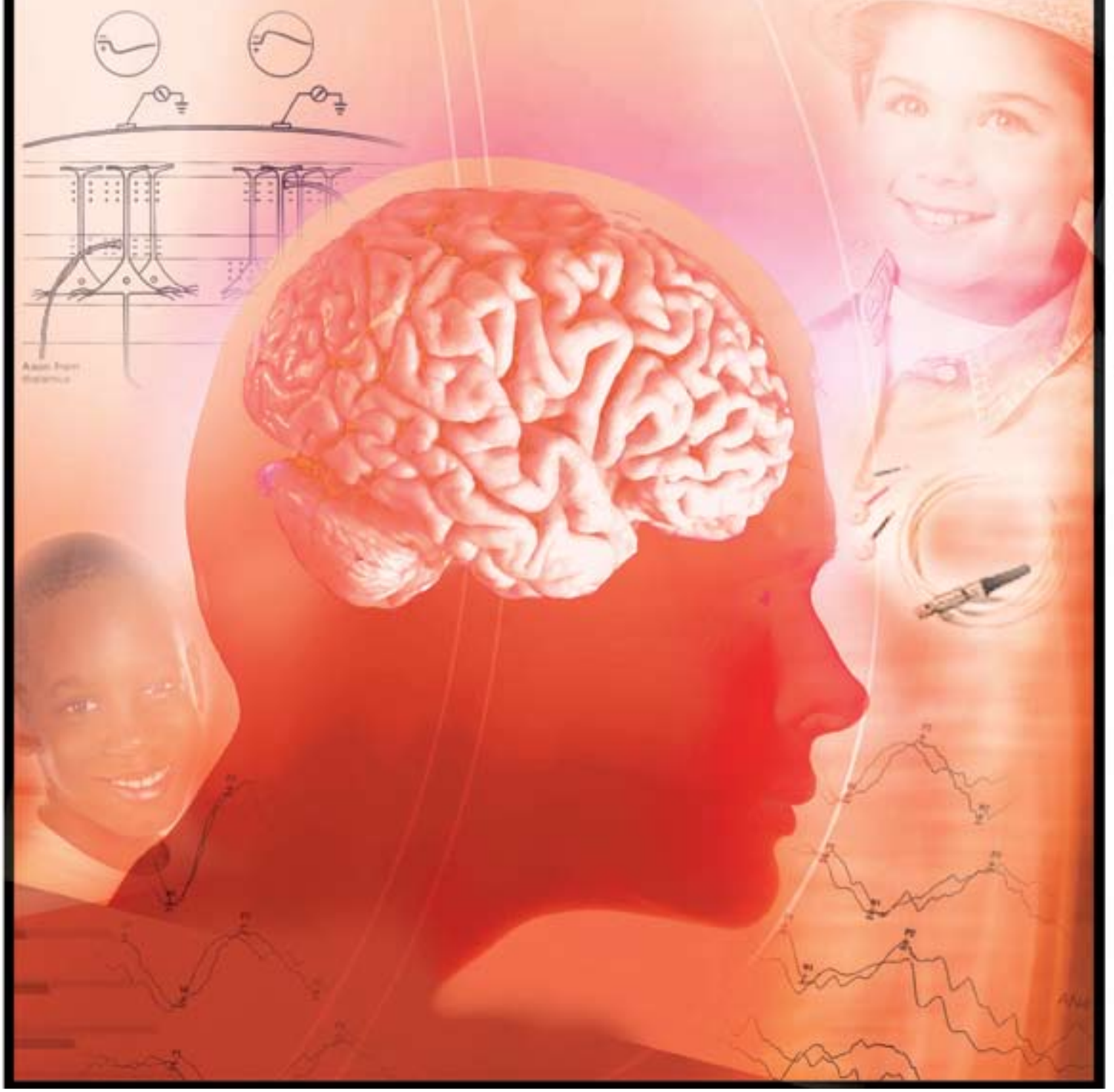
NEURO CONNECTIONS Newsletter

October 2008

A joint newsletter from the
& the aapb Neurofeedback Division



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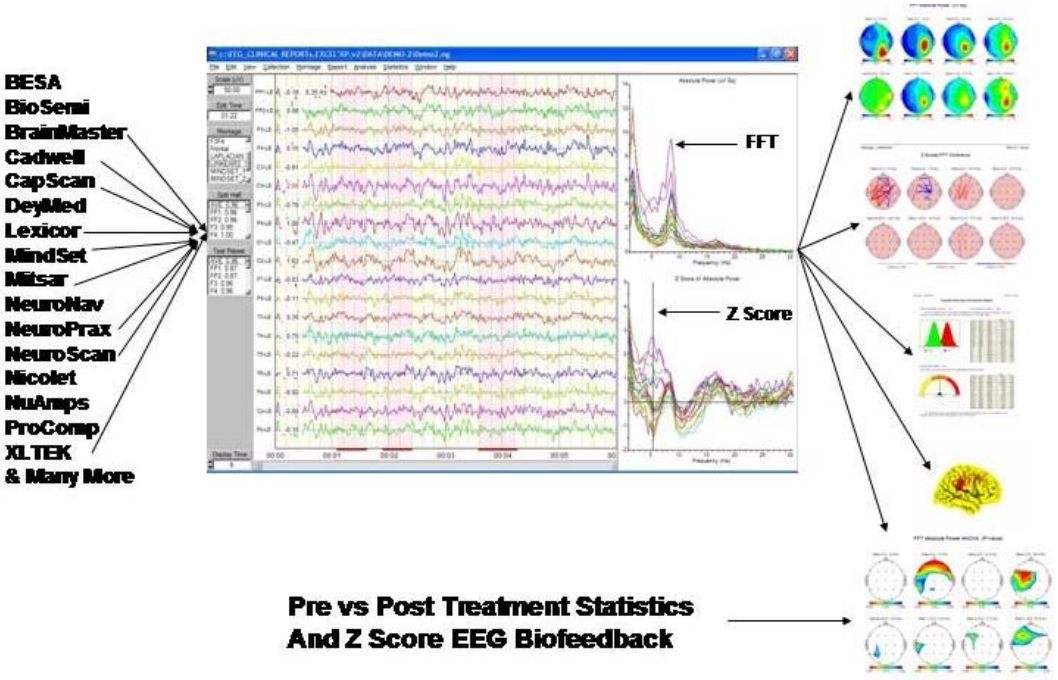

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Letter from ISNR President

I hope those of you who were able to attend the 2008 Conference had a great experience, and I hope that if you couldn't attend you'll come next year. I know the Labor Day Weekend isn't ideal. We've got it next year again, but then we will absolutely stay away from that weekend. Promise.

I heard so many things from so many people at the conference. One thing I heard again and again was that the meeting is a time and place to catch up with friends, to renew relationships, to spend time enjoying people you just don't get to see often enough… I really enjoyed hearing that, and it was a big part of my enjoyment of the conference.

I heard many ideas in the hallways. Those included issues surrounding vendor participation in the governance of the Society – which the ISNR Board continues to endorse strongly. I heard suggestions that we add more focus on the use of neurofeedback in peak performance – which I hope will occur as we are able to identify good research that demonstrates effectiveness. One problem in that area may be that those doing the work with professional athletes tend to be fairly private about what they do. Perhaps that will open up.

Another thing I heard about was suggestions that we are limiting ourselves too much by the term "neurofeedback" in our name. Originally, we chose the somewhat hard to pronounce "neuronal regulation" in our name (Society for the Study of Neu-

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Letter from AAPB Neurofeedback Division President

The Value of Quantitative EEG in Clinical Psychiatry

The topic of the value of quantitative EEG in clinical psychiatry was recently reviewed by Coburn et al.[1] The authors are psychiatrists affiliated with several medical schools in the U.S. The emphasis was on studies that use QEEG to aid in clinical diagnosis and secondarily on use of QEEG to predict medication response or clinical course. QEEG as a guide to neurofeedback was not covered. Head injury, stroke, infections axis II disorders, and substance abuse were excluded from their analysis.

The authors considered visual analysis of the raw EEG to be an essential part of the QEEG analysis. They reviewed the controversies regarding the use of normative databases of healthy subjects to determine abnormalities in a given patient, emphasizing the consequences of false positive and false negatives. They stressed the need for a cautious and conservative approach to diagnosing one or another disorder based on multivariate approaches to well-defined clinical populations (such as discriminants, unipolar or bipolar depression, ADHD, or reading disability). The authors reviewed studies of that subtyping using QEEG, indicating that it can be useful in predicting medication response.[2,3] Studies were reviewed of QEEG, indicating the value of conventional EEG in distinguishing dementia from normal aging and distinguishing vascular dementia from Alzheimer's disease.d Conditions outside the DSM, such as mild cognitive impairment or dementia with depressive or psychiatric features, have not been well studied. Dementia can be distinguished from depression with high sensitivity and specificity. Suffin and Emory reported that the QEEG subtype predicted response to treatment better than the clinical diagnosis did.[4] For example, patients with excessive frontal theta tended to respond to stimulants, while patients with coherence abnormalities tended to respond to anticonvulsant therapy, regardless of their clinical diagnosis.

The bottom line is that QEEG is useful in detecting and differentiating some common psychiatric conditions (unipolar depression, bipolar depression, dementia, alcoholism, ADHD, and learning disabilities).[5] In a few situations it can help predict treatment response to drugs. As far as neurofeedback is concerned, it is useful in improving treatment efficacy vs. standard (non-QEEG guided) protocols. This issue will be discussed for several disorders in the Winter issue of the AAPB journal.

Jonathan Walker, MD

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2. Chabot, R. J. et al, Hosp. Community Psychiatry 43:716-719, 1992.
3. Prichep, L. S., et al, Psychiatric Research 50:25-32, 1993.
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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 ISNR Co-Editor

Dear All,

Welcome to the October issue of NeuroConnections that is bursting, like autumn, with information regarding SCP and DC. An interview with Dr.Ute Strehl helps us understand the foundations of training children with epilepsy and ADD with SCP. Erwin Hartsuiker and John Anderson of the Nexus group give us technical information to guide us in using these types of training.

Meanwhile, let us all give a big thank you to Dr. Leslie Sherlin, AnnMarie Horvat and Cynthia Kerson for providing one of the most informative, smooth and fun conferences of ISNR. The video tribute to Dr. Joe Horvat was especially touching and reminded us of the great loss we have experienced.

In this issue is an attendee's impression of the conference, which has been written up by Dr. Gary Ames.

Dr, John Carmichael, organizer of the Small Group Discussions (formally the Clinical Corners), where one could discuss/debate/provide information to friends and colleagues regarding a wide range of topics has given us a write up of the ideas put forth. The Small Group Discussions at the conference is one of the most popular for the quality of the leaders of the groups and the ease of discussions that are supported. Besides, having lunch, discussing clients and obtaining suggestions for working with the clients is worth the effort. In future issues other Small Group Discussions write ups will be published.

Dr. Jeffrey Carmen has provided us with an article that looks at unobtrusive radio frequency. All of us will benefit from his information so be sure to give it a look.

Dr. David Kaiser has provided two articles for this issue. His MindFull article is Brief History into the Mind, well worth the time to absorb his ideas. The second article is Production of the Future in the Frontal Lobes. Let me just say, if you have ever attended one of David's workshops you know you always walk away with a deeper understanding of the working of the brain, so be sure to read this article and gain some more depth of knowledge.

We are looking forward to provid-

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Letter from AAPB Co-Editor

Welcome to the fall, 2008 issue of NeuroConnections magazine. Within these pages we begin a two-issue thematic focus on low frequency and DC training. Classical work in this area emerged from Europe over a decade ago, emphasizing slow cortical potential (SCP) training techniques which had their basis in a rich tradition of event-related potential EEG research. In the current issue, we speak with Ute Strehl, whose landmark work in Parkinson's disease, epilepsy and most recently, ADHD, spans that decade. Dr. Strehl contrasts SCP and frequency-based theta/beta ratio training techniques, describing the advantages of each method. She also presents longitudinal outcome data which sets a new standard in the field.

Growth in interest in DC and low frequency training techniques is reflected in recent efforts by the major equipment manufacturers to introduce hardware and software refinements addressing the technical requirements of this form of training. Within this issue, Anderson and Hartsuiker are the first of a series of contributors, discussing the hardware and software solutions which are emerging from the the R&D lab, to address technological challenges associated with DC and low frequency, as well as recent clinical developments in low frequency training protocols. We will continue this discussion in our next issue, with contributions from Othmer, Collura and Saab describing a converging body of efforts to establish low frequency and DC training techniques as a viable option for the future.

Lest we forget that today's harvests would not be possible without the contributions of those who have toiled the fields before us, Liz Stroebel brings us the story, in this issue, of a remarkable physician couple who played a critical role in the emergence of peripheral and EEG biofeedback in Europe during its early years.

As always, we welcome reader contributions. We are planning upcoming thematic issues focusing on autism, the treatment of epilepsy, and on therapy initiatives supporting returning combat veterans. We would welcome case histories, reviews, or interviews related to these themes. Please feel free to contact me at rriss@madonna.org, or any of the editorial staff at office@isnr.org.

Roger Riss, PhD
AAPB Co-Editor

Letter from ISNR ED

This issue of NeuroConnections, the last of 2008, focuses on two treatment formats using slow cortical potentials. We hope bringing you these innovative approaches to new this paradigm encourages discovery in your practice and with your contributions to your patients and clients.

ISNR has made available on the Web site (www.isnr.org) the DVDs from all of the plenaries and many of the workshops from San Antonio. We have also included a book store with the books that we had available at the conference. So, if you missed your chance to get the DVD or book you wanted, they'll always be available through the Web site. Soon, we'll be able to offer the power point presentations to the attendees. This will be for a limited time, so look for an email announcement and take advantage of this opportunity, which has been graciously forwarded by most of the presenters.

ISNR and the Biofeedback Neurofeedback Alliance are moving forward, having met for a second time in San Antonio. We decided to have a booth at outside conferences, including APA among others that will spotlight ISNR, AAPB and BCIA, create a better understanding of the modalities and create exposure for the associations to the conference attendees. We hope this effort will strengthen our position amongst the attendees of these conferences, who are often leaders in their areas. Additionally, if any of you present at outside conferences, please inform us (office@isnr.org). Having scientific presentations at conferences that we will have a booth presence will support our goal even further.

The ISNR Research Foundation met for the first time in San Antonio and its members have been allocated to committees that will focus on study design, university affiliations and fundraising strategies. We intend for 2009 to be a very important year for the Foundation. I hope your Fall and holiday season are delightful and look forward to more to come.

Cynthia Kerson, PhD, BCIA-EEG
Executive Director, ISNR

ISNR President
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ronal Regulation) to allow us to encompass the other technologies that change the brain. There are certainly a number of technologies—rTMS, AVS, DC stimulation—that produce changes in the brain state without feeding back any information on brain activity. We may want to include these technologies in our scope, formally. This is something the Board will discuss this year and I hope the membership will let us know their thoughts on this.

The issue of standards has also come up in various contexts. Seb Streifel has proposed the AAPB and ISNR begin considering how to develop practice guidelines for neurofeedback. We're a very long way (research, research, research) from being able to define the "right" way to treat any disorder, if indeed there is a "right" way. But it may be possible to develop useful guidelines that would tend to help insure clinical success and avoid harm. I'm sure this will be an interesting discussion in the coming year.

Another standards issue I've heard about from various people is in the instrumentation and software arena. It would be a help to our field if we had a way to know, based on published data – public, easily available data – exactly what our neurofeedback machines and other devices are doing. Do we know that a 10 uV, 10 Hz signal input actually displays as a 10 uV, 10 Hz signal on our screens? It might be interesting to have this conversation with all the manufacturers and to discuss the possibility of a published consensus standard for neurofeedback equipment. The ISNR, AAPB and BCIA have in a way begun this process by developing a "standard" and reasonable definition of what the biofeedback/neurofeedback principle is. The ISNR will add to this with a definition of what we think neurofeedback is in terms of methods and scope. But we can go further and say, with the cooperation of the manufacturers, what neurofeedback hardware and software should do and how we can tell if it does that. We can go further by developing some mechanism to test equipment, including ongoing random samples of production runs and field tests of aging equipment. Some manufacturers may already have some of this data; we'll be opening this discussion this year.

Finally, I must not leave out the core of the conference, the fantastic set of presentations and workshops our Conference committee labored hard and long to present. I heard presentations ranging from applications of neurofeedback to a wide range of clinical problems, to basic neuroscience and principles of experimental design that are very pertinent to the ongoing development of this field. These wonderful presentations always highlight the importance, but also the difficulty of what we do in our clinical work. It seems inevitable that increasing the internal validity of research diminishes the external validity, i.e., the degree to which the experimental conditions are similar to the actual conditions in the clinic. The trick for the clinician is to be informed by – but not limited by – the existing research. It is the task of the clinician to apply truly scientific levels of observation and measurement and to use what knowledge is painstakingly gained from careful research. On the other hand, I think it is also the task of the clinician to go beyond existing research, using clinical judgment, generating hypotheses specific to the individual we're working with and testing those hypotheses as best as can be done in the real world. Clinical work must be informed by research, but research should also, I think, be informed by clinical practice. The initiative of the ISNR Research Foundation that we've launched will try hard to add to this interesting mix with large scale and well controlled studies. But as a clinician, I cannot wait for the outcomes of even the best research. I think one has to reason with the results of research in mind to generate what one believes will be the most helpful and efficient strategies. I don't think things would work so well if we didn't demonstrate strong, positive belief in what we're doing. Belief and applied neuroscience? Another topic for another time.

John K. Nash, Ph.D., L.P., Fellow, BCIA-EEG
President, ISNR

ISNR Co-Editor
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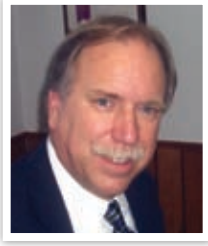
ing you with issues coming up on Autism, Epilepsy and Asperger's, hopefully in that order. Working with veterans who have suffered Traumatic Brain Injury, Post Traumatic Stress Syndrome and Epilepsy are to be a focus also. If you are or have experiences with clients with these issues do send us case studies for the upcoming issues. We will all be most appreciative of your contributions.

Have a wonderful autumn and see you at the next ISNR conference.

Warmly,

Merlyn Hurd PhD, BCIAC/EEG Fellow
Co Editor of NeuroConnections

Letter from AAPB ED



AAPB Launches New Services

Member service is the cornerstone of AAPB. A primary component of our membership is made up of clinicians. Therefore, it is paramount that we equip our members with resources that will help them in their practices. The adage "information is power" comes to life with AAPB's newest service, the Clinician's Tool Kit. It provides information needed to run, promote, and sustain a successful clinical biofeedback and neurofeedback practice. This new service is located on the AAPB website in the Members-Only Section and includes:

1. Patient/Consumer Tools – information to help educate consumers about biofeedback and neurofeedback and their effective use in treating a variety of disorders and affecting optimal performance.
2. CPT Codes – provides guidance for codes to be used in the practice of biofeedback and neurofeedback.
3. Insurance, Billing & Coding – information to help clinicians in working with third party payors and appropriate billing and coding practices
4. Justification for Biofeedback – this section provides valuable resources to use when helping clients answer questions about the efficacy of biofeedback and neurofeedback. Information from this section can also be used with insurance, local media, local medical communities and other referring sources to educate them on the value of biofeedback and neurofeedback in treating a variety of disorders.
5. Biofeedback in the Media – this section provides access to a variety of information that has appeared in the media about biofeedback and neurofeedback. This information can also be useful in educating clients and others on the efficacy of these modalities.

Members can simply login to the AAPB members-only page at www.aapb.org and put these services to work for them.

In addition to the new Clinician's Tool Kit, AAPB has two new publications, Biofeedback Mastery: an Experiential Teaching and Self Training Manual and the 2008 edition of Evidence-Based Practice in Biofeedback and Neurofeedback.

The first teaches basic skills derived from more than 30 years of biofeedback training and teaching experience. Authored by Erik Peper, PhD; Hana Tylova; Katherine H. Gibney; Richard Harvey, PhD and Didier Combatalade, D.C. Biofeedback Mastery covers the following important areas:

- Making sense of the data;
- Translating a computer-based practice into home practice;
- Monitoring and displaying biological signals of interest;
- The underlying physiology of each signal;
- Accurately recording the signal;
- The basics of self-regulation;
- Limitations of psychophysiological monitoring;
- Techniques for connecting and attaching sensors;
- Discriminating real feedback signals from artifact.

The second new publication, Evidence-Based Practice for Biofeedback and Neurofeedback – 2008 Edition, by Carolyn Yucha, PhD and Doil Montgomery, PhD, reviews the efficacy levels of 41 types of disorders treated with biofeedback and/or neurofeedback. These reports represent an increase from 37 specific disorders and a doubling in size over the previous edition, from 48 to 96 pages. Biofeedback and neurofeedback provide the kind of evidence-based practice the health care establishment is demanding. Evidence-based practice is a process that uses the best evidence, preferably research findings, to guide delivery of health services. Levels of evidence range from case reports to observational studies to randomized clinical trials.

All of the new AAPB services are available online at www.aapb.org.

It was great to meet so many of you at the recent ISNR Annual Conference in San Antonio. We hope to see you at the 2009 AAPB Annual Meeting to be held in Albuquerque, NM. Mark your calendars now for April 1-4, 2009 and plan to attend!

David L. Stumph, IOM, CAE
Executive Director

Wideband DC-EEG Amplifiers, Slow Cortical Potentials and Noise Cancellation Technology

Erwin Hartsuiker and John Anderson

In cooperation with Erwin Hartsuiker of Mind Media, I received an advanced copy of the new NeXus-10 /BioTrace+ system in January of 2004. I was quite impressed by the quality of the hardware and software and I was immediately drawn to a new feature with which I was completely unfamiliar. The system utilized a sophisticated DC amplifier that was capable of displaying a wide frequency range from 0 Hz up to about 1000 Hz. I was, of course, accustomed to AC amplifiers that blocked the DC portion of bio-potential signal, leaving only the AC or alternating current EEG pattern that fluctuated in a positive to negative wavelike pattern above and below the zero line.

With the benefit of this new amplifier and software, I was able to see not only the AC information but also a general fluctuation in the overall electrical properties of the cortex that I later learned represented a measure of the excitability characteristics of that cortex from moment to moment. I now had access to a measure known as slow cortical potential (SCP), but what to do with it?

Erwin suggested a search of the literature for information about SCP and recommended publications by Niels Birbaumer and colleagues at the University of Tübingen in Germany. They had been working with slow cortical potentials for quite some time and had shown some positive results when working with clients with seizure disorders. They had noted that the SCP gradient became more negative prior to the onset of seizure activity. It appeared from their published work that they found training an individual to have voluntary control of this electrical gradient could give them the ability to prevent or minimize seizure activity and their results appeared to demonstrate this quite nicely. At this point a discussion of what this electrical gradient represents and how it is measured is needed.

In 1875, Richard Caton identified what may have been the first evidence of slow cortical potentials (SCP) in an article in the British Medical Journal, titled The Electric Currents of the Brain. He stated "The cortex's Direct Current baseline waxes negative whenever it is more active. Gradients of 150-200 μV/mm are noted." He later noted "when any part of the gray matter is in a state of functional activity, its electric current usually exhibits negative variation." Some later researchers suggested that this signaled the discovery of the "steady potential" or the DC potential of the brain, though others have noted the possibility of equipment-based artifacts in his recordings (Niedermeyer, 1999).

This characteristic of cortical activity identified by Canton has been subsequently verified in animal and human subject research. To put it simply, when the cortex is active and engaged, it becomes more electrically negative and this change in electrical gradient can be measured at the scalp with appropriate devices. When the cortex becomes less active a corresponding movement toward greater positivity in the electrical gradient is observed.

Birbaumer and others have used this characteristic feature of SCP to train individuals with a variety of conditions, including migraine headaches and ADHD, in addition to those with seizure disorders. The thinking seems to be that when you have an individual with a significant degree of under arousal, which you might observe in an ADHD client with a finding of excess frontal slowing, you would train for control of the SCP signal with an emphasis on encouraging greater negativity, which we have not-

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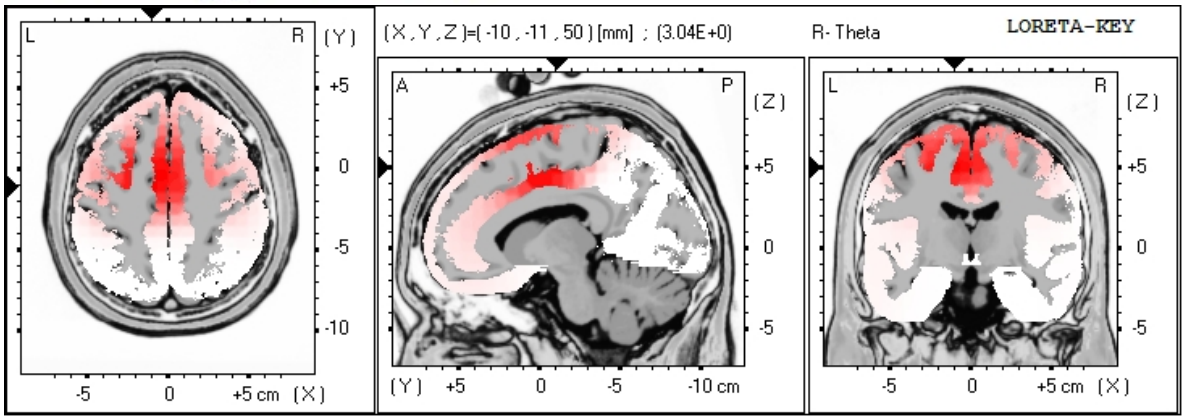

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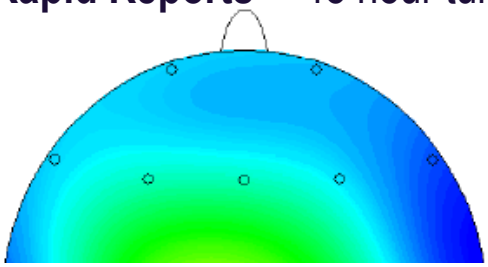
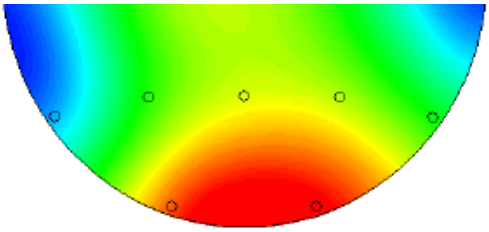


We provide understanding and follow-up... not just more data



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Wideband DC-EEG Amplifiers continued from page 7

ed above, corresponds with more activation of the cortex. For an individual with excess activation, which might include a migraine headache sufferer, the same protocol could be used with an emphasis on encouraging greater positivity and hence a decrease in overall cortical arousal.

This was certainly an intriguing possibility. Here we have a single measure, easily accessible with a DC amplifier and appropriate software that could be trained in one direction or another to resolve a wide variety of presenting conditions. Significant research had already been done by reputable individuals and this information had been published and had also been presented in a variety of professional meetings, including the ISNR SABA conferences.

As I continued to pursue this line of inquiry, I had a discussion with an electrical engineer who informed me that to be able to manage the high voltages of the DC signal it would be necessary to have a high resolution analog to digital (A/D) converter. I then found that the NeXus amplifiers have very high resolution, 24-bit analog to digital converters (more than one million steps of resolution), which gives them ample "headroom" to handle DC offset voltages. Most AC amplifiers with a lower A/D converter value would find their input stages overwhelmed if they didn't block these voltages with capacitors and hardware-based high pass filters. The NeXus 10 amplifier that I was using had four channels with this high resolution capacity.

This amplifier and the corresponding BioTrace+ software allowed me to view a single electrophysiological signal that included slow cortical potentials, EOG (electrooculogram), ECG (electrocardiogram), EEG (electroencephalograph) and EMG (electromyograph), depending on sensor placement and filter settings. I didn't need separate sensors, pre-amplifiers or other devices to visualize each of the signals. They were all available as a result of the design of the amplifier and software. Finally, access to SCP also opened up the potential for monitoring and assessing event related potentials (ERP).

Another issue addressed by the new technology was the elimination of the customary alteration of the EEG signal by the use of various filtering approaches. Erwin explains this as follows:

Artifacts and the classical EEG Amplifier

The typical classical AC based EEG amplifier cannot measure slow cortical potentials and uses all kinds of filters to eliminate "unwanted" signals (external and physiological artifacts). Such amplifiers typically use 3 filters to accomplish this:

1. A high pass filter set at 0.5 to 1 Hz. (filtering out DC activity and SCP)
2. A low pass filter set at, for instance, 35Hz, 40Hz or 70Hz. (suppress EMG)
3. A notch filter to suppress 50/60Hz main interference.

The "bad news" is that all these filters actually alter the signal and the phase of the waves. In other words: they alter the shape of the EEG waves. There is even a risk in that a bad source signal may look quite reasonable after intensive filtering. Bio-medical engineers know the principle of "garbage in – garbage out." In EEG terms this means: if you put a noisy signal, full of EMG, 50/60Hz, movement artifact and other garbage, into a classical EEG amplifier, run it through some heavy duty filtering, you may end up with something that looks quite acceptable, but of course, it is not. Garbage is garbage.

Image 1 shows such a "poor" source signal. It contains movement artifact, EMG and 50/60Hz. By the way, this 'EEG' signal was not measured on the head, but from the foot! Beneath it, the same signal is shown after filtering. It does look somewhat like EEG, does it not? This should perhaps make us wonder what it really is we are monitoring and using for EEG training. How much artifact does a typical EEG really contain?

The following list is not complete by far, but some of the typical problems with classical EEG amplifiers and electrode cables are:

1. Movement artifact may show up as Delta or Theta waves. (try swinging your EEG cables on your system and observe what happens)
2. Low level EMG artifact may appear to be SMR, Beta or Gamma activity
3. 50/60Hz (even when suppressed by a notch filter) may impact Beta and Gamma and distort the EEG signals.
4. High electrode impedance (poor contact to the skin) above 10Kohm may cause noise and increase 50/60Hz interference.

We have to realize that any filtering that is used to removing artifacts (whether it is digital or analog) is really something that alters the signals and data. But then, is there a way to use less filtering to condition the signals? Is there a way to see the source signal as it is (wide band) and get signals with less artifact?

One of the main design considerations in the development of NeXus and the BioTrace software was to address these questions. One surprise, the NeXus wideband DC amplifier does not have any of the typical filters found in most classical EEG amplifiers. There are no high pass filters around 1 Hz, no low pass filters around 35-70Hz, nor are there any notch filters. From

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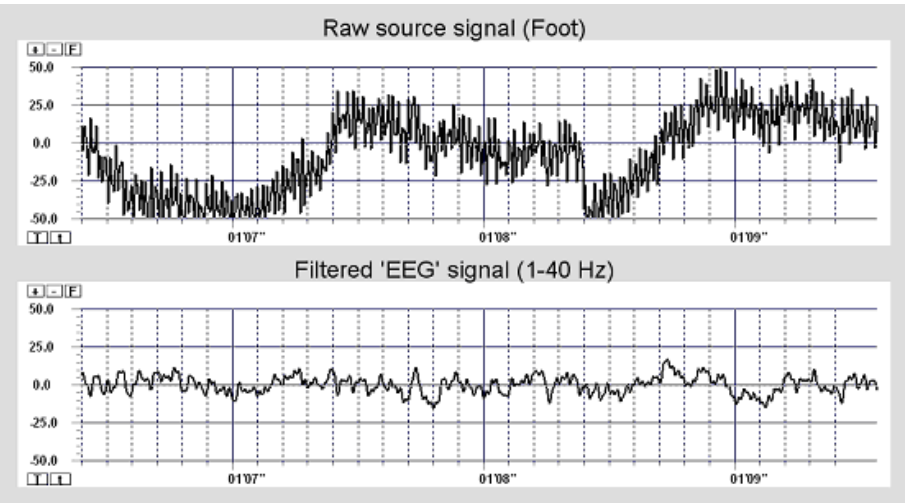
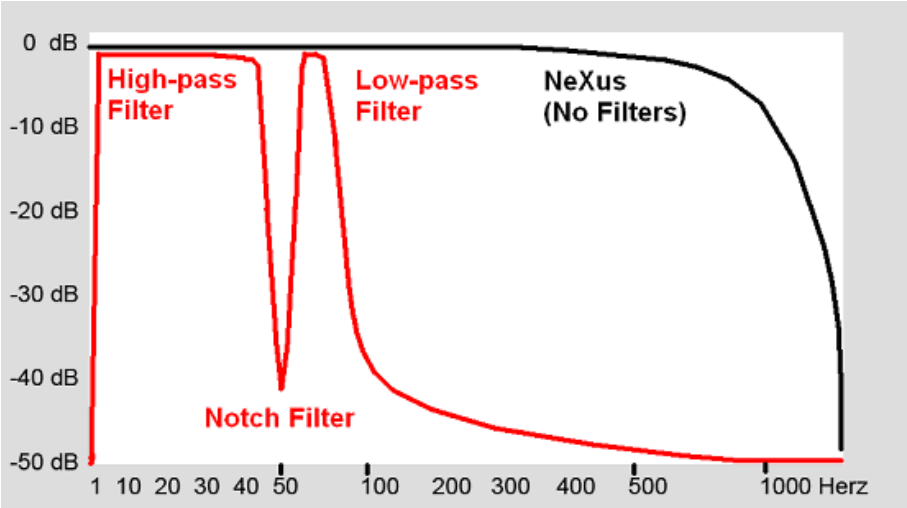


Image 1

Wideband DC-EEG Amplifiers continued from page 7



Graph 1

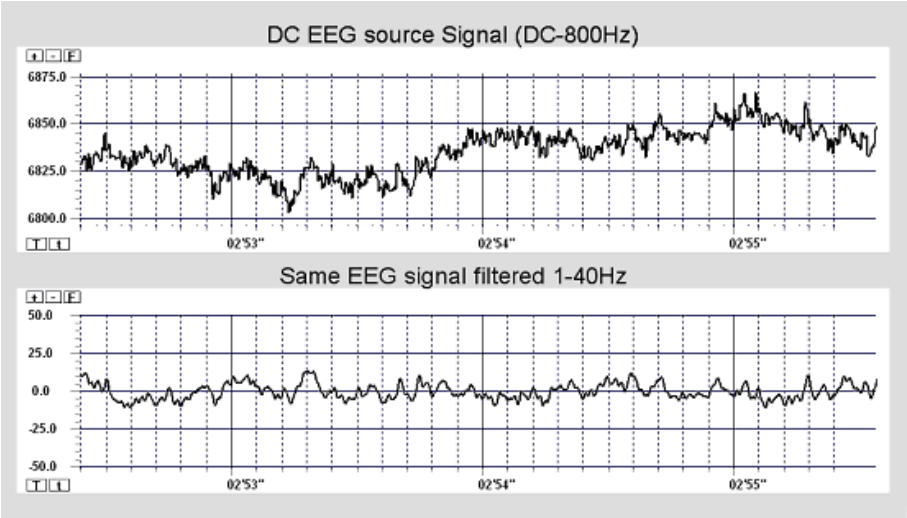


Image 2

DC to way over 200 Hz, the frequency response is flat.

Graph 1 illustrates this flat response and compares it with the frequency response of a typical classical EEG amplifier.

As you can see, (illustration 2) NeXus monitors the entire EEG signal from DC (slow cortical potentials) up to high EMG frequencies around 1000 Hz. This allows us to see a much broader picture. The graph below shows the filtered classical EEG (1-40Hz) and the entire wide band signal without any filters. Notice the DC offset in the source signal.

This approach has some real advantages to researchers and clinicians. From a single set of electrodes, say a standard referential placement with positive on Cz and negative and ground on the earlobes, we can simultaneously monitor both the DC (SCP) activity, Delta, Theta, Alpha, Beta to Gamma and observe EMG artifact up to 500 Hz or more. So now we can check whether our Beta and Gamma activity is real or whether it is actually a 'side effect' of high frequency EMG. After all, Neurofeedback is about training the brain and not muscle activity.

Active Noise Cancellation Technology

In order to get a cleaner source signal, the NeXus uses special carbon cables with active shielding technology, also called active noise cancelation. The net effect of this is that 50/60Hz artifact is very low (without any notch) and movement artifact is virtually absent. Even swinging the cables normally does not create movement artifact. Slow cortical potential activity occurs within a frequency range that is particularly susceptible to movement artifact, including eye movement artifact, and even subtle baseline shift due to cable movement. Historically the approach to address this problem has been to develop software algorhthms which reject all trials in which eye movement or other activity exceeding a given threshold is detected.

Modern equipment manufacturers now have an additional method at their disposal to exclude movement artifact from SCP recordings – the use of high performance actively shielded cables which are less susceptible to movement artifact(such as that caused by subtle cable sway

It should be noted here that active noise cancellation does not work like a filter, rather it shields the signals from external interference, so some of the 'garbage' does not enter the amplifier to begin with. This is particularly important at the lower end of the spectrum where we find Theta, Delta and slow cortical potentials. Most classical EEG amplifiers use copper wire for electrode cables. Moving that cable will generally produce slow wave-like activity with amplitudes that can be as low as a few microvolts (difficult to recognize) or over 100 microvolts (easy to recognize).

Anyone with EEG equipment can try this out and see how much artifact moving the cable actually causes. So why is movement artifact a concern? Well, we all know that some ADHD kids (and adults) have a hard time sitting perfectly still. When slow wave activity is used for feedback training, it would be nice to know it is not caused by (subtle) cable movement.

What is DC-EEG and how do we measure SCPs?

Slow cortical potentials can only be measured with a DC-EEG amplifier. The DC amplifier not only measures the alternating current (AC) signal but also the absolute DC levels. The largest DC component of the DC-EEG signal is composed of the electrode-offset or 'battery effect' of the electrode. The combination of electrode paste and gel, the electrode material and the skin (sweat) works like a miniature battery. Then on top of that are the actual, rather small bio-potentials generated by the brain. The electrode-offset is usually fairly large. With Ag/AgCl based electrodes it can be as high as 25,000 microvolts. Silver and Gold produce even higher offsets and are therefore not recommended for DC-EEG or SCP recordings.

Being able to measure this DC electrode offset in real time has a nice side ef-

fect; the offset correlates with electrode impedance! That means if electrode impedance is higher the offset will also be higher. So indirectly this is a good alternative method to check the electrode-skin contact, with the advantage that a session does not need to be stopped as with most classical impedance tests.

I was training slow cortical potentials and so I wanted to further explore this method. I began experimenting with SCP training according to the Tübingen approach as implemented by the BioTrace software.

SCP Training and Clinical Protocols

In a semi random fashion, the client is instructed to make their brain potentials more negative (cortical activation) or positive (reduced activation), so the emphasis is on training control. The actual amplitude of the shift is secondary. Each trial is about 8 to 10 seconds. During each trial the success of the training (time over threshold) is fed back with a tone, reward counter (score), and visual graphic animation.

With this protocol already built into the software, I was able to practice this technique and develop fairly good control of the signal, as evidenced by the separation of the tracings in image 3 representing the averaged negativity (red) and positivity (blue) responses during a session.

During this self training, I experienced changes that appeared to be attributed to greater control of the slow cortical potential gradient. When the emphasis was on increasing negativity (more negativity trials) I experienced an increase in activation, at times leading to difficulties with sleep and an increase in muscle tension. Training that emphasized greater positivity (more trials encouraging the positive shift) tended to leave me feeling somewhat sluggish and tired. All of these training sessions were done with the dual (two channel) active sensor at Cz and a reference on each mastoid, following the Tübingen approach.

After this period of self training and following further study of the published literature, I was ready to work with a few select clients. The first was an 18-year-old male with significant frontal slowing and a diagnosis of ADHD inattentive type. His initial SCP training session showed little ability to control the direction of his electrical gradient in response to the trial stimuli (see image 4).

Later sessions showed much greater control and corresponded with self-reports

Continued on page 12

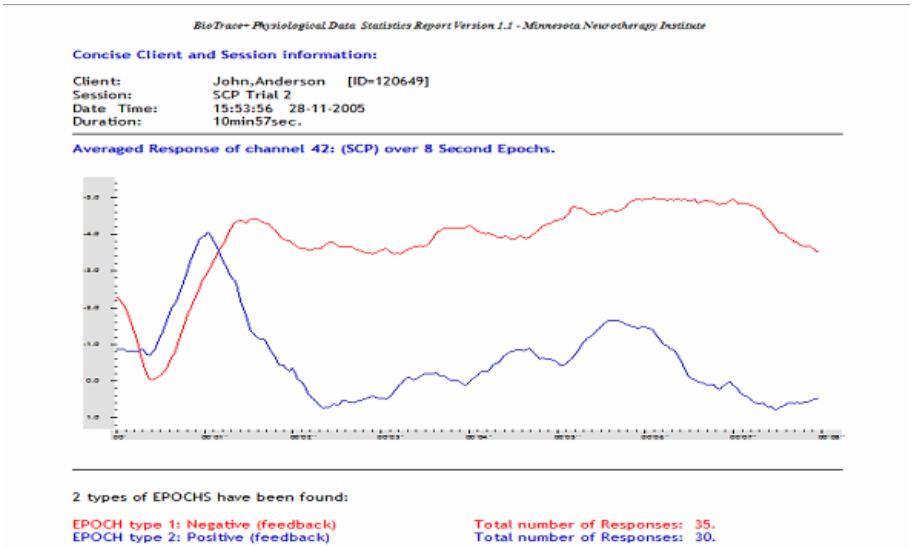


Image 3

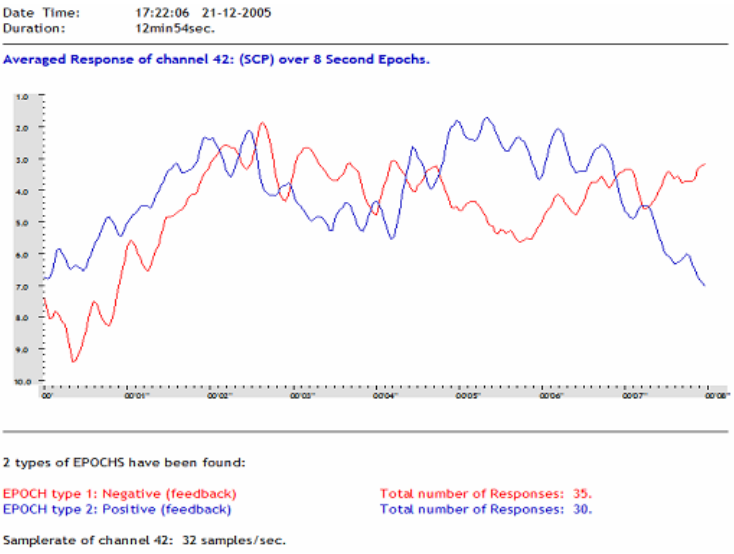


Image 4

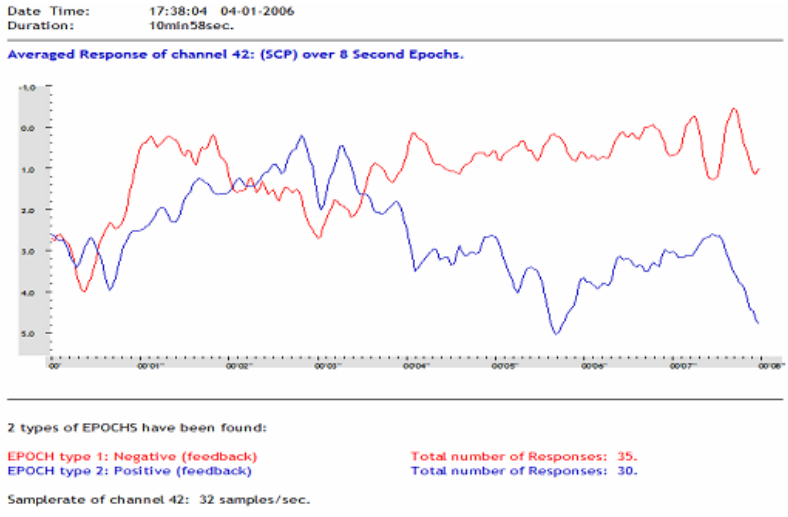


Image 5

Wideband DC-EEG Amplifiers continued from page 11

of improved attention and better grades in school (see image 5).

Other clients showed similar results when the goal was increased activation. However, clients with a need for decreasing activation had more difficulty and did not experience the same positive effects.

There appeared to be a need for an alternative training approach for these clients. With this in mind, a protocol was devised to gradually reward an increase in positivity in the SCP signal over the course of a 30-40 minute training session. Participants reclined in a comfortable chair with their feet up and listened to variable volume music feedback or variable volume natural sounds such as a recording of ocean waves. The volume was set to increase as the SCP gradient became more positive and decrease as it became more negative. The sound of birds chirping was linked to a delta frequency (1-4 Hz) feedback instrument to alert the client if they became drowsy (delta amplitude exceeds a preset threshold) as this has been a reliable indicator of the onset of sleep in alpha/theta training protocols.

Figure 1 shows the composite session results for an individual undergoing this training protocol. It is clear that the individual has demonstrated a steady trend toward the positivity condition and that this trend corresponds with several other changes in both AC EEG and in the peripheral biofeedback measures of finger temperature and GSR (Galvanic Skin Response).

Figure 1: This review screen shows changes in peripheral measures: basal skin resistance (BSR), a measure of galvanic skin response, and finger temperature – higher values of both measures reflect decreased arousal. Slow cortical potential gradients show positivity as up with the zero line indicated. Alpha and theta line graph indicates the classic "crossover" state common to a/t training. A 13-36 Hz. bar graph shows decreased cortical activity and possibly decreased motor output. 7 Hz. bar graph shows increased activity in the 5.5-8.5 Hz. band, again associated with the so called crossover state.

The post-session self-report of this individual described a profound level of relaxation and a sense of peace not experienced prior to this session. This individual was an experienced meditator and had participated in a number (>20) of traditional

Continued on page 14

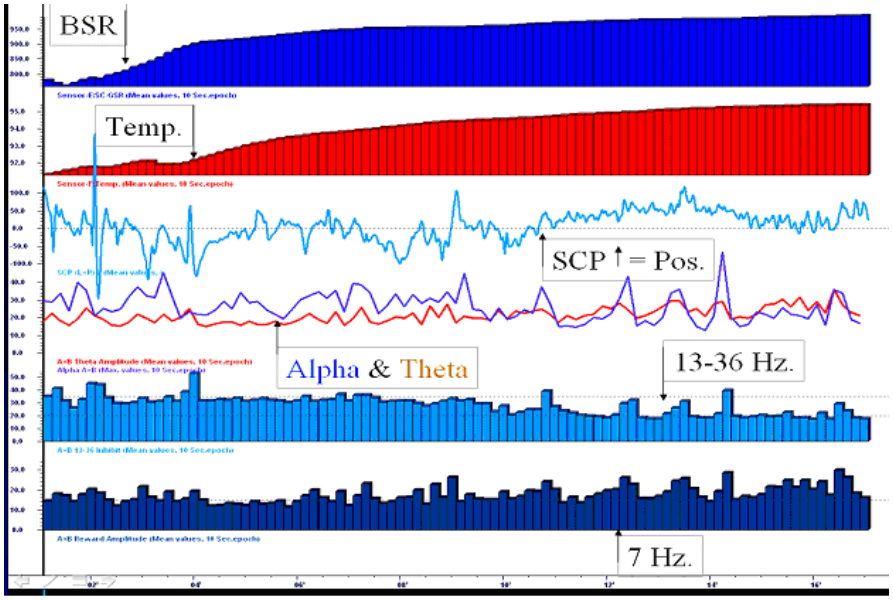


Figure 1

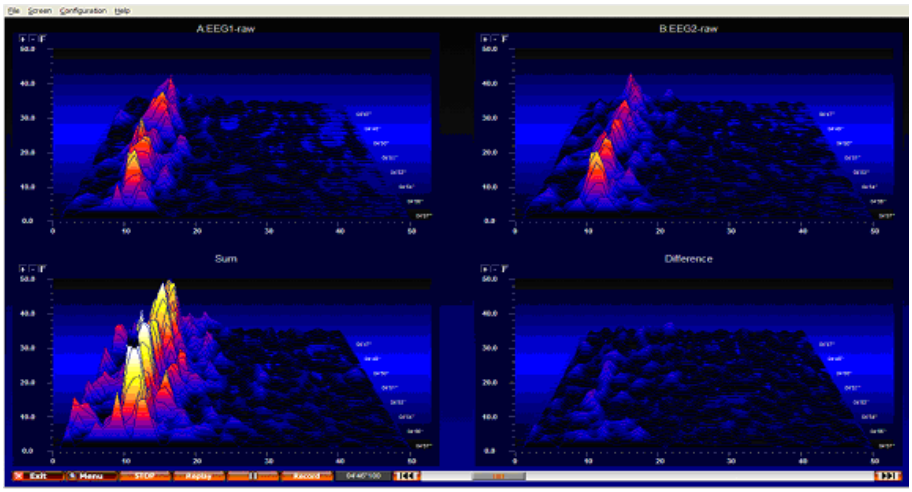


Figure 2

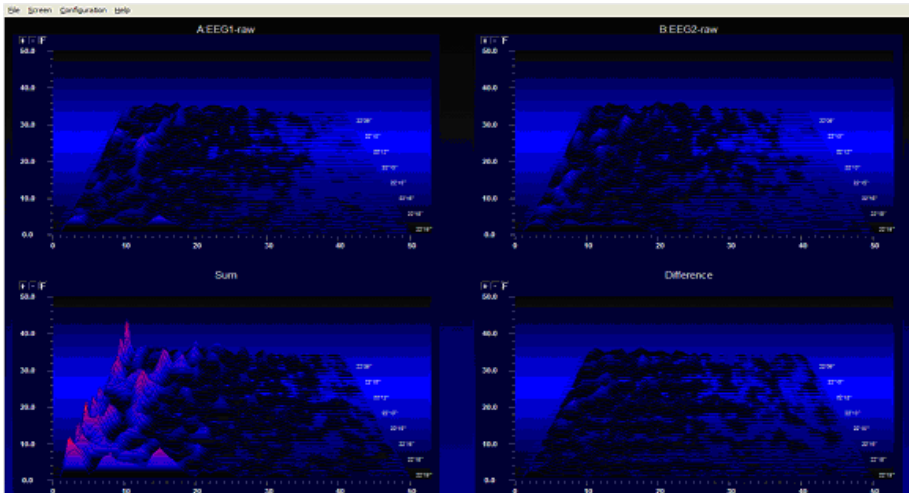
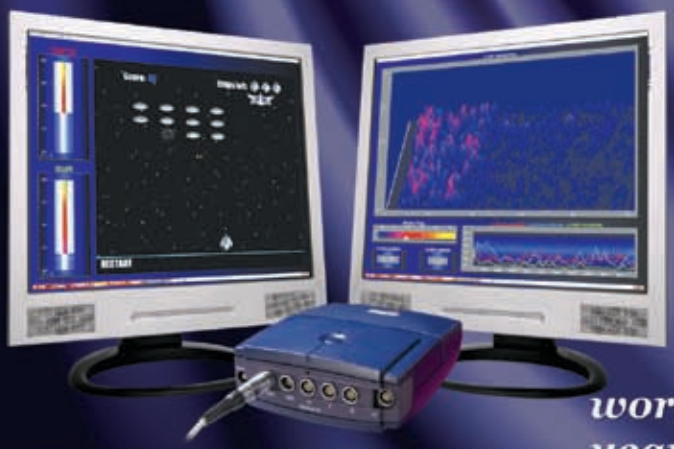


Figure 3

Biofeedback workshops for professionals... by professionals



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Wideband DC-EEG Amplifiers continued from page 13

alpha/theta training sessions.

Figures 2, 3 and 4 show another individual utilizing the same training paradigm. Figure 2 shows the initial eyes closed segment for this individual indicating a high degree of 8-11 Hz. activity. Figure 3 shows the activity later in the session indicating a generalized decrease in overall activity. Figure 4 indicates the average SCP change for the entire session. Note the time indicator of figure 3 corresponds to the period of greatest SCP positivity.

Figure 2: This figure shows four compressed spectral array graphs representing approximately 10 seconds of data at approximately 5 minutes into the session. The top two graphs represent channel A and B activity while the bottom graphs show the sum of the two channels (left) and the difference between the two channels (right). Note the high amplitude 10 Hz. activity that appears to be quite synchronous.

Figure 3: This figure shows the same view as in figure 2, at approx. 22 minutes, using the same y-scale values. Note the generally decreased levels of cortical activity displayed here compared to Figure 2.

Figure 4: This figure shows the SCP gradient as 1 minute mean value bars indicating that the greatest positivity values corresponded with the same time point (between 22 and 23 minutes) displayed by the graphs in Figure 3.

In conclusion, based on the scientific research that has been published up to date, we believe training slow cortical potentials is certainly something that may be of interest to many clinicians and researchers. We believe the potential of SCP training is not so much that it will replace classical EEG feedback training, but we do expect it will establish itself as another method to train the brain.

It is clear that there are many opportunities for additional experimentation. These possibilities could include active sensor placements in areas that are specific to a client's presenting disorder and/or findings on a quantitative EEG assessment, rather than simply using a Cz placement. Additionally, other training protocols could develop that might be more efficacious when working with clients needing to increase either positivity or negativity.

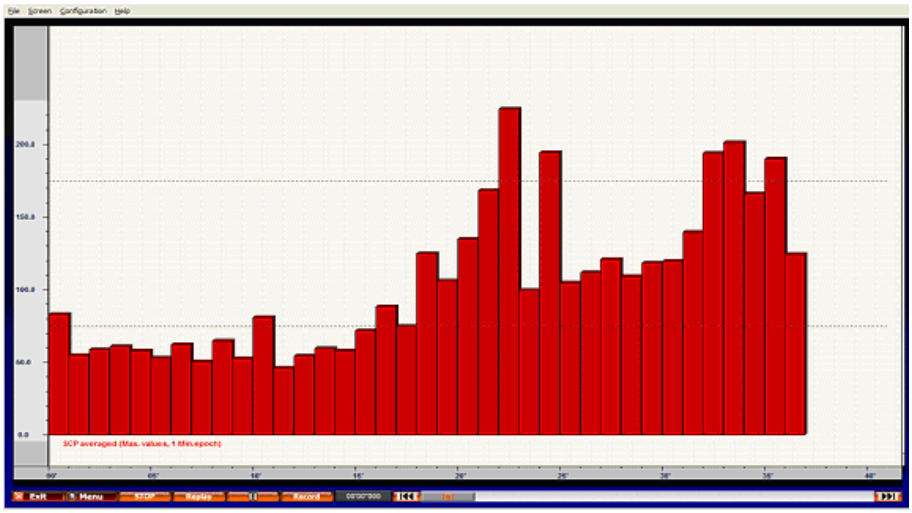


Figure 4

Reference

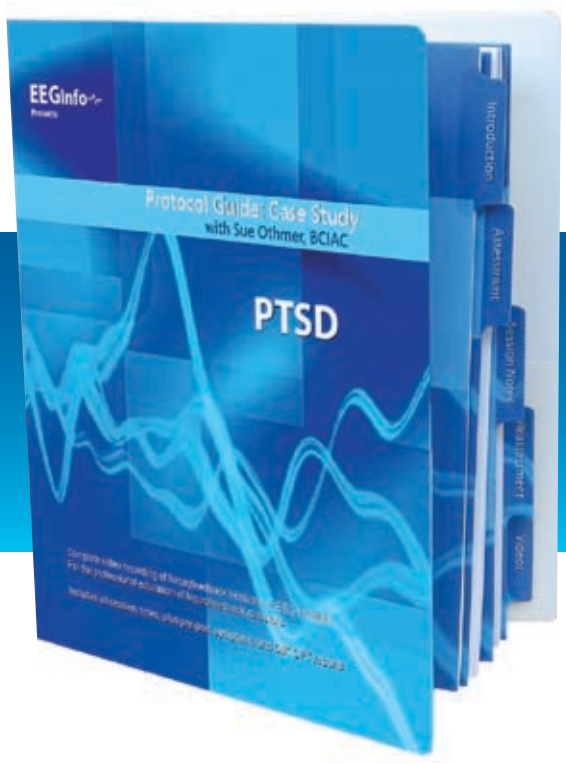
Niedermeyer, E. (2004). In Niedermeyer, E., & Lopes Da Silva, F. (Eds.)

Electroencephalography; Basic principles, clinical applications, and related fields. Baltimore: Williams & Wilkins

Protocol Guide: Case Study

with Sue Othmer, BCIAC

PTSD



In response to clinician demand, EEGInfo has created the **Protocol Guide: Case Study**. This video case study expands on Sue Othmer's popular "Protocol Guide," offering the unique opportunity to experience Sue's decision-making process firsthand.

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- how to translate symptoms into optimal reward frequencies
- how to choose training sites
- what questions to ask and how to correctly interpret the answers

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In the PTSD Case Study, follow along as Sue works with Kevin, a 10-year veteran of the conflict in Bosnia. Some of Kevin's symptoms include sleep issues, panic attacks, nightmares, and depression. Watch Sue in action as she determines his optimal reward frequency. See how he changes and how she adjusts her protocols in response. In addition to the awake-state training, Sue's use of Alpha-Theta continues to yield significant progress and by the end of 24 sessions, he is a self-reported "new man." He is sleeping through the night without medication, able to go to the grocery store, the movie theater, and out to dinner for the first time in years.

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The French Connection—EEG, Peripheral Biofeedback and CBT

The Legacy of physicians Anne Blanchard-Remond and Antoine Remond—An Interview by Elizabeth L. Stroebel, PhD

Among the attendees at AAPB's early meetings many decades ago could be found a remarkable French couple, Drs. Anne and Antoine Remond. Anne Blanchard Remond is a visionary psychiatrist whose efforts to break free from the constraints of psychoanalytic methods led her to pioneer the introduction of CBT and biofeedback to the European medical community.

Antoine, a founding member of both French and International EEG societies, with over 400 published papers, was a pioneer of early topographic EEG brain mapping methods which predated the computer era. Together, this physician couple played a pivotal role in introducing peripheral and EEG biofeedback to the European scientific community. They jointly went on to found France's first biofeedback society, and publish some of the first scientific papers on biofeedback in Europe. Anne Remond shares her memories of those years with her dear friend, Elizabeth Stroebel, who serves as her translator in the pages that follow(Ed. Riss):

Love in the time of EEG and CBT

When Antoine Remond and I met at the University of Paris, Faculty of Medicine, we were 19 years old and in the first year of medical studies. We were good pals-nothing more, yet with a keen interest in the coming together of science and medicine

I was brought up in Paris in a distinguished political family. My Father, who was anticipated to become Prime Minister of France, was killed in an airplane crash when I was twelve years old. Under the tutorledge of an English governess, I became proficient in English, bilingual, spoke fluent German and took up Latin, all of which became crucial to my survival in WWII, and later professional endeavors. I did not go to school until age fourteen. At an early age, I asked myself. "What can I change in the world?" At university, Antoine and I asked the same questions and frequently discussed how scientific and humanistic goals could advance our dedication. Antoine was born in Cordilliere des Andes at St. Raphael de Mendoza to parents who were "vine planters", and the grandson of Professor of General Medicine at the Faculte de Medecine at Toulouse (France). In 1921, they moved to Corbie, near Amiens, France.

World War II came and we did not see much of each other. I had completed my medical studies, but due to my heritage, I was dismissed from the hospital, as a physician, and was forced to flee Paris in the wake of the tragedies of the annihilation of family members. Antoine served in the military and was highly involved in the French Resistance, earning him the "Medaille de la Resistance". He was involved with many Parisian physicians in building an underground medical hospital in the heart of Paris, during the occupation, as well as working in the general pathology laboratory directed by Prof. A. Baudoin, the first French lab to carry out EEG techniques.

Antoine and I met again in 1944, when I was married to a neurologist as soon as Paris was freed, and we had moved to Amiens in the north of France. My husband and I bought a bombed house, and my chief task was to rebuild it while raising our four children, as well as building four structures for child psychiatry. There I began my private practice, which continues today.

As my neurologist husband needed EEG, he asked me to learn more about EEG applications. Meanwhile, Antoine was beginning his life long work at the prestigious CNRS (Centre National de la Recherche Scientifique) and had a school for teaching EEG in Paris and doing research at the Salptriere Hospital (Paris). In the 1950's, I often came to Paris to continue my work in EEG and to discuss cases. During this time, Antoine developed the early EEG map of the brain and continued seminal work on evoked potentials, advanced for the time.

My husband died. Several years later in 1975, Antoine and I married. We combined our families, as Antoine's wife had died. While both of us were dedicated to EEG, my interest was always looking toward its implication in psychiatry. We worked together in his Lab, the LENA (Laboratoire d'Electro-encephalographie et Neurophysiologic Appliquee) that Antoine originated and was director for nearly forty years. His research in EEG was very advanced for the time. He was President of the International Federation for Medical Electronic and Biological Engineering and President of the International Federation of EEG Societies.

Collegial Influences

Our work was the refinement of Antoine's visits in the USA in 1945, where he and a crew of French physicians observed what Americans knew about EEG. He brought this knowledge, as well as enormous computers for EEG back to France. In 1951, Antoine published the original work on classic myoclonia, the first significant research on effects of intermittent light stimulation and papers on treating Parkinson's disease. We continued collaboration with American scientists. Antoine continued his collegial affiliation at USA conferences. His knowledge of advanced EEG was of interest to his friends and colleagues there and in France. In the States, the research ideas were good, but there was controversy over the placement of electrodes and the diversity of outcome readings. Some of the clinicians and researchers were drawn to the EEG field but weren't sufficiently trained in its use or interpretation of data. Many conclusions were misleading. However, Antoine and I consulted with knowledgeable colleagues, i.e., Kamiya, Surwit, Mulholland, Taub, Sella and Toomim, and others, in both the States and Europe, combining their knowledge with those in France at LENA and CNRS.

Combining EEG and Peripheral Biofeedback

In the early 1970's, I continued my interest in looking at emotional changes that could

Continued on page 18

The French Connection continued from page 17

be measured with other Biofeedback parameters using heart rate, GSR, respiration, and EMG, and withstood the skepticism and hostility of the psychoanalytical Freudian psychiatrists. I went to the States to learn more about the Biofeedback field and brought back the premises of Biofeedback techniques and its potential for clinical work to my colleagues. Antoine and I combined our interest and registered EEG along with what is now peripheral Biofeedback with other variable and protocols. We hired students from the medical faculty in the Salptriere Hospital for several sessions each lasting an hour and a half or abit more. EEG along with GSR, EMG, pulse, and HR were attached. While being attached to equipment, the students first read texts without showing any increased anxiety on the recordings. When they were required to give the meaning of what they had read, what was shown was heightened anticipatory anxiety. The students were then exposed to scents both pleasing and awful. At least ten measures were used. They were shown both pleasant and horrible pictures, some of a man and woman having a heated discussion, and others in provocative situations. Each student registered unique reactions with a wide range of emotional responses as the EEG registered the conscious and unconscious responses. The data was recorded on camera as well.

Antoine had always worked in fundamental research where he developed the early EEG map of the brain. It didn't have much success but years afterwards his work was worldly recognized. He was among the first to work on evoked potentials, which was very advanced for his time. While I understood EEG, it wasn't my only area of interest. I worked with Cognitive Behavioral Techniques in psychiatry. We combined our interests and registered the EEG with other variables. We used respiration, heart rate, and GSR to record and examine what was the impact of emotions. Both of us worked together with colleagues at LENA.

Little by little, Antoine and my perspectives came together. While Antoine never abandoned his fundamental research principles; nonetheless, he was excited about examining another path of knowledge that included psycho physiologic behavioral research. And for me, this research was highly relevant to psychiatry. Both of us looked at how 'measure and data' were inextricably linked to the interactivity of the brain, emotions and health, a dimension that one could not dismiss its importance. Thus our research took yet another turn toward measuring human being's reactions to stimuli by recording with statistical analysis of the conscious and unconscious in combination with Biofeedback, which is common practice today. There was mutual sharing among colleagues in France and abroad, especially in the States.

Resistance-CBT and Psychoanalysis

In 1975, there existed huge resistance by the psychoanalysts in Paris against Cognitive Behavioral Therapy. At this stage for

me in private practice in Paris especially, I was surrounded by psychoanalytical Freudian psychiatrists. As a psychiatrist, I did not believe that one must stay in the past, and I focused on moving the patient forward. I had no time to sit like a psychoanalyst with my hands folded. Some thought I was totally mad with these CBT ideas. I had no friends and no colleagues in the psychiatric establishment. Fortunately, a few neurosurgeons, neurologists, and general practitioners were willing to listen to the merits of CBT and sent me patients. The psychoanalysts shut the door in my face. I was a heretic in their eyes. At the Salptriere Hospital, I was rejected and humiliated by traditionalists; yet, there were a few who were willing to listen. However, I refused to be intimidated by the negative pressures. I believed in the validity of cognitive behavioral techniques.

Along with five colleagues who believed in the practice of CBT, I helped organize informal meetings for the purpose of bringing together theories and to define practices, which became the underpinnings of this controversial movement in Paris. These few physicians made steady inroads within their small circle and played an informal role in the infancy of what is now the de l Association Francaise de Therapies Comportementale et Cognitive AFTCC. My work was with children, parents, adults, the mentally ill and other troubled individuals.

Avoid perpetuating problems

One of the more important skills I taught my students, colleagues and patients: "Not to keep your eyes in the back of your head." Dwelling and dwelling and rehashing the same script does not bring change. Equally important for the therapist was not to be "drawn into the hole and make it bigger." For the inexperienced therapist, it is seductive to perpetuate the problems. When a patient is ill, one has to help the patient out of it. I wasn't going to wait for ten to twenty years to do it in the psychoanalytic way. I was an ordinary woman physician who studied human problems and simply wanted to give the patient tools to find the way out of their troubles. The traditionalists said that I didn't do the whole job, as I didn't dig deeply. I didn't believe in confining the patient to years of analysis. Thus in the analyst's eyes, I didn't clean up the house, so to speak. Contrary to the opposition, many of my patients got better.

Ericksonian Techniques

While Antoine continued his work on EEG and communication with Hershel Toomim on HEG, I went to the States to learn interactive therapies from practitioners in Boston, NY and Stanford University. I was intrigued by Ericksonian techniques and drawn to the ways both individual and family therapy were practiced. I learned Hypnosis. The advances in cognitive and behavioral interactions thrilled me. Although there were traditional psychoanalytic psychiatrists in American, for

Continued on page 20

The French Connection
continued from page 19

the most part, American psychiatrists either ignored or were less resistant to CBT. As a physician, I had the right and obligation to say I am with the patient meaning that I could acknowledge their suffering. I could acknowledge that we are going to work together. From Erickson, I learned how paradox helps the patient to take them out of the place where they stand. And so the work began. I wrote articles in French journals and they were received with very mixed reactions.

Assoc. Pour l'Enseignement du BFK Thérapeutique (France)

In 1976, Antoine, a few colleagues and myself formed the French Biofeedback Society. It was difficult to attract members in France because many professionals, who were drawn to the concepts, did not have a background in psychobiology and psychophysiology, chemical interactions and EEG. Additionally, for the dozen or so individuals who joined the society, this new way to treat patients and/or to continue research wasn't easy to promote in France, despite their dedication to the history of good research and their competency. There was absolute resistance from the psychoanalysts, who dismissed the validity of using EEG and Biofeedback parameters to help patients understand their conditions and then how to adopt a proactive approach. The Society promoted lectures at the leading Parisian hospitals, attracting European colleagues to attend and present. Eugenia Carmignani (Italy) was an early contributor. Through the 1980's and early 90's, the Society waned, although colleagues within France and Europe continued to contribute to meetings and individuals exchanged research with international colleagues. Antoine and I promoted Biofeedback at AFTCC meetings and within the Paris hospital community. Antoine attended and presented at the Association for Applied Psychophysiology and Biofeedback, as well as at international psychophysiology conferences. Our attempts helped to sustain both EEG and Biofeedback practices in France.

In 1994, Antoine and I published in French Biofeedback Principes et Applications (Masson Medicine et Psychotherapie). Antoine continued his collegial association in the UK, Europe and USA. I continued a full time private practice (Paris) in CBT with children, adult patients and families, while Antoine continued his research in applied psychophysiology.

The Loss

Unexpectedly, Antoine died in 1998. He is best remembered as a determined visionary into unknown and then unpopular domains, namely EEG. Never wavering, he made a difference in understanding brain function through EEG innovation and moving forward the field with colleagues to what is now the practice of neurofeedback. In doing so, he advanced the understanding of disease and disorder to find a better un-

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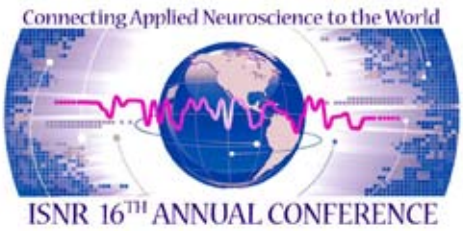
An Attendee's Impression of the ISNR Conference

Gary Ames, PhD



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2. Utilize a comprehensive assessment protocol incorporating semi-structured clinical interview, examination of academic records, and administration of behavioral rating scales, neuropsychological and neurophysiological measures to promote initiation and maintenance of treatment.
3. Establish dietary, sleep, and exercise patterns that are likely to contribute to improving attention in patients with ADHD.
4. Conduct a functional assessment in order to develop a comprehensive treatment plan that addresses those areas of impairment that are not responsive to pharmacological or neurotherapeutic treatment.
5. Provide parenting and social skills classes in clinical settings.
6. Assist in the development and implementation of Accommodation and Individual Education Plans for students with ADHD.
7. Explain the rationale for EEG biofeedback, as well as, specific, empirically supported protocols to improve attention and behavioral control.

8:00 to 9:30pm

Panel: Past, Present and Future

Barry Sterman describes our early meetings as being composed of the scientific researcher types versus the levitators, who wear robes. At a meeting in 1969 the members are divided: shall we call it autoregulation or biofeedback? Some wing nut says the Teamsters may not like autoregulation. So biofeedback it is.

Vince Monastra's all day workshop on treating ADHD.

Demoralization is one of the common comorbidities of ADHD. Generally treat attention first, then other issues may resolve, if not treat them. Vince sees theta/beta ratios at CZ under task of 8:1 vs.3:1 in normals. He trains to that criterion. But don't expect significant change before 20 sessions. Vince does an extremely thorough intake insisting on all kinds of records and tests, but not always a QEEG. After a couple of visits he says, no we are not going to do neurofeedback now. Come back and see me in a month. I object: it is often obvious when interviewing an ADHD family that we have a genetically inherited neurological disorder and those genes belong to you-know-who. No, you must do the history to avoid having a 65% success rate. There are many things that mimic ADHD.

Thursday Aug 28

8:40 am 9:00 am

Student Award/Oral Papers: Optimizing Microsurgical Skills with EEG Neurofeedback

Peak performance training is already been proven with cognitive skills, athletes, artistic performers. Now add physicians doing microsurgery on the eye. Both SMR-Theta and Alpha/theta protocols are effective in learning this complex motor skill. While both were effective, SMR training was better than Alpha/theta training. There were positive changes with the Spielberger anxiety scores (STAI). With the busy schedules and varied time between sessions it could be determined that neurofeedback was most effective when done 2 times a week, ideally 4 days apart. Results were impressive: surgeries 25% faster and r = .7 better. Less time in the eye means faster recovery time from surgery.

I heard Rex Cannon say that Russell Barkley says QEEG is most sensitive diagnostic tool for ADHD.

9:10 to 9:30 am

Oral Paper: EEG Phenotypes Predict Treatment Outcome to Stimulants in Children with ADHD

The objective was to differentiate the concept of subtype from phenotype. There are 11 phenotypes which occur in the population and these cut across DSM categories. However some phenotypes are more prone to certain types of disorders than others. Response to stimulant medication can be predicted better with phenotype than DSM.

Jay also warned us that slow alpha is a phenotype. Beware of your database seeing slow alpha as theta.

9:30 to 10:20 am

Invited Speaker: An Evolutionary Approach to Brain Rhythms and its Clinical Implications for Brain Modulation

Discuss the different brain wave patterns as a dynamic system to improve feedback treatment. Dirk DeRidder shows us brains of reptiles and other mammals to demonstrate how ontology recapitulates phylogeny. Reptiles only have a brain stem producing delta. Primitive mammals have a limbic system that produces theta waves. Modern mammals have a neocortex making alpha waves. Dirk answers the question: why to we have a brain? Because we need one. By contrast he tells of the sea squirt which has a nervous system until it finds a home rock. Then it eats its own brain. To treat tinnitus train delta down and alpha up at CZ.

10:30 to 11:20 am

Invited Speaker: The SMR Story: Sleep, Motor Regulation, and Memory

Discuss the potential for SMR neurofeedback therapy in the treatment of sleep disturbances and the facilitation of memory function related to sleep. Barry Sterman tells some of the cat story. Look for a neurofeedback article in the journal Sleep this year. Just 2 30-minute SMR training ses-

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ISNR Conference

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sions reduces sleep latency and improves memory without increasing resting SMR. Handwriting too.

11:30 AM to 12:25 PM

Keynote: A Proposal for Combining Measures of Electric, Magnetic, and Chemical Gradients to Optimize Brain Imaging of Large-Scale Activity

Search EEG and ECoG for spatiotemporal patterns correlated with cognition and mental states. Walter Freeman, a grand old man, gave a talk on integrating chemical (MRI, SPECT), EEG and MEG brain imaging. There are 13.7 billion neurons in each hemisphere. You can get from neuron to any other neuron in just 3 hops. "That was the best presentation I've heard since I was at MIT."

12:30 to 12:50 PM

Oral Pa pers: Paradigms Lost: Intellectual Survival after Expulsion from the Operant Garden with LENS

1. Discuss the value and limits to the Operant Conditioning model in EEG neurofeedback theory.
2. Discuss the application of the regulatory challenge/exercise model as related to observations of long-term EEG changes with neurofeedback.
3. Discuss the possible application of Pribram's holonomic model in understanding the EEG signal used in neurofeedback.
4. Explain the potential explanatory power of the cranial nerve stimulation model in LENS neurofeedback.
5. Discuss whether Popp's biophotonic model may be helpful in understanding the mechanisms of LENS neurofeedback.

Tom Brod: Non linear means a small change can require a large accommodation. LENS uses one trillionth the exposure of a cell phone as a carrier wave to convey information to the brain. Beverly Rubik says: in biofields cells whisper and listen to each other.

12:50 to 1:10 PM

Oral Papers: Systems Theory of Neural Synergy: Neuroanatomical Underpinnings of Effective Intervention Using Neurofeedback plus Biofeedback
Michael Thompson

1. Relate neuroanatomical sites to the symptom picture and the EEG patterns found in clients with Asperger's syndrome.
2. Identify the symptoms of Asperger's syndrome and be able to differentially diagnose it from other syndromes.

Ed Hamlin ran the group discussion on Neurofeedback for Alcoholism.

The room had plenty of practitioners experienced in this area. Peniston was honored, but most have moved beyond his protocols. Some practitioners do only a little alpha-theta training near end of treatment. High beta at CZ is related to relapse. The 75% success rate holds at 7-10 year follow up. Drop out rates are high even at in-patient facilities, but SMR training helps that.

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OchsLabs

Did you know that since 1990, over 100,000 clients have been treated with the LENS, in over 2 million sessions?

This is an average of 20 sessions per client.

Foundations Trainings

Oct 3-5, **2008** by Cathy Wills R.N.,M.S.N.,C.N.S. and Len Ochs, Ph.D. Sebastopol, CA. Registration: through www.ochslabs.com or (707) 823-6225.

Oct 17-19, 2008 by Cathy Wills R.N.,M.S.N., C.N.S. and Len Ochs, Ph.D. Lansing, MI. Registration through www.ochslabs.com or (707)823-6225.

Nov 14-16, 2008 by Cathy Wills R.N.,M.S.N., C.N.S. and Len Ochs, Ph.D. Sebastopol, CA. Registration through www.ochslabs.com or (707) 823-6225.

Jan 23-25, 2009 by Cathy Wills R.N.,M.S.N., C.N.S. and Len Ochs, Ph.D. Sebastopol, CA. Registration through www.ochslabs.com or (707) 823-6225.

Mar 30-Apr 1, 2009 by Cathy Wills R.N.,M.S.N., C.N.S. AAPB pre-conference training, Albuquerque, NM. Registration through www.ochslabs.com or (707) 823-6225.

Advanced Trainings

Nov 7-9, 2008 by Len Ochs, Ph.D. Sebastopol, CA. Registration through www.ochslabs.com or (707) 823-6225.

Dec 5-7, 2008 by Len Ochs, Ph.D. New Paltz, NY. Registration through Stone Mountain Center (845)658-8083.

Feb , 2009 by Len Ochs, Ph.D. East Coast (TBA). Registration through www.ochslabs.com or (707) 823-6225.

Mar 30-Apr 1, 2009 by Len Ochs, Ph.D. AAPB pre-conference training, Albuquerque, NM. Registration through www.ochslabs.com or (707) 823-6225.

Third Annual LENS Conference
April 24-26, 2009
Los Gatos, CA (San Francisco Bay area). Registration through www.ochslabs.com or (707) 823-6225.

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. OchsLabs, Inc. offers a number of trainings throughout the year for both the beginner and the experienced practitioner. The Foundations training is designed to teach assessment, introductory treatment planning, and software operation. The Advanced training is designed to teach advanced assessment, reassessment, and treatment planning.

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2:30 to 5:45 pm

Workshops/Commercially Oriented Short Courses: The Respiratory Arterial Pressure Wave— Cardiopulmonary Mechanics Behind the Heart Rate Variability Cycle

1. Describe the theory and practice of Coherent Breathing.
2. Sketch the cardiopulmonary mechanics of respiration, blood flow, and heart rate variability.
3. Explain Heart Rate Variability (HRV) biofeedback as a tool for cultivating optimal respiration and autonomic balance.
4. Describe the application of Coherent Breathing in clinical practice.

Workshop by Stephen Elliott and Dee Edmonson on HRV as A respiratory arterial pressure wave. See Coherence.com.

If you cut the vagus nerve HR goes to 90 with no HRV.

Steven believes everybody's optimal breathing frequency is exactly 5 breaths per minute and that this should be even in and out. =2 0HRV correlates well with skin conductance and alpha waves. Relaxation bridges: eyes, jaw, tongue, throat, breathing, hands, urinary, anal, feet.

Stephen's research thus far shows that nobody has hypertension and at least a 13 beat swing in their HRV.

7:30 to 9:00 pm

Progress in Biofeedback in Application to Migraine

Frank Andrasik, Siegfried Othmer, Jeff Carmen, Deb Stokes.

Frank Andrasik shows the diverse and compelling research case for biofeedback. And how well these results are accepted by many meta analyses by various medical and scientific consor tia. Biofeedback for migraines is 30-60% effective as a preventive measure which equals prophalactic drugs. However the long term benefits endure for at least five years. Tougher migraines are MOH (medication overuse headaches), menstrual, post-traumatic and chronic.

Jeff Carmen starts with 10 minutes of pIR HEG and moves up to 20 minutes. If it isn't working within six sessions, then it won't. Hand cooling is almost as useful as hand warming.

Siegfried is training migraines at .001 Hz: yes, that is a 100 second brainwave. Typically at T3-T4. Finding the right reward frequency is vital, but once you're training the sweet spot it has broad therapeutic effects. Sue Othmer used to start searching for the sweet spot at high frequencies and=2 0then move down. But now she starts low and moves up to better avoid adverse reactions.

Deb Stokes uses a combined approach and presented her data showing a 70% success rate.

Friday Aug 29

8:20 to 8:40 am

Student Award/Oral Papers: Efficacy of Neurofeedback for Executive and Memory Function in Dementia: Preliminary Findings

Marvin Berman and Jon Frederick

Identify neuropsychological tests that measure executive and memory function and understand the specific aspects of functioning they assess.

They are looking at both EEG and HEG neurofeedback on executive functioning in subjects with early stage dement ia.

The 14 subjects received a QEEG, a neuropsychological battery and 30 sessions of EEG or combined HEG and EEG training. 5 out of 7 outcome measures show positive results thus far. HEG is not contributing much.

8:40 am to 9:00 am

Oral Papers: Quantitative Electroencephalograph Effects as a Result of Single Session Respiratory Sinus Arrhythmia Feedback in an Anxiety Population

Evaluate the global impact of Biofeedback on QEEG from a single session respiratory sinus arrhythmia (RSA) feedback in an anxiety population.

Breathing to boost HRV with the Stress Eraser is associated with more alpha, less beta, fewer stroop errors, less anxiety and l ess HR reactivity. Nice results on QEEG with just one session.

9:10 to 9:30 am

Oral Papers: Progress of Neurofeedback: From Scientific Research to Clinical Application (18645) (2622)

Describe the actual status and the future of neurofeedback in terms of the recognition of its quality, efficacy and credibility reviewing the obstacles and challenges the field is facing.

Tanya Morosoli urges us to develop standard methods for disorders moving in the direction of a standard of care. We must do more and better research so that we can be accepted by the scientific and medical communities.

I rush to the microphone to say this is a time for innovation, not consolidation. Very few of us are guided only by the hindsight of validated protocols in published research. Who only does the theta/beta ratio training used in our best studies for ADHD? We are flourishing with innovation and artistry and this must be encouraged. I further lament that the hundreds of published articles have not give us much recognition. Not even our best studied indications impress many referral sources or 3rd party payers. If research worked for recognition then CES (Cranial Electrical Stimulation) not be a secret niche. Research does not explain why my Pennsylvania Biofeedback Society has dwindled from a couple of hundred members down to a couple of dozen. People opposing my comments were applauded.

> "Give the brain a mirror and it is fascinated. It wallows in information about itself; it becomes absorbed in self-interaction."

9:30 to 10:20 am

Invited Speaker: Executive Functions: A New Approach

Guillermo van Wielink says that the ability to represent, plan, execute, evaluate and the qualities of will, insight, abstraction and judgment are not localized only within sections of the frontal cortex.

10:30 am to 11:20 am

Invited Speaker: How Modulating Hemispheric Specialization and Interhemispheric Interaction Enable Skilled Behavior

Discuss the roles of hemispheric specialization.

Eran Zaidel wonders why theta-beta ratio training doesn't change that value. There must be a network effects on a meta control system.

11:30 am to 12:25 pm

Invited Speaker: Effect of a Psychoneurotherapy Upon Brain Electro-

magnetic Tomography in Individuals with Major Depressive Disorder (18669) (2626)

Discuss new information about the effect of neurofeedback and psychoneurotherapy in major depressive disorder.

Mario Beauregard presents an elegant research design on depression. Only heart disease is more of a burden to society than major depression. 5-15% suicide. He induces sadness with movies to study the decreased cerebral blood flow. He does not find theta or alpha abnormalities, only beta is elevated.

To stimulate resilience, NF is done under challenge conditions such as "Your boss is concerned about the quality of your work." The trainees come up with meta cognitions and other strategies to counter toxic thoughts. This NF training has 74% success rate (no longer meet criteria for MD). I asked about the 26% failures. Non-responders are the non-believers.

In a Small Group Discussion on Major Depression Cory Hammond blasts the Big Pharma bias in studies. They are allowed to keep on researching until they get a study good enough to publish. Most medication results evaporate with an active placebo is used as a control. Bob Gurnee sees 12 sub-types of depression in his QEEGs. Bipolar is tougher to treat especially if rapid cycling. You have treat the client-state that shows up that day. Anxiety can be located anywhere in the brain.

Saturday Aug 30

8:20 to 8:40 am

Oral Papers: The Effect of the Low Energy Neurofeedback System on Children with ADHD

Nick Dogris reports amazing results for LENS on ADHD. Very few don't respond in 15 sessions.

8:40 to 9:00 am

Oral Papers: Reading Difference Topography as an Aid to Neurofeedback Remediation of Reading Difficulty

Explain the use of reading difference topography as an aid to neurofeedback training for reading difficulty.

Jonathan Walker does a difference map between EO and task. He finds that poor readers deactivate critical areas of the brain under task. The areas that were slow become slower. He finds they most often have slowing at O1 and O2.

As I wander the vendor area I try Jon Cowan's Pleasurizer. This device has wonderful face validity for the mind-brain connection. You can see your focus bar go up and down as your fades in and out. A clear mirror. Jon induced some of my pleasant memories and my blue graph rose as my heart swelled with joy. What a high!

I am slowly tilting, yawing and rolling on a table with pRoshi glasses and relaxation coming through the headphones. I overhear that a woman has a blinding migraine and she has to get to a conference PDQ. She was brought over from Toomin's booth. I quickly get up and help her on the table and gently massage her feet. Next day I discover she is a psychiatrist and that the migraine was completely aborted in 15 minutes and she slept like a log that night.

> ""The only active ingredient in NF is your intention"—Ed Hamlin

9:30 to 10:20 am

Invited Speaker: Noninvasive Brain Stimulation as a Neuromodulatory Approach: Review on the Clinical and Neurophysiological Effects

Discuss the benefits of rTMS and tDCS in psychiatry and neurology.

Felipe Fregni discusses repetitive transcranial magnetic stimulation and transcranial direct current stimulation.

Joel Lubar finds that theta/beta ratio is strongest in youth, but not in adults where more than 5.5 alpha/beta ratio is a better marker at PZ EC. Hyperactivity wanes as kids get older and it is replaced with inattention. We see 15% with frontal spindling beta.

Joel invented the term thalpha for 6-10 Hz associated with inattention. ADHD alone is rare, it most often associated with comorbitities such as OCD, ODD, anxiety, mood disorders, etc. Joel doesn't like autothresholding. Instead set a goal, now try to beat it.

Joel, like Vince Monastra, always works with the famil y. There is often excessive sympathetic tone and electrodermal biofeedback works well. Beware of gluten sensitivity and other acquired mimics of ADHD. Joel finds Strattera to rarely be effective. Joel has only had one case in 35 years where he could not complete a QEEG.

2:45 to 6:00 pm

Workshops/Commercially Oriented Short Courses: Advanced Techniques for Live Z-Score Training Using an Activation/Coherence Model Advanced Z-score training, by Tom Collura.

Live Z-score training was a hot topic at the conference. We typically find watch the amplitudes resolve then the coherences in just a few sessions. EO an20EC resolve together without specific attention. Beware of training down several peak performance patterns without clinical complaints. However they seem to rebound. Beware of dismantling coping/compensating patterns too soon such as cognitive dissonance in PTSD.

I wonder why don't I see aberrant theta/beta ratios in my ADHD kids? Bob Thatcher tells me because resting theta/beta is not that big of marker. ADHD is a frontal lobe dysfunction.

Saturday night dinner

During the open comment period I regret not saying that in the fund raising community it is called planned giving. I have put ISNR in my last will and testament and urge others to do the same.

Martijn Arns suggests we add the word Neuromodulation to the name of the International Society for Neurofeedback and Research. He wants to include rTMS and direct current stimulation. At my table we ponder the name: International Society of middle aged psychologists who do Qs.

Michael Thompson points out that the ISNR logo has a cardio wave. I notice that it flat lines.

Everybody agreed that this ISNR meeting was a big winner. Yes the European meetings are more scientific, this one better for practitioners.

Sunday Aug 31

8:20 to 8:40 am

Oral Papers: The Basic Application of Pharmaco-EEG in a Clinical Setting

1. Create qEEG graphs that can be used to identify medication response patterns.
2. Identify qEEG patterns that would respond well to stimulants and SSRIs.

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3. Identify qEEG patterns that would contrindicate stimulants and SSRIs.

Ron Swatzyna is predicting medication response and monitoring drug toxicity.

If you see diffuse slow wave activity 1-7 Hz then stimulants are indicated. If mixed fast and slow then anti-convulsants.

8:40 AM to 9:00 AM

Oral Papers: Neurofeedback and Motivational Interviewing Based Bio-Behavioral Treatment in Cocaine Addiction

Explain how neurofeedback can be combined with motivational interviewing in addiction treatment.

Give cocaine addicts SMR up and theta down with motivational interviewing.

9:10 to 9:30 AM

Oral Papers: ERPs Endopenotypes and Their Application to Neurotherapy

Juri Kropotov from Russia has a big EEG database. Juri finds the theta/beta ratio a modest discriminator of ADHD. He flashes images with a go/no go task 100 times to get event related potentials. With this he sees 2 types of ADHD in the frontal and parietal lobes.

9:30 to 10:10 AM

Oral Papers: Clinical Outcomes in Addiction: a Large Neurofeedback Case Series

Jay Gunkleman primes with SMR training when he sees low alpha.

Two-thirds of addicts should get alpha/theta training. It reduces beta and is calming for over-arousal. Jay shows us several IQ sub-tests with 20 point jumps after training. All types of addicts do well.

I am so high and excited to have had such sustained exhilaration for the entire conference. The intellectual stimulation was rich and the fellowship sublime. I fully expect the ramifications of this experience to transform my private practice.

I have several conversations with practitioners about what works in advertising. Some people find freebie newspapers to be a better advertising source than the regional glossy mags. Others say the opposite. I encourage a few people to check out Google ad words to begin pay per click internet advertising to drive local people to your web site.

Unobtrusive Forms of Radio Frequency Interference

Jeff Carmen

We all know about normal forms of RF interference so I won't go into those. However there are many forms of RF interference that are overlooked because they are around us all the time, especially in offices.

To start with, it is useful to think of the front end of a bio/neuro feedback system as a radio receiver. That is not its intent but that is what it is. It is also useful to think of the leads connected to this system as an antenna because that is what the leads are even if not intended to be. It is also useful to think of the human body as a wonderful wideband receiving antenna.

There are various means of protecting the system from picking up unwanted signals, but none of them are perfect. EEG signals are so small (microvolts) fed into a front end that has a very high input impedance, that it does not take much of a competing signal to cause trouble. For the most part, the larger the signal of interest and the lower the source impedance, the less troublesome interference is likely to be. HEG signals are in the millivolt range so are a little less vulnerable. Skin conductance may be among the most robust signals.

The sources of these interfering signals are things that are all around us that we pay no attention to. Very few modern electric/electronic appliances actually turn off when you turn them off. The on/off switches no longer turn power on and off. They are signaling devices that tell the circuit to wake up or go to sleep. Most contain microprocessors. When "shut off" they are more like a predatory animal waiting for prey to pass by. They lie in wait for a signal to become more active. Unfortunately, the stage of lying in wait takes different forms, during which some of them have processors running waiting for the "on" signal. If the item allows the microprocessor to idle rather than completely stop while waiting for a signal to turn on, it is a potential source of electrical interference. So, think about all the items you have that may be quietly generating radio frequency signals while appearing to be "off."

These interfering signals are extremely tiny when compared to something coming from a radio/tv transmission tower. However they have the advantage of proximity. They are much closer to the bio/neuro feedback device. A general guide for power density is that it roughly reduces to ¼ when the distance doubles, but this is not accurate for close signal sources. For one thing the human body makes a nice receiving antenna and can manipulate the direction of the signal. Electrodes connected to the human body are in effect connected to an antenna.

Here are some examples of potential signal corruption found in most offices:

Cell phones: It wasn't that long ago that cell phones were only carried by a few people. Now it is very unusual to find someone without one. When the phone is turned on (capable of receiving a call), it is periodically checking for a solid signal from one or more towers. To do this, it sends a signal to the tower and waits for a response. Your body and/or your instrument can pick up the signal sent to the tower. Since most cell phones are worn on the body, the signal is very intense and may be carried by the body to the electrodes.

LCD monitors: Most are illuminated with fluorescent lamps driven by a high frequency signal. This is a potential source of interference. Depending on shielding, the signal may be received directly by the human body and fed to the instrument through the electrodes.

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MindFull

Brief History into Mind

David Kaiser, PhD

In adult centers the nerve paths are something fixed, ended, immutable. Everything may die, nothing may be regenerated. It is for the science of the future to change, if possible, this harsh decree. --Santiago Ramon y Cajal, 1928, founder of modern neuroanatomy

The brain is the most adaptable structure in nature, child or adult. New connections are created and new neurons born every moment of life (Lledo et al., 2006; Eriksson et al., 1998). There is still some question as to the extent of neurogenesis in the adult brain (Sohur et al, 2006), but the corpus callosum only gets better with age: it continues to myelinate in the frontal regions until age 70 and beyond (Aboitiz et al., 1996). Synaptogenesis, neurogenesis, and myelination are all life-long, as is learning. In fact learning and synaptogenesis are nearly psychobiological synonyms.

Our modern sense of mind emerged in a select few 2,500 years ago and it took the better part of two millenia before most cultures joined this experiment in self-government and self-understanding. One of the first controversies surrounding this new concept of mind was its location -- where was it? Was it in the chest? the arms? the eyes? the head? the genitals? The first mention we have of a brain is in an ancient Egyptian papyrus 2000 BCE and it speaks nothing about mental faculties. In fact the brain was considered useless in the afterlife; Egyptians pulled it out through a nostril and tossed it aside during mummification whereas viscera were preserved in jars and the sacred heart was left intact within the body. It would take the Greek tribes 700 miles to the north, 1500 years later, to begin a discussion about what function this large organ in our head might serve.

Aristotle placed Mind in the chest and considered our brain to be a radiator which cooled the heart. His teacher Plato and Hippocrates from the previous generation placed Mind in head, a modern view, cerebrocentric, but nothing is ever neatly decided when it comes to self-understanding. The heart/head controversy remains with us to this day, although in a more diluted form. Mind may be largely situated in the brain but how can we discard contributions of body? Body must be part Mind as it is our source of sensory information as well as end point of interaction with the environment. Ironically, Aristotle's cardiocentric view held sway over the academic world until the 19th century when enough courage and political will collectively overturned his views of nature.

Returning to the formative years of neuroscience, little was known about brain structure during the thousand-year empire of Rome. Galen, a renown 2nd century physician, ignited a revolution in medicine with animal dissection along with evaluation of wounded gladiators, but he passed off knowledge of nonhuman neuroanatomy as human, and this slowed progress and cause confusion for later generations. To his credit he clearly described brain divisions but some thought he considered empty spaces more relevant to function than brain tissue. By focusing on the brain vesicles, spinal fluid reservoirs within the head, and assigning executive, sensory, and memory function to the liquidy realm, he propelled neuroscience forward while simultaneously pushing it backwards.

In the mid-16th century Andreas Vesalius realized Galen's description of human neuroanatomy was primate but nonhuman-- which made sense given Roman prohibitions against human dissection -- and correctly described some of the overlooked peculiarities of our neuroanatomy. As it often happens in science, moving us closer to Truth enrages those who considered themselves guardians of It, and his publications turned his mentor and older generations of physicians against him.

In the 17th century Rene Descartes centralized the correspondence between mind and body which for him was soul-to-body. There are a handful of unique unduplicated structures in our brain, those which lay in the center between or below the cerebral hemispheres, and he chose the most modular central structure, the pineal gland, a producer of melatonin, as the seat of the soul. Others who followed suggested the corpus callosum, those innumerable fibers connecting cerebral cortices, as the seat of reason. It was the search for locality, where soul meets body, which evolved into our theory of cerebral localization, the idea that specific brain tissue is dedicated to specific mental operations.

Cerebral localization moved to the forefront of brain science two centuries later when Franz Gall's childhood observations (1758-1828) ignited a firestorm of interest and controversy into brain function. During this school years Franz had been bested verbally by a student with bulging eyes and he decided that the boy's overdeveloped sense of language was attributable to the bulge, due to additional brain tissue pushing out the boy's eyeballs. Gall went on to speculate as an adult that the shape of one's skull revealed the Mind underneath. He identified 27 personality features associated from skull topography. Phrenology, as it came to be called, was the rage of Europe, in both senses of the word. It grew to be extremely popular with laypeople, a common practice at parties, and it enraged medical professionals. Today we live in a new age of phrenology for good or bad, with the only real change being greater abstraction of behavior. Gall linked brain areas to general habits, such as veneration, criminality, and spirituality, while modern neuroscientists have whittled these down to mental operations, tiny brain habits, such as assigning sounds to written words and attaching familiarity to perceptions. Gall was also early in associating frontal lobe injury to loss of language, which is the issue that propelled functional neurology for more than a century (1850-1981).

Gall's detractors were many. In the early 19th century Pierre Flourens set up one of the earliest wetware (neuroscience) labs to discredit Gall's mind-brain equivalence. Ironically he validated Gall's paradigm with his findings, although he never acknowledged this result. Flourens argued that all functions are everywhere in the brain based on religious conceptions, and he cut away sections of bird and mammal brains to prove his point. But what he proved was the opposite. When he re-

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Brief History into mind
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moved the cerebrum of pigeons or rabbits, perceptions, motor function, and judgment were abolished. Removal of the cerebellum impacted equilibrium and motor coordination. Destruction of the brain stem caused death.

"The function of the cerebral lobes is to will, to judge, to remember, to see, to hear, or - in a word - to feel. [They] wish and feel; that is their proper action. The suppression of these lobes weakens the activity of the entire nervous system." (Flourens, translated, 1824)

Flourens' rigorous experimentation put functional localization in solid standing to this day, though not in line with those higher functions Gall was concerned with. The question of cerebral localization polarized scientific institutions throughout Europe for decades, as this question was another step in our endless struggle to contest the divinity of humankind. Mind may possess many faculties but Brain must be unitary to receive Soul, according to prominent thinkers of the day. Cerebral holism, as it was called, was losing adherents until neurologist John Hughlings Jackson reframed the idea. He suggested that the central nervous system is best considered as a series of interactive hierarchies, a reasonable medium of localization and holism.

"To locate the damage which destroys speech and to localise speech [itself] are two different things." (Jackson, 1864)

Or as British physician Henry Head clearly stated, "The processes which underlie an act of speech run through the nervous system like a prairie fire from bush to bush; remove all inflammable material at any one point and the fire stops. So, when a break occurs in the functional chain, orderly speech becomes impossible, because the basic physiological processes which subserve it have been disturbed... The site of such a breach of continuity is not a 'center for speech', but solely a place where it can be interrupted or changed." (Head, 1926).

The contest between holism and localization of cerebral function continues today, reformulated into networks versus modules. Where is Mind? Where is Consciousness? Is self-awareness a function of a single brain area or is it an emergent network property?

As it was in the past, both! may be the common answer.

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Small Group Discussions from San Antonio

Selecting a Neurofeedback System

Held on Thursday

Joy Lunt, RN and John Carmichael, PhD RPsych

A number of people attended the small group discussion of this topic at the 2008 ISNR conference.

Rather than coming up with answers, this small group discussion resulted in a series of questions which potential purchasers could consider before selecting a system for neurofeedback training. They included:

1. What computer requirements is the system based on?
2. Does the vendor provide instructions on how best to use the system?
3. Does the vendor provide ongoing technical support for the system?
4. What are the details of accessing technical support such as cost, hours of service, and duration of any contract?
5. Does the vendor provide clinical support?
6. Does the system support full 19 channel recording?
7. Is the system size such that it is easily transportable?
8. Can peripherals such as for HRV biofeedback training be added to the system?
9. Can more channels for recording be added to the system?
10. What is the cost of the system?
11. Are lease arrangements possible?
12. What governmental or electronic engineering certification has the system been awarded (e.g. FDA approval)?

Continued on page 30

Small Group Discussions
Continued from page 29

Neurofeedback for Migraine Headache

Held on Saturday

Jeff Carmen, PhD

The group welcomed Herschel Toomim who discovered HEG.

What's a migraine? It's a brain event that sometimes hurts, but only sometimes.

So how do you know when you have a migraine? The interesting thing is that they're more like seizures than headaches. They can come on slowly – minutes to hours to days – then there's an abrupt shift – after long/stressful day or weather systems coming – and then the migraine crashes in, which can sometimes hurt…. But in the first stage you get malfunctioning in the brain. The malfunction can be anything the brain does for a living. Typical malfunctions are visual disturbances, emotional disturbances, cognitive disturbances, receptive and expressive language disturbances. More dramatic things like partial paralysis also occur.

Is migraine a constant thing once you have migraines? No there are downtimes, but may not always know it's there. First stage can last for a long time – a real long time… hours to days to weeks. So can 2nd stage…. As in status seizures (which have been questioned), Carmen's seen status migraine for up to 6 months (which means constantly experiencing pain, constantly in stage 2).

Interestingly Jeff does not get migraines, nor does Herschel. This was likened to a priest conducting marriage counseling.

Question regarding depression and migraine co-occurring…. It's unknown whether it's a predispositional comorbidity or whether the PFC (prefrontal cortex) is impacted by the chronic pain effects of the migraine. In terms of medication, SSRIs also tend to help manage migraines, though if stopped suddenly, rebound migraines will occur.

Herschel asked Jeff to review common treatments for migraine, in addition to neurofeedback, to aid clinicians. Interventions fall into 2 categories – abortive and prophylactic. Some things work better or faster than others. Neurological community is taught that migraine is a locked up system that will come on and then not leave until they're going to leave. Jeff believed this until he discovered that they could be shut down. This can be done by either shutting down the brain stem migraine generator or by shaking up the brain enough (as with magnetic stimulation). Or you shut it down by creating a better form of brain organization, using the negative feedback loops.

Jeff demonstrated positive feedback by putting the microphone near the speaker (putting the output signal back into the input, which increases the output, increasing the input, cyclically, which in brain terms would lock up the brain.) Most of the brain systems are negative feedback systems in which a portion of the output is fed back to the input which reduces the output (likening it to cruise control).

College students with stress, drinking, cramming, coffee, irregular sleep, etc., are likely to experience more migraines.

College students with stress, drinking, cramming, coffee, irregular sleep, etc., are likely to experience more migraines. For best migraine care, stable sleep schedules are critical, preferably incorporating the same wake time 7 days a week.

Best migraine abortive medications are triptans (like Imitrex) which are only good until the pain is starting, so for them to be effective you need to take them early on when you don't know if you need them, but if you take them more than once a week you can create your own migraines. Triptans constrict blood vessels, including cardiac vessels, which explain some of the chest pains that some patients experience. Jeff said that of the neurologists he knows who experience migraines they themselves will not take triptans, but they do prescribe them.

Whatever medication helps the brain to maintain a steady state will help prevent migraines, though any of the medications are of special concern for pregnant women with migraines due to possible teratogenic effects.

There is a long respected history of peripheral thermal training (finger temperature warming). It was thought that this works due to excessively dilated blood vessels in the head, but the theory on migraine pathophysiology was wrong, which makes the biofeedback theory wrong. Also, finger cooling helps about as much which runs counter to the original hand warming theory. If intentional hand warming is done during the second stage (pain stage) of the migraine, the pain may worsen. Jeff theorizes that any intensely focused activity (like finger warming) will activate the PFC which will help with reducing the migraine pain. He believes that migraines are controlled by the central nervous system. Clients attempting to levitate something (like Yoda levitating the spaceship out of the swamp, even though we know they can't move anything) will shut down the migraine. The process of attempting to control something is the key. He gave an example of a student he worked with who attempted to levitate books on the teachers desk or he teacher herself, with the added bonus of the student appearing to pay attention (and this can also help to quiet hyperactivity).

This provides further evidence that this is not a locked up system. If you can get into a relaxed mental focus, you stand a good chance of shutting a migraine down; as this helps to bring the PFC online (it goes offline as part of the natural pain response).

One attendee indicated that he found the combination of Co-Q-10 and magnesium helpful. Jeff indicated that magnesium was sometimes helpful in research he was aware of, and further indicated that anti-nausea medications like compazine or medications like Benadryl or Sudafed may be helpful (neurologists that he knows tend to take Sudafed for their own migraines). Coffee can also work (though as a participant pointed out, there can be a rebound effect).

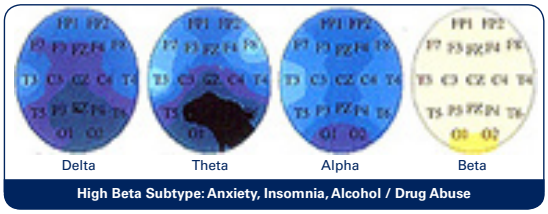
Jeff said that, while people with migraines tend to fear that they'll get the migraine during an important stressful event (an exam, or presentation, etc.), most often it won't happen until after the event, but they will be in stage 1 of the migraine during the event, which will result in brain dysfunction, reducing an individual's mental capabilities, possibly interfering with the cognitive/attentional functions needed for test taking. The high stress of the exam encourages the PFC to shut down, which also encourages the first stage of the migraine. Sometimes the rebound of the pain stage of the migraine after an exam can be avoided by maintaining intense mental activity after the exam.

Continued on page 32

SCOTTSDALE NEUROFEEDBACK INSTITUTE

QEEG mapping service

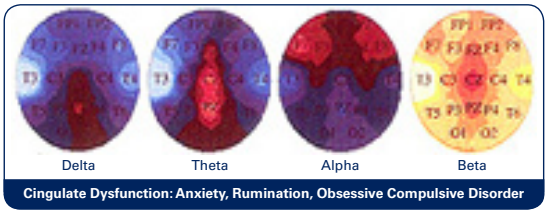
QEEG / TOPOGRAPHIC BRAIN MAPS:
Generalized Anxiety Disorder Subtypes



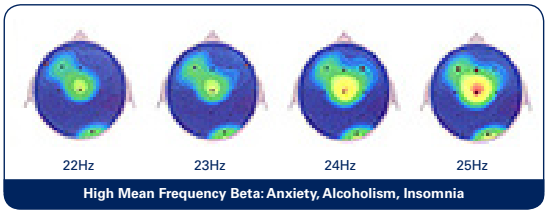
High Beta Subtype: Anxiety, Insomnia, Alcohol / Drug Abuse

High Alpha Subtype: Anxiety, Depression, ADD

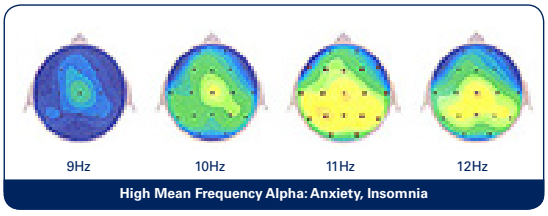
Low Alpha Subtype: Anxiety, Insomnia, Alcohol / Drug Abuse



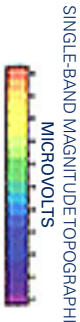
Cingulate Dysfunction: Anxiety, Rumination, Obsessive Compulsive Disorder



High Mean Frequency Beta: Anxiety, Alcoholism, Insomnia



High Mean Frequency Alpha: Anxiety, Insomnia



AVAILABLE SERVICES

Full Package: #'s 1-7: minimum recommended for Neurotherapy *Includes electronic copy. Priority mail is $20 extra.*	**$225.00**
Full Package: #'s 1-6: Without report (1-5 only) *Includes electronic copy. Priority mail is $20 extra. If one database used the minimum is $75.00*	**$195.00**
01) NX Link - NYU/E. Roy John Normative Database (Eyes Closed) *A) NX Link Discriminant Analyses: ADD, LD, Depression, Memory/Dementia, Substance Abuse, Head Injury, Schizophrenia/Thought Disorders*	$70.00
02) EureKa3! - Nova Tech EEG LORETA Analysis System and Adult Normative *Database - Eyes Closed*	$70.00
03) Neuroguide - R. Thatcher Normative Database *A) Eyes Closed Linked Ears Z-scores // Eyes Closed LaPlacian Z-Scores* *B) Eyes Open Linked Ears Z-Scores // Eyes Open LaPlacian Z-Scores*	$70.00/each
04) Neurorep - W. Hudspeth QEEG Analysis System *A) Eyes Closed - Weighted Average, Z-scores, Magnitude, % Power, LaPlacian, Average Spectrum, coherence, connectivity* *B) Eyes Open - Weighted Average, Z-scores, Magnitude, % Power, LaPlacian, Average Spectrum, coherence, connectivity*	$70.00/each
05) Thatcher TBI Discriminant Analysis and Severity Index	$70.00
06) Thatcher Learning Disabilities Discriminant Analysis and Severity Index	$70.00
07) Clinical Correlations and Neurotherapy Recommendations by Bob Gurnee	$70.00

total value: $630

08) Conventional Medical EEG - Read by Neurologist	**$125.00**
09) EureKa3! – Nova Tech EEG LORETA Analysis - Eyes Open-Non Database	**$70.00**
10) Neurorep - W. Hudspeth QEEG Analysis System: Task *Weighted Average, Z-scores, Magnitude, % Power, LaPlacian, Average Spectrum*	**$70.00**
11) Supervision and Training Hourly Rate	**$100.00**
12) Extra set of Printed Maps sent priority mail	**$35.00**
13) Electronic (sent via FTP or E-mail) and Paper Copies of Maps sent priority mail with package purchase *(Standard package rates only include electronic or paper copies of maps, not both)*	**$20.00**
14) Overnight Shipping & Handling (Price varies with carrier, destination, & package weight)	**$Varies**

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Established 1982

Small Group Discussions

Continued from page 30

One participant discussed the temporary reductions he gets in practice using various neurofeedback approaches, like Neurocare Pro or T3-T4 training, but that they will see clients back in a month or so with more migraines. Jeff indicated that this is a protocol approach – in terms of frequency/scheduling of appointments. He sees clients weekly until stabilized, and then lets the client determine the frequency of sessions in terms of reducing their frequency. As symptoms stabilize, appointments can slowly be spread farther apart.

He never trains T3-T4 or C3-C4, - he trains on the forehead at Fpz and currently only does HEG for migraine. He stopped doing EEG neurofeedback in his office sometime ago due to some significant radio frequency disturbances in his environment. Hershel pointed out that EEG uses microvolts and HEG deals with millivolts, so there is less interference to the signal.

One attendee asked if there were any Q or ERP studies related to migraine. Jeff indicated that there were some studies—some found general irritability, and indicated that Dr. Walker has found some increases in beta parietally.

Hershel asked about Jeff's using relaxation before the EEG training, to which Jeff replied that he no longer uses it. The downside of deep relaxation is that some people use psychological tension as a protective mechanism and panic when they lose the feeling.

Jeff does a 5-minute baseline, in which clients watch a movie (with the instructions to get drawn into the movie and to make no critical assessments of it), which allows the frontal lobes to shut down and the limbic system to take over, so that they then have to re-activate the PFC as part of the training.

Hershel indicated that he does a baseline to see the level the brain seems to run at, and then his training goal is to exercise the brain by increasing the activation during the training session. He asked Jeff why getting down to a more basic level is necessary. Jeff indicated that by having them start at a lower place they could have a greater range of increase. He said that he wants the front of the brain to shut down completely, so there can be a forced fractionating of brain states as the brain must flip between passive external control with the PFC shut down and active PFC dominated attention. Hershel said that he's hearing that this has to do with the dynamic range of temperature (which pIR measures appear to be); Jeff said this was a logical but incorrect observation. The primary reason is to force the brain to flip between two incompatible brain states.

The basic difference in what nIR and pIR is looking for was explored. Jeff indicated that with pIR clients often end at a lower baseline than they started with. Jeff said that if you push someone too long with pIR HEG training, it creates disinhibition, (which both Jeff and Hershel said is an easy mark to step over). It's important to get as close as you can to that mark without crossing it – Jeff and Hershel said that as soon as the signal starts to drop they see that as the sign to stop the session.

Deb Stokes asked about other types of headaches, like tension type headaches. Jeff indicated that the mechanism for tension type headaches are currently unknown, and estimated that they likely approach psychogenic type issues, due to the heavy mental component. These headaches tend to be more or less steady, non-pulsing, and tend to have a heavy psychological component. Siegfried Othmer indicated that Sue Othmer makes no differentiation between any headache types, though tension type headaches are rarely a primary complaint, where migraines are. Several clinicians indicated that they don't differentiate their approach with regard to different headache types.

Most of the brain systems are negative feedback systems in which a portion of the output is fed back to the input which reduces the output

Jeff indicated that most headaches that are significant enough to appear in a clinic are probably migraines or migraines combined with other types of headaches.

Migraines frequently image with a "hot" temporal artery, Jeff indicated.

Jeff discussed that many clients who enter a deeply parasympathetic/deeply relaxed state become panicked, and also that the relaxed state ends quickly when individuals re-enter their real worlds. He indicated that the goal is not so much activating the parasympathetic system, as helping to create stability and balance in the system, which Siegfried and he discussed in similar terms. A well functioning brain maximizes how it handles environmental demands.

A question was raised about cluster headaches. Jeff indicated that nothing works well with cluster headaches, and no one in the room indicated that they'd been successful. Oxygen has been tried with marginal success. Siegfried indicated that Sue is starting to track some possible progress with cluster headaches, though due to the variable timing of cluster headaches, it may too be soon to tell. There is no good understanding of clusters. Several clinicians discussed the suicidality that co-occurs with cluster headaches. Jeff indicated that the pain with cluster headaches very far exceeds the worst migraine pain and is so bad that people attempt suicide. The suicide attempts are not due to depression, but as a final attempt to escape the pain.

Frank discussed some European studies that utilize BVP in terms of reducing migraines (comparing it to thermal). Siegfried suggested that this might be best explained in terms of central control and stability, which he, Frank and Jeff explored further.

Jeff indicated that migraine was probably an evolutionary survival mechanism (in terms of weather prediction). Knowing that a storm was coming would make a person very valuable under primitive living conditions. That probably represents one of the positive aspects. However a negative aspect is that migraines (at least those with aura) increase stroke risk, and that modern stressors appear to challenge individuals' central stability in ways that increase susceptibility to migraine. He indicated that individuals with migraines who tend to improve, sometimes still have stage one migraines that just don't evolve into stage 2. More often with neurotherapy interventions both stage 1 and stage 2 "soften" in terms of intensity.

Siegfried and Deb emphasized that the relief from the pain was a significant goal for most clients, though Jeff stressed that the disruptions from stage 1 problems are still a significant goal for training, like learning difficulties. All agreed, however, that instabilities at any stage deserved attention.

More SGD recaps in the January Issue

Slow Cortical Potentials in the Treatment of ADHD

An interview with Ute Strehl, PhD.
by Roger Riss, PhD

Dr. Strehl is an assistant professor and award winning researcher with the renowned neurofeedback research group headed by Niels Birbaumer, Ph.D. at University of Tübingen, Germany. Over the past decade, she has contributed a series of landmark studies establishing the scientific basis for SCP neurofeedback training in the treatment of epilepsy and attention deficit disorder symptoms. She was interviewed by telephone from her office in Germany.

RR: Dr. Strehl, can you tell our readers something about your early background?

US: My early background is not very interesting, I'm afraid. I started as a psychology student and became a research assistant at the University of Berlin. After a few years, while writing my doctoral thesis, I had the opportunity to organize a new student counseling center at University of Berlin, and so I did this for quite a few years from 1976 to 1993. Actually, in those days, I lost a little bit of the connection to clinical psychology because what I did was more management; thinking about improving structures at the university and things like this. Then the family decided--we decided--to move to Tübingen and there I started to work with Niels Birbaumer. This was the point when everything became very exciting and interesting.

I started with a research project with patients with Parkinson's disease. After this the other two main topics became epilepsy and then finally ADHD in connection with neurofeedback. So, I think everything started when I came to Tübingen. Before that, I didn't know much about EEG and biofeedback.

RR: I didn't realize that you had done work with Parkinson's disease. . .

US: Yes, but this was not really neurofeedback. What we did was develop a behavioral treatment package for Parkinson's disease patients. Let me say it another way. When we move, everything is automatized and internally cued. In Parkinson's patients, this internal organization, internal progression or sequence of movements, is disturbed. We trained PD patients to use cues in their environment in order to have a new, more externalized method for initiation of movement.

RR: Very interesting. . .

US: Actually, this was quite successful. We showed that in our experimental group the progression of Parkinson's disease stopped; as long as they were in the program they had no further symptom progression. By comparison, PD patients in our control group continued to progress to more severe symptoms. Unfortunately, nobody is working in a systematic way with this program anymore and all the research is going in the pharmaceutical and neurosurgery direction.

RR: That's a familiar story. Well, let's turn to the work which first brought you into neurofeedback. Could you tell us a little bit about how you were introduced to neurofeedback work in epilepsy?

US: Well, this was just after having finished the Parkinson's disease project and this was quite successful. We won an award, given by a pharmaceutical company, for our work. So, this was quite a success and, therefore, Niels Birbaumer invited me to do the epilepsy project. At that time, he had a grant to replicate a neurofeedback study published by Rockstroh and colleagues several years before. My task was not only to replicate that work but also to integrate the neurofeedback intervention within a more systematic behavioral therapy program. This was a multi-center study with two other clinics. We took the same neurofeedback protocol, and I wrote the program for the behavioral therapy part of the study.

RR: Our readers may be more familiar with Dr. Sterman's SMR work with seizures. But your research group pioneered an entirely different approach to self-regulation training focusing on slow cortical potential training. Could you tell us a little bit about that approach?

US: Well I don't know whether you know that Barry Sterman and Niels Birbaumer have been friends for ages. They once worked together in the U.S. I think this was one of the projects for NASA. So, they always knew of each other's work. I don't know whether they just took different directions on purpose or whether they wanted to compare results. So, these are all the stories I have been told. I wasn't there in those days. I don't know, but I think maybe Barry didn't use the slow cortical potentials because he was concerned about artifacts and Niels didn't use the SMR because in those days it was not so easy to record SMR in humans as far as I know. So, I think both of them had practical reasons why they chose the other paradigm. But both had the same aim in their work.

We know that slow cortical potentials are important for epilepsy because many experimental animal and more recently, human studies, have shown that before seizure onset, there are huge negative shifts in slow cortical potential activity in the brain; after the seizure, they turn into positivities. This was the reason why the Birbaumer group decided to train these slow cortical potentials. Another reason may be that the EEG tradition in Europe historically was much more focused on event-related potentials than in the U.S. Maybe this is another reason why we took these different pathways.

RR: For those who may not be familiar with the term, could you explain what we mean by slow cortical potential?

US: Yes, I will try. Slow cortical potentials are very slow shifts of the brain activity with a duration of up to several seconds. They are either electrically negative or electrically positive. Negative shifts reflect activity of large cell assemblies that are responsible for planning, initiation of goal-directed behavior for attention and so on, while positive shifts are more understood as an inhibition or abatement of negativities.

Continued on page 32

Slow Cortical Potentials continued from page 33

RR: When would you be likely observe an SCP shift? What kind of event or mental activity is likely to trigger a shift?

US: You would observe a negative shift in my SCP activity whenever I need to increase attention and arousal, whenever I want to concentrate on a certain task, whenever I want to make a quick movement, or want to prepare myself for doing a motor task. During this preparation, you would observe a shift toward cortical negativity.

RR: And how long might such slow cortical potential shifts be sustained?

US: They fluctuate, lasting up to several seconds. Several weeks ago, I heard a very nice analogy about the difference between frequency oscillations of the brain compared to slow cortical potentials: if you look at the ocean and you see all of these smaller and bigger waves, these are the frequencies. Then you have the tides. Slow cortical potentials are more like the ebb and flow of the tide. They are a more phasic activity of the brain compared to the oscillations which are more tonic activity of the brain.

RR: That's a very useful analogy. Thank you. So, your group was investigating the notion that training a shift towards electropositivity might reduce susceptibility to seizures. Is that correct?

US: Yes, exactly.

RR: However, in your research protocol, subjects learned both to increase and decrease their cortical arousal. Why did you train in both directions?

US: Yes, there are several reasons. First, one of the reasons is that we wanted to develop a kind of self-perception for the state of the brain. So, by training negativities in patients with epilepsy, we wanted to let them experience how it feels when the brain goes negative. This could help them develop early self-perception of an impending seizure. So, this was one of the reasons. The other reason is that these negativities normally, by themselves, change to positivities. There is always a fluctuation between negativity and positivity because otherwise, you either would get a ceiling or a bottom effect. If you only train into one direction, this wouldn't be really physiological.

RR: Sure. When the tide goes in, it has to be followed by the tide going out.

US: Right, right.

RR: More recently your interest has turned towards attention deficit disorder. What led you to suspect that training ADHD children to regulate slow cortical potentials might help to improve their attention? US: After having finished with the epilepsy project, somebody asked me whether we couldn't do something with children. I knew a colleague in our psychology institute who did lots of behavioral therapy work in ADHD and who had many children on the waiting list. So, I was starting to think about, couldn't we do something for these children? Then I remembered a very early study, done by Brigette Rockstroh years before I came to this institute. She found that children with attention difficulties (although these were not children with clinically diagnosed ADHD) had an impaired ability to regulate slow cortical potentials. I thought that this observation might be important for children with ADHD. For me, it was a short step from epilepsy to ADHD, given the hypothesis that ADHD is mostly due to cortical under arousal. If this is true, then the only thing you have to do is to bring this under arousal back to a normal level of arousal; or in other words, to lower SCP excitation thresholds. Of course, the aim of training in ADHD is just the opposite from epilepsy because here we want the children to train negativities to increase cortical arousal, and to learn to use these negativities in everyday life when they start a test in the school or when they have to do homework or so on.

RR: So, do you have children bring in their homework to the neurofeedback session so that they can practice self regulation skills while doing their schoolwork?

US: Not initially, but by the third phase of their training the children will have short sessions for 20 minutes or so, in which they do homework, while receiving feedback. The trainer also reminds them that, when they are studying at home and in the classroom, they should try to use this self-regulation of brain activity which they have learned in the lab. So, each child is given a card to carry with them. And on the card is a picture of a computer monitor, with a display of one of the trials when the child was successful in activating their brain to cause a negative SCP shift. And so when they were in school or sitting down to do their homework, they were asked to look at this picture, remember what they had done when sitting in front of the neurofeedback monitor, and now just do the same before starting. So with this is kind of cueing we attempt to establish a kind of classical conditioning of the brain state with the picture of the monitor.

RR: Recently your group conducted a study comparing SCP training and theta/beta ratio training methods for ADHD children. What did you find?

US: We didn't find many differences. Overall, both groups showed similar improvement in behaviors, similar improvement in attention, and similar improvement in IQ. However, if you go more into detail, you will find small but perhaps important differences. For instance, the theta/beta group very quickly learned to self-regulate their brains while the SCP group needed more time, because it is more difficult to learn to self-regulate slow cortical potentials. So, this is one of the points. However, in the end, there are very slight hints--I'm very careful with these conclusions--that slow cortical potential training may lead to a more enduring change. Just now, we are looking at follow-up analysis two years after the end of training. Both groups maintained their improvement, and are even improved a little bit more than they were at the end of training. But, if you look at the effect sizes, I have the impression that perhaps slow cortical potentials do have some advantages. Another difference between the two methods in our study is that we didn't find as strong a relation in the theta/beta group between successfully learning self-regulation and clinical outcome, but we found such a relation in the SCP group.

RR: So, not all children who learned to shift theta/beta ratio showed equal clinical benefits?

US: Yes. I don't want to open a wall between these two paradigms because I think for both paradigms there are many things that have to be discussed and much more to learn. It was still kind of a pilot study, so I would not dare to say yet that slow cortical potential training is better. But, what I do dare to say is that I think slow cortical potential training has clearer psychophysiological grounding than does

theta/beta feedback. My colleagues and I have been discussing this all day. As I was preparing for this interview, I asked them, "Please compare the scientific basis for SCP and theta/beta training?" All of them say, "Hmmm, what are we actually doing when we train theta? Can we really be sure what kind of theta we are training and that we are doing the right thing?" and so on.

For me, at least from my experience and as far as I know the literature, I think the scientific grounding for training slow cortical potentials is safer, better established. Therefore, for our next planned study, we will concentrate on slow cortical potentials only, although I have to repeat that the success was very similar for both methods.

RR: Can you tell us more about how you actually implement your training protocol?

US: Yes, training is done at the vertex, referenced against the masseter. Of course, when we train slow cortical potentials, the training frequency would be near 0 Hz, or what some people call direct current. In order to do this, you need a high pass sorter that really is able to detect these very, very slow frequencies, and you need a time constant, which means that activity has to be averaged over each 8 to 10 second training trial. This is one of the most important reasons why for so many years there were no commercially available systems for SCP training; because in former days amplifiers were just not able to record those very slow activities or frequencies. But this has changed. Now, there continues to be another restriction, and this is the issue of artifacts. Slow cortical potentials are easily contaminated with movement artifact, for example with activity that comes from the eyes. Therefore, we say that an online artifact detection of eye movement is mandatory. In addition, online detection of potential shifts that exceed certain microvolt thresholds is necessary.

RR: When eye movement is detected, how does that change the child's feedback display? Does feedback terminate when eye movement exceeding threshold has been detected?

US: Yes, at least the current trial stops, because otherwise the children would just be reinforced for moving their eyes. And then another trial starts. The more trials stopped, the longer the training takes and, therefore, the children learn very quickly not to produce so many artifacts.

RR: Could you explain precisely what a "trial" might look like for the child? What task are they being asked to perform and what are they seeing on the screen?

US: For our research protocol the child may see a display with one of several objects, for instance, a bird or a boat or just a circle. Next, a triangle that is pointing either upwards or downwards is displayed, indicating the task required for that trial. If the triangle is pointing upwards, the child's task is to cause the object to move upward on the screen by producing a negative SCP shift. If it is pointing downwards, they must cause the object to move downward by producing an SCP positivity shift. Next, the child's SCP activity is monitored over the next 8 seconds and compared to a 2-second pre-trial baseline. If the child produces an SCP shift in the correct direction, they get a smiley face at the end of the trial. SCP training is always relative to baseline, taken within the 2 seconds before the next trial starts. Again, if you think of the tides, this is because it's always changing and it's always relative to what has been before.

RR: Alright.

US: So this is a very, very simple and unsophisticated kind of feedback of the brain activity. But, the important thing is that they have these two tasks, negativity and positivity, and, in addition, we have two conditions. So, we have a feedback condition, which means that the child receives feedback while following the task, and in addition, there is a transfer of training, or skill generalization condition, in which the child does not receive post-trial feedback. I think this concept may be new for those coming from a frequency training background where typically you always give feedback. From the beginning, we want the patient to get used to the idea that they have to do something with their brain without getting feedback, in order to have it transfer to everyday life.

RR: So, does the child receive a break before the next 8-second trial?

US: A very short break of about 2 seconds.

RR: And how many trials does the child complete in a typical training session?

US: There are about 40 trials, and then there is a short break. Normally, we have 4 blocks of runs of 40 trials each, and this constitutes a session. For our research protocols, the whole training comprises about 30 sessions. After 10 sessions there is a break of 4 to 6 weeks, then the children come back for another 10 sessions, and then following another break, a 3rd, final phase of 10 sessions.

RR: You reported that not all children were able to learn SCP self-regulation. What percentage of children did you find were successful in acquiring the skill?

US: This is a very difficult question because there is no objective criterion for having learned to self-regulate slow cortical potentials. What you can use is hit rate and what you can use is the differentiation of the amplitudes against the baseline. But we have consistently found that in comparison to theta/beta ratio training, it takes longer for children to learn SCP self-regulation, and some children are unable to master the skill.

RR: Are very young children able to master SCP training?

US: I cannot answer this question because in our research criteria, we wanted to work with children from the age of 8 to 12. Younger children, we never had. But I have spoken with a colleague who is working as a therapist in her own practice, with children from the age of 4 upwards. She says that there are no problems with these small children learning to master the training.

RR: Dr. Strehl, do you plan to offer any workshops on the SCP neurofeedback method in the near future?

US: Actually, I am offering workshops on a rather regular basis here in Germany. If somebody asked me to do so in the U.S., I think we could talk about this.

RR: Are there student training opportunities in your laboratory?

US: Yes, students may come and watch us work, and they may also be involved in their own projects, although we do not offer a formal training curriculum.

RR: Dr. Strehl, can you share anything about your group's future research plans?

Continued on page 36

Slow Cortical Potentials continued from page 35

US: Yes. We are just on the edge of starting a new project, and for me it is kind of a final question we still have to answer, and this addresses the question of specificity of neurofeedback training. There are quite a lot of hints regarding this question, if you think about the study of Lévesque and Beauregard. If you consider our results, then we found that the clinical outcome appeared to be dependent upon the child's performance in slow cortical potential regulation. These are all hints that, for us, suggest that what we are doing is specific. But, regarding what evidenced-based medicine asks for, you need more. Therefore, we are starting a project, again a multi-center project, here in Germany, probably beginning in January where we will compare SCP feedback training with a blind control using another kind of feedback. I do not want to talk about what we are using, but we did some pilot studies and we found a condition that is ethical and that allows us to compare the changes between the two paradigms we are going to use. This project is sponsored by the German Research Society with a grant of more than 1 million Euros. I think with this project, we will be able to develop really solid research and, hopefully, we will be able to demonstrate that the changes seen in children after neurofeedback are directly attributable to neurofeedback. In addition, we are considering including a 3rd group in the study and this group will receive NIRS (near infrared spectroscopy) feedback, and then we will be able to compare NIRS with slow cortical potentials and, of course, with controlled conditions. We are going to collaborate with some of our European colleagues. In Europe we now have quite a few very active groups working on neurofeedback, and there is one group that is beginning to research NIRS feedback. Another group is just on the edge of finishing a study with about 100 children. So, I think within the next, let's say, 5 to 10 years, we will already know a lot more about what we are doing when we do neurofeedback.

RR: Very exciting. Doctor, how many clinicians would you estimate are actively using slow cortical potential techniques in their practices?

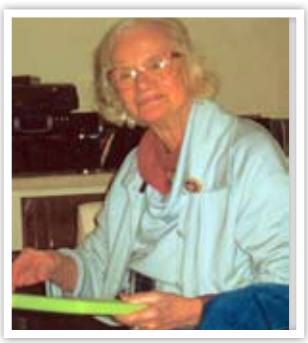
US: It is becoming more common. I can only speak for the German-speaking countries because they are those that are used to the event related potential EEG methods, and they were the first to adopt this SCP neurofeedback. I would say, if you take them altogether, there are 10 or more universities who are now working on this topic and 50 to 100 clinicians in Germany using SCP neurofeedback techniques in their own clinical practices. So, it is really progressing, although we have the problem in Germany that neurofeedback is not paid by state health insurance. For every single case, you have to fight with the health insurance agency in order to get the money, but most cases parents pay it from their own pocket. Normally you would get your medication and whatever you need for ADHD and you wouldn't have to pay a penny for it, but for neurofeedback parents have to pay. But parents do so, because they are desperate to help their children, and they feel that this is hopefully a good chance for their children.

RR: Thank you, Dr. Strehl. Do you have any final words that you would like to share?

US: I think one of the most important things we have done now is this 2-year follow up of our ADHD outcomes. We recently presented this data at an international conference, and we are in the process of submitting it for publication. As far as I know, nobody else has done this long-term a follow-up in ADHD treatment research, at least not in prospective studies. The results in these follow-up studies are so good that we really should think that this is a good message that neurofeedback provides a good alternative for children with ADHD. We are beginning to see an evidence base that with neurofeedback that we can count on the brain--that the brain has learned and has changed in an enduring way, contrary to all of these pharmacological treatments where you never can be sure what will happen if you withdraw the medication. With neurofeedback you really can rely on learning processes, and I think this is one of the most important strengths of our method.

The French Connection Continued from page 20

derstanding of the human condition. Subsequently, many changes occurred at LENA. Antoine's research wasn't continued with EEG Biofeedback, and much of our data collected over the years was lost. What was not lost was our continuing friendship, which began when we were nineteen and pals at the University of Paris.



Currently

I continue benevolent private practice in Paris with the privilege of being among two in France who practice medicine at my age. I am still thrilled with studying the advances in science and medicine, of combining hypnosis and CBT, and of witnessing changes in impoverished lives for their realization of possibilities and dreams. I am contributing experiential materials to the soon to be published program for chronic pain and life-threatening illness in children and adolescence with E. Stroebel. My recent publication (2007) Pieges et Sortileges, Itineraire d'Une Psychiatre takes a journey through the use of hypnosis, paradox, surprise shaping techniques, visualization and guided imagery, as they become the patient's journey to well-being.

With the urging of friends and colleagues, I humbly acquiesced to an interview recorded on DVD entitled Conversations avec Anne Blanchard-Remond Medecin Psychiatre (2008).

"Cette "conversation" est due à une amie et à une réalisatrice, je les en remercie. Un de mes fils m'a dit que j'avais eu 8 vies….peut-être….privilège qui m'a permis d'avoir des idées sur l'âme humaine et les moyens de l'aborder le plus simplement possible. Ce dvd est dédie a tous ceux que j'aime. Anne.

Translation: This conversation is due to a friend and a director, I thank them. One of my sons said to me that I had had 8 lives….perhaps….a privilege which enabled me to have ideas on the human heart and the means of approaching it most simply possible. This DVD is dedicated to all those who I love. Anne"

Publications

(1994) Anne Remond and Antoine Remond. Biofeedback Principles et Applications. Masson Medecine et Psychothérapie.

(2007) Anne Blanchard-Remond. Pièges et Sortilèges, Itinéraire d'Une Psychiatre. (Paris, France.

(2008) DVD Interview : Conversations with Anne Blanchard-Remond, Doctor Psychiatrist. (Paris, France).

Why a Research Foundation?

David L Trudeau

Practitioners of neurofeedback know how potent this therapy can be for a wide variety of disorders. Many times our patients/clients have been inadequately treated with other therapies and adding neurotherapy to their treatment regimes makes a huge clinical difference. Yet neurofeedback remains a therapeutic option available to the few – most often those who have become convinced of neurofeedback's effectiveness through word of mouth and who have the ability and motivation to self-pay. Because neurofeedback lacks large randomized and controlled studies that can demonstrate its efficacy and specificity, it is not widely accepted as a mainstream therapy and is not recognized by third party payers. As a result hundreds of thousands of people with afflictions including autism related disorders, post concussive disorders, attention deficits disorders, substance use disorders and other disorders known to respond to neurofeedback can not avail themselves of this therapy. The objective of the Foundation is improved quality of and accessibility to neurofeedback through sound science.

The Research Foundation of ISNR seeks to channel funding from individuals and foundations to qualified academic researchers to conduct well designed large-scale studies that will determine efficacy of neurofeedback. To this end the Research Foundation will engage in a number of strategies. One will be to dialog with academics and departments interested in neurofeedback to foster research capabilities and interest and graduate studies. A key part of this process is to identify researchers and institutions capable of performing large-scale studies. Another will be to collaborate with researchers and research supporting institutions to establish criteria for definitive studies, and determine – for instance – what conditions are suitable for sham controls, and which study designs are optimal for conditions studied. A third will be ongoing support and monitoring of research funded through the Foundation, with strict performance, ethical and accountability standards. Finally, the Foundation will inform the general public and health care providers about advances in knowledge, quality, credibility and availability of neurofeedback services.

To finance these strategies the Foundation will pursue funding from interests that share the objective of improved and accessible patient care for the disorders that appear to benefit the most from neurofeedback and other neurotherapy interventions. Identifying and contacting and dialoging with these interests will be ongoing.

The Foundation is just starting – beginning its first year and has a vision (above) that will refine through dialog and collaboration and insight as it evolves. The focus of this first year is to initiate and guide a long-term process that will yield advances in quality and accessibility of care for those who suffer from brain dysfunctions such as autism, attention deficits, brain injuries, addictive disorders, affective disorders and others amenable to neurofeedback.

Unobtrusive Forms of Radio Frequency Interference
Continued from page 28

Other even less obvious sources:

Compact fluorescent bulbs, tubular fluorescent bulbs, light dimmers, touch activated lamps, cordless phones, wireless Ethernet, copiers, printers, wireless mice and keyboards etc. In addition the computer itself is a potentially strong source of RF interference. That becomes more difficult to check since it needs to be running for the instrument connected to it to run. However you can temporarily run the instrument on a different computer, and turn the main one on and off. You can also try varying the position of the wires and also the person connected to the wires.

The fool proof (more or less) test for any suspected item is to shut it down by removing the power source. If battery operated, remove the batteries. If line powered, pull the plug. Otherwise, assume it is still running.

The moral of this story is that in addition to the "normal" types of interference we are all used to, we generate lots of potential interference from normal office devices. Happy troubleshooting!

Horvat Fund:

Joseph Horvat $175 (his membership transferred) (Beta 2 level)

Merlyn Hurd $300

ISNR Foundation:

Delta Level

Richard Soutar $25

Brodmann booklets total $680, which includes sales since last July and at the conference

Conference Silent Auction:

$9,588

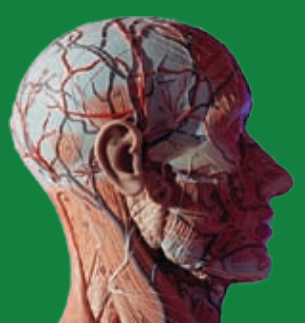
As always, Thank You to everyone who donated a service, software or hardware to the auction.

Final Contributions to the Horvat Fund include:

Beat 2 Level

Joseph Horvat $175 (Ann Marie transferred his 2008 membership dues to the fund)

Merlyn Hurd $300



Production of Future in the Frontal Lobes

David A. Kaiser, Ph.D.

One of the deepest functions of a living organism is to look ahead...to produce future. —F. Jacob

At 24 years of age I spent a summer in Hawaii in order to study hemispheric specialization of Atlantic bottlenose dolphins. A few years earlier Lou Herman (1986) had published his research which showed that dolphins could understand symbol order, a rudimentary comprehension of grammar, which meant that humans were no longer alone linguistically-speaking. His lab was cutting-edge, the front of a wave of understanding about our large mammalian brain. I rented a moped at the Honolulu airport to tool around in, but it remained locked on a telephone pole outside the lab, never used during my stay, as I spent all of my time with the dolphins, even sleeping nights in the storage room over the tank.

We actually never got around to running any new experiments. Herman's postdoc showed me the setup many times and explained what was going on and it was the greatest learning experience of my life so I soon forgot why I was there. The tanks were adjacent to the beach and after long mornings signing to four very studious dolphins, most of the lab hopped the fence and played volleyball on Waikiki beach or swam in the ocean. The lab was made up of all comers: a young woman studying exotic veterinary medicine, a delegate from the 1988 Republican convention, a ex-hippie or two, a Naval candidate in training, and the constant stream of eco-tourists known as Earth-Watchers. But of course the main attractions were not the humans but the four sign-language-trained dolphins: Akeakamai and Phoenix, the older pair, and a set of youngsters, Elele and Hiappo, the only boy. They are all dead now, sadly. Elele went first and once she was gone the older girls dropped within a month of each other. Hiappo soon followed, which didn't surprised me, as rule number one for dolphins is never do anything alone, not even life.

But I've skipped ahead 20 years and need to rewind. Life was good in 1989 and I considered leaving UCLA for the greener (bluer) pastures of Oahu as part of my post-adolescent quest for other worlds. Here in the middle of the Pacific was a larger-than-life experience unfolding every day, the largest brains on the planet communicating with humans (outside of alien abduction, of course). Hollywood had brought me to this very spot. I had followed a blueprint laid out by two movies from my youth, Day of the Dolphin (1973) and Altered States (1980), both inspired by the life and work of John Lilly, MD, a neurophysiologist from my father's generation who Herman knew well and who I would meet the next summer. Lilly was well known for his opinions on dolphin intelligence; he claimed that the large cetacean brain, which was 20% bigger than our own, allowed these creatures to be more conscious, more benevolent, more humane than us.

One could only hope….

The dolphin brain is impressive. It's large and convoluted—out-of-control convoluted, a mass of wrinkles and folds and curves with twice as much surface area as our own. It makes our own neural apparatus look puny and primitive by comparison. Nevertheless I was not taken in by size and needed proof—behavioral evidence – of Lilly's divine incarnation hypothesis. Within moments of my first eye-to-eye, I realized how remarkable these graceful creatures were and more importantly how much more remarkable humans were. These aquatic aliens were not philosopher-kings, as I had hoped for, but mindful wolves that had adapted to ocean life. They were Romper Room kids, raking the backs of each other with their jaws as they vied for more time with the human teacher. They were as far removed from Aristotle and Buddha as I was. And without hands or history to change the world around them, I assumed they lived inside a work of art, in a world of intellectual stasis.

I retreated back to the mainland and UCLA to study the human mind -- well, as close as I could get to the human mind as it was L.A in the 90s. Lilly was living in Malibu, although his dolphin lab was long since shut down. He continued to promote his ideas and he suggested that the largest dolphin of sorts, the sperm whale, possessed the most advanced mind on the planet because of its great brain; this, despite a relatively low brain-to-body weight ratio, 37,000 kg-to-7.8 kg (Ridgway, 1986). Here are the other contenders ranked by maximum brain size in grams:

1700 g—Tursiops truncatus [Bottlenose dolphin] (Lilly, 1967)

2850 g—Homo sapien [Human, mentally-retarded, epileptic]

6075 g—Proboscidae [Elephant] (Tower, 1954)

7200 g—Balaenoptera phipalus [Fin whale] (Jansen, 1952)

9200 g—Physeter catadon [Sperm whale] (Kojima, 1951)

The relationship between brain and mind is never simple. We now consider connectivity more important than mass and focus a lot of attention on the frontal lobes, but even with such an anatomical index as neural connectivity, too much of a good thing is not good; too many axonal connections leaves an individual dumbfounded. Our brains create more axons and synapses and cells than we need for our cultures and we must prune back much of the growth to be able to function well. This process is called neural Darwinism, or exuberance and elimination. The focus on frontal lobes is relatively new; in the past we called it the silent lobe, unable to grasp its role except perhaps as head ballast, even though it makes up more of the cortex (35-38%) than any other lobe (parietal 20, temporal 18, occipital 16, limbic 9%, plus a smattering of insula).

Frontal lobe function began to undergo serious scrutiny 150 years ago in response to events that took place in Vermont, of all places. Phineas Gage was foreman of a crew working for the Rutland and Burlington Railroad in New England and he soon possessed the most famous brain in science. One day while working on a cutting outside of town, gunpowder ignited prematurely and a meter-long tapping iron rocketed out of his hands and into and through the left side of his face. What followed after this incident is well known to neuroscientists: Gage recovered, miraculously, but according to friends "Gage was no longer Gage." He regressed, became childlike, impulsive, given to profanity and drinking. He lost his railroad job, worked in a livery stable, went down to South America on specula-

tion. Twelve years after he lost much of his frontal lobes, he lost his life during a series of violent epileptic convulsions.

Reconstruction of his skull revealed how the metal bar disconnected and destroyed much of his left frontal lobe, especially the orbitofrontal area. This part of cortex provides cortical constraint over the hypothalamus, among other functions. The hypothalamus is in some sense the first CPU, evolutionarily speaking, sitting atop the brainstem, the first interpreter of sound and sight with its main program being survival, finding food and mates. Gage underwent an accidental frontal lobotomy (removal of gray matter) as well as a partial leucotomy (cutting of the white matter). "The most that the Gage case indicated was that radical operations on the brain were possible." (Macmillan, 1996).

The history of frontal lobotomy begins with Gage's accident in 1848 and extends into the present. Forty years later, in 1890, Friederich Golz discovered he could calm dogs by cutting away parts of the cortex. Not to be outdone, Gottlieb Burkhardt in 1892 removed what could only be considered in hindsight random bits of neocortex in 6 schizophrenics, killing two in the process. He was roundly criticized for his hubris by his colleagues and that ended experimental human psychosurgery for decades. But never underestimate our arrogance to destroy other members of our species. In 1935 Carlyle Jacobson at Yale damaged chimp's prefrontal cortex, which calmed the previously aggressive animal down without compromising its memory or intelligence. The next year his colleague at Yale John Fulton replicated the work and would go on to present it at a conference in London attended by Antonio Egaz Moniz and Walter Freeman. Moniz, a Portugese surgeon, extended the process into treating human maladies. He cut the frontal lobes of 20 of his psychiatric patients and reported a similar "calming" effect. He developed the leucotomy, white matter disconnection of the frontal lobe from the rest of the brain, and was awarded the Nobel Prize for his efforts (and later shot in the spine by an ex-patient). Walter Freeman, an American, introduced the frontal lobe leucotomy to US markets, refining it into his famed transorbital "icepick" technique. By pushing an icepick into the brain via the eye sockets and slicing back and forth to cut the white matter above, thousands could be (mis)treated in minutes for conditions ranging from depression to ADHD. It also was an effective way to render political opponents impotent and to calm unruly relatives, truthfully. The frontal leucotomy, still used in extreme pain cases, did not even lose favor when its clinical efficacy was evaluated and it was found entirely lacking any: 1/3 of patients got better, 1/3 got worse, 1/3rd stayed the same—the same had patients been left to their own devices. It only lost popularity when antipsychotic drugs like Thorazine and the other miracle drugs for schizophrenia became popular (Sabbatini, 1997; Valenstein, 1986).

In terms of function, the frontal lobes are divided into three main sections, a dorsolateral region serving executive functions, an orbitofrontal area involved in emotional regulation and related processes, and motor programming areas for speech and eye movements. This last division is excluded when we speak of prefrontal cortex. Executive functions are those involved in planning behavior, initiating behavior and in the cessation of behavior, as well as evaluating behavior and changing a behavioral approach or mind set.

When prefrontal cortex is damaged, here are the major problems that can arise:

Impaired abstract reasoning

- failure to maintain goal-directed behavior
- inability to perform abstract reasoning
- failure to generalize experiences into rules or general principles
- reduced mental flexibility and increased distractibility

Personality disturbances

- lack of originality and creativity
- inappropriate emotions and behavior, with little awareness of it
- difficulty initiating behavior or stopping when started

Impaired language production

- rare initiation of conversation, even mutism

Impaired social behavior

- deficits in maintaining appropriate social responses
- loss of spontaneous behavior
- confabulation (lying), tendency to fabricate quick, impulsive answers to questions.

Impaired motor function and reflexes

- problems with highly controlled, volitional components of motor control (apraxias)
- perseveration, incoordination, motor impersistence, including reflexes

There are a number of tests used to assess frontal lobe function, such as the BRIEF test battery. My experience is limited to the Stroop task, which forces a person to inhibit an automatic process (reading) to arrive at the correct answer, the Tower of Hanoi, which requires strategy and planning, and the Wisconsin Card Sorting Task, which evaluates perseveration and ability to shift mindset.

One of the more critical survival functions served by the frontal lobes in humans is perspective taking and detection of deception (Stuss et al., 2001). The right frontal lobe inhibits self-perspective and allows us to take on other perspectives, to see all sides of a situation (Samson et al., 2005). In fact self-awareness appears to be the output of the right frontal lobe (Tsakiris et al., 2007; Morita et al., 2008). It separates us from others, both bodily and mentally, a skill we likely fine-tune with reading. When we read, we inhibit our own perspective and acknowledge and generally acquiesce to the author's perspective, at least to the extent that we believe he or she is reliable.

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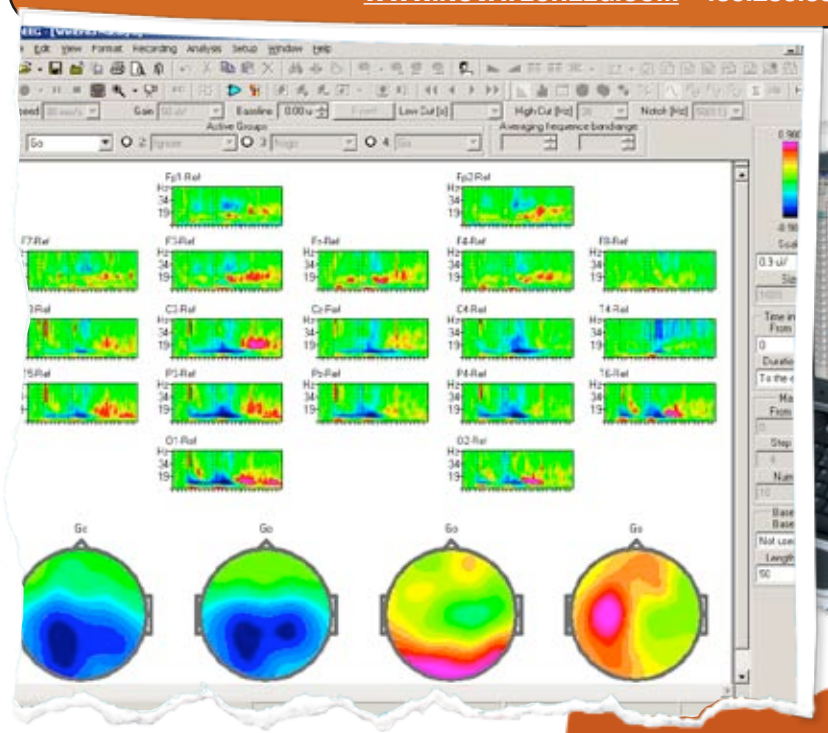

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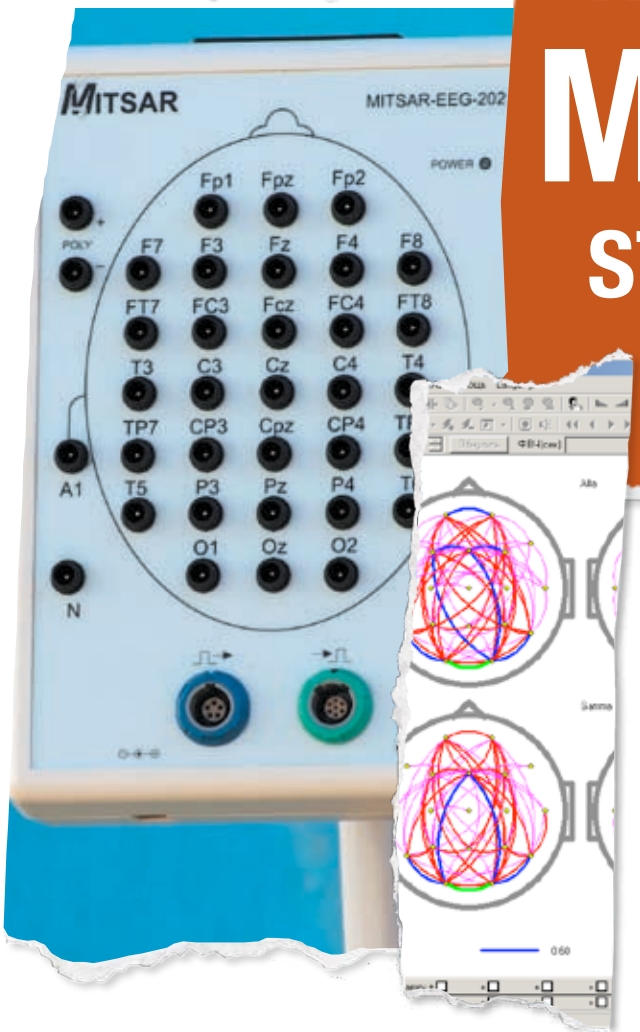

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