

NEURO CONNECTIONS



Summer 2009 *Newsletter*

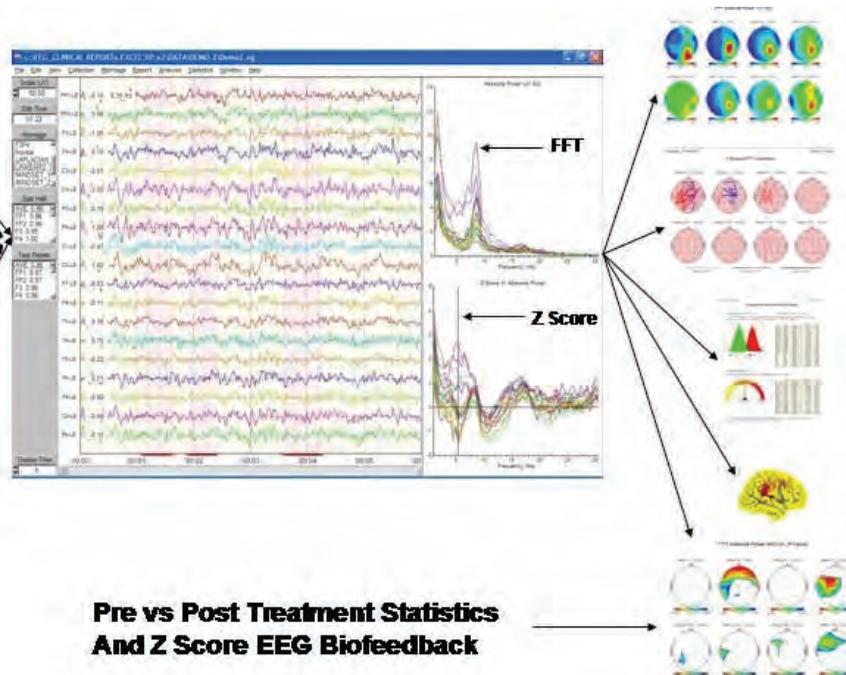
A joint newsletter from the  ISNR
& the  AAPB Neurofeedback Division



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by Erik Peper, Hana Tylova, Katherine H. Gibney, Richard Harvey, and Didier Combatalade

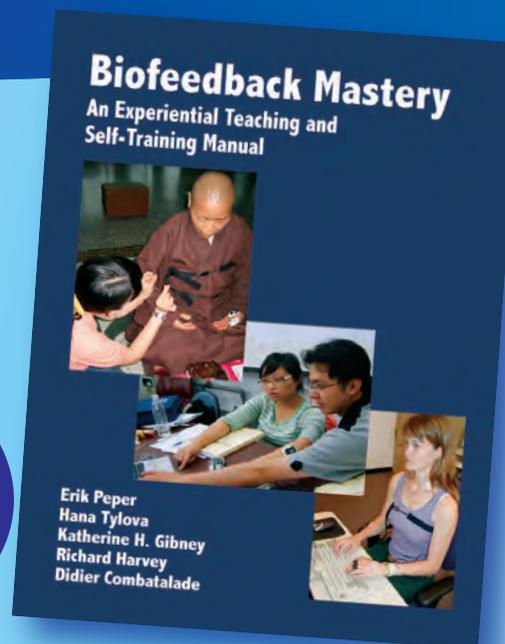


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- Techniques for connecting and attaching sensors
- Discriminating real feedback signals from artifact

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NEURO CONNECTIONS

A joint newsletter from the
& the AAPB Neurofeedback Division

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LETTER FROM ISNR PRESIDENT



As I write this I'm on my way home to Minnesota from our annual Houston Board 3 day-meeting. This meeting was started a few years ago and I think has now become a permanent feature of our process. The opportunity to meet face to face for an extended period of time with the other Board members is outstanding. While many of us get to know each other over the years through working in the same region, attending state or regional conferences, or at the annual ISNR Conference, few of us are able to get to know each other at more depth. During this meeting we discussed and adopted numerous decisions that constitute strategic moves intended to



promote the long term health of our field, the recognition of neurofeedback in the wider health care community and the continued improvement of the depth and professionalism of the field. The summary of the actual minutes of the meeting and the decisions we took should already have reached you via e-mail. What isn't in the minutes is, I think, as important as the summarized facts of what we did. What happens in this extended meet-

Continued on page 6

LETTER FROM AAPB PRESIDENT

QEEG-GUIDED NEUROFEEDBACK FOR PERSONALITY DISORDERS



Drs. T. Surmeli and A. Ertem¹ (from Istanbul) have reported successful treatment of antisocial personality disorder using QEEG-based neurofeedback training in 12/13 subjects. They used the NX-Link data base. Each subject received 80-120 sessions of neurofeedback. Protocols included alpha reduction at FP1/FP2, FP1-F3, F7-F8, and F3-F4 (bipolar training). Other protocols included reducing coherence of alpha, beta, or theta at O1-O2, P3-P4, T3-T4, T5-T6, FP1-FP2, and F3-F4 (when abnormal). C3-C4 SMR reward with inhibits at 4-8 Hz or 8-12 Hz was also used. Test pre- and post- training included parent interviews, MMPI, T.O.V.A., and SA-45 questionnaires. Each session was thirty minutes, using the Biolex neurofeedback system. All the subjects had excessive frontal alpha, theta, and beta abnormalities, as well as alpha, theta, and beta coherence abnormalities. Following treatment, 12/13 patients reported all of their problems had resolved. 10/13 subjects reported a new interest in reading books after the training. The one patient who did not respond also received LORETA neurofeedback, which was not effective.

This study is important in establishing a new indication for QEEG-guided neurofeedback. Drug treatment is usually not effective, nor is psychotherapy. As far as I

Continued on page 6

LETTER FROM ISNR CO-EDITOR



Welcome to the summer edition of *NeuroConnections*.

This edition takes us to the roots of biofeedback and how all of our work is aimed at one major part of the human body...the brain. Of course, our work with the brain influences the rest of the body and it is still so interesting how simple biofeedback techniques such as breathing, muscle relaxation and skin conductance can have such powerful effects. The articles that look at biofeedback and neurofeedback have informative views that are advantageous for us to revisit often. Dr. John Nash looks at the way we tend to separate biofeedback and neurofeedback and challenges us to rethink our language and clinical applications. Dr. Wes Sime's interview is focused on the same issues with answers that help us to review our operations and communication to clients. Dr. Elizabeth Stroebel has provided us the case history of Carla who helped write the article and shows the value of biofeedback with very young clients. This is part one and part two will be in the Fall edition. Part II will include the changes that take place in this client when neurofeedback is added.

Dr. Jon Friedrich has brought to our attention a means of feedback that involves the whole body. Check it out! Dr. John Carmichael provides us with his experiences working with PTSD. An article recently in *American Scientific Mind* looked at the incidents of PTSD in veterans and how often the diagnosis in them is incorrect and is more related to adjustment difficulties. Dr. Carmichael is an expert in the field of

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.

PTSD and has important information to help us in our work.

Dr. Steve Rothman has written a thoughtful article regarding the website listserv usage and how we need to be aware of how this powerful technology is used.

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LETTER FROM AAPB CO-EDITOR



Welcome to the summer 2009 issue of Neuroconnections. As we send this issue to press, a very successful AAPB 2009 Annual Conference is now behind us, and readers are already making plans to attend a very exciting ISNR fall meeting. In light of the spirit of cooperation between our two associations which gave birth to this shared newsletter format, the focus of our current issue is particularly apt. In this issue we explore the synthesis of peripheral biofeedback and EEG neurofeedback interventions in clinical practice.

John Nash's provocatively titled contribution, "It's ALL Neurofeedback!" may be a good place for the reader to begin this issue. Dr. Nash frames the discussion with a thoughtful series of questions- "Do the assumed distinctions between so-called "peripheral" and "neuro" biofeedback recapitulate Descartes' now-discredited mind / body dualism? Do not all forms of biofeedback training ultimately aspire to impact an integrated mind / body network?"

Dee Edmonson and Steve Elliott are well known to NeuroConnections readers for past contributions exploring the potentiating impact of combined breath work, HRV biofeedback and neurofeedback based training protocols. In the current issue, they present updated clinical case data to assist readers in adding this powerful synergistic model to their own practices.

Tom Collura develops this theme further, highlighting, with a simple model, the elegance of peripheral and neurofeedback combined synergistically in real-time, rather than with sequential, step-wise combined protocols.

The synergies between peripheral and neuro/biofeedback are not limited to the clinic. Offering a historical perspective, Wes Sime offers a retrospective of his own career in sports psychology and peak per-

formance training, discussing critical turning points as he learned the power of adding neurofeedback to peripheral biofeedback and motivational coaching interventions.

Liz Stroebel rounds out the theme, through the eyes of a remarkable young patient. In the current issue we follow her as she first learns that biofeedback can both validate, and help her to more effectively manage, her intractable pain. Her story will continue in our winter issue, as she learns to take increasing control over her recovery, and her bio/neurotherapy training progresses.

*Roger Riss, PhD
AAPB Co-Editor*

LETTER FROM ISNR ED



The theme for this issue of NeuroConnections is the integration of biofeedback and neurofeedback in clinical practice. This is something I've been working with for a long time. I came into this field studying peripheral biofeedback and quickly realized there is a head above the body that contained the Oz of the autonomic function. I became certified in neurofeedback soon thereafter. So, I'm glad to see this and the Winter 09 issues dedicated to it and so many clinicians working in this way. If you have a case write-up or theoretical article on the integration of biofeedback and neurofeedback, please feel free to submit it to me at office@isnr.org for the winter issue.

ISNR continues to work toward standards and guidelines for equipment and practice. We're working to create a PR program for further promotion of the field and are moving forward with the Research Foundation project. We are moving forward with the Alliance and continue to feel committed to serving our members. Be sure to stay informed by reading our monthly Member's Minutes email blasts.

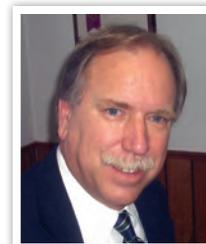
The conference schedule should be online by mid May. Once there, I'm sure it'll convince you to take advantage of the very early discounted registration that ends on June 4th.

Looking forward to Indianapolis,

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

LETTER FROM AAPB ED

**ECONOMIC STIMULUS?
THERE MAY BE NO BETTER
TIME TO MAINTAIN YOUR
PROFESSIONAL ALLIANCES!**



Times are tough! As I write this message, the markets have dipped to a 12-year low. For many of us, it feels as though we are watching our retirement funds fly off into the sunset.

As with everything in life, we have choices to make. We can choose to cry doom and gloom or we can do everything possible to make the situation. Bio and neurofeedback is hot. Pick up any newspaper or public media publications and you are likely to find an item on the subject. As the general public seeks solutions to their own healthcare needs, bio- and Neurofeedback has an important position to play in offering non-pharmacologic alternatives. In light of these factors, now is the time to get involved.

One of the most important things that you can do now is to maintain your professional alliances. There is no better time to be active in organizations like AAPB, BCIA, and ISNR. In doing so, you give yourself an edge. Just as your family is always there to support you, your professional family – your professional association – is there to provide a network of resources that can make the difference in support of your career.

The single highest rated benefit of AAPB is networking. Here are some of the networking and professional support opportunities that are available to you as part of the AAPB family:

- The Clinician's Tool Kit – as an AAPB member, you have access to this outstanding resource offering clinicians support in providing facts about psychophysiology and biofeedback to consumers, help in answering questions about CPT codes and insurance concerns, justification for the use of bio and neurofeedback, and examples of the media's interest in our field and how you might approach the media in your community.

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ISNR PRESIDENT
CONTINUED FROM PAGE 4

ing is a lot like what happens in our annual conference. The meeting goes on over dinner and in the evening, and at breakfast in the morning. We get to experience how each other thinks. We learn something of each other's personal lives, sense of humor, history, interests. We learn how we work and therefore we learn how best to work with each other for the benefit of the ISNR.

As you look over the minutes of this meeting and the summaries of our monthly meetings, I'd like you to consider the same idea I put forth to the Board at the beginning of our pretty length 3 day agenda. Some of what we had to do was "just business" – review the Taylor and Francis contract for publishing NeuroConnections and the Journal of Neurotherapy, etc.; Important, but tactical. Many of the agenda items were, however, strategic – items that directly affect the attainment of the major goals and mission of the Society. A great example of this is the presentation by Christiane Vigil from the IEEE. Chris showed us the detailed process by which the IEEE helps technology industry develop consensus standards. The IEEE has 380,000 members, publisher of 30% of ALL the technical information that is published on the planet each year – and has been able to facilitate agreement on common standards across the whole spectrum of technology, bringing together competitors, end users and often various government agencies and regulators. The IEEE process for developing consensus standards rests on five Principles:

The ISNR Board was very impressed by the methodology IEEE presented and we intend to incorporate this process as we move ahead from developing equipment standards to developing practice guidelines. We will have much more detail to present to membership as this project develops, but right now I want our membership to understand we are developing rational guidelines for the practice of neurofeedback and that we will be soliciting the active participation of all those who are interested in contributing. The IEEE defines 3 levels of "standards:"

- *Standards*
 - Documents with mandatory requirements
- *Recommended Practices*
 - Documents in which procedures and positions preferred by the IEEE are presented
- *Guides*

– Documents in which alternative approaches to achieve good practice are suggested but no clear-cut recommendations are made

We will aim for creating something that incorporates primarily Guides and Recommended Practices. The ISNR Board will develop an initial draft for discussion. We've already gone some distance with this, but it will develop further before being offered to a wider audience. Balance is achieved by having working practitioners, researchers, equipment manufacturers, educators and other interested parties participate as individuals, representing no one but themselves. Openness happens: these will be open, online meetings. A clear due process runs, with formal appeals made on technical or procedural grounds, if positions are taken by the group that discomfit some and eventually a true consensus is reached. 100% agreement is never possible and is not sought. Undue influence by any one point of view or interest group is avoided. Consensus means agreement by 75% of those who return ballots at the final vote. 75% of those who earned the right to vote by participating in the meetings must return ballots for the vote to be valid. We will also encourage all our manufacturers to engage in a corporate version of the same process, this one actually facilitated by IEEE staff. In the corporate consensus process each organization is represented by one person and has one vote. That levels any playing field.

The process itself is fascinating and very successful. The process, however, is a tactic to get a job done. The strategy is the development of clear, valid guidelines and standards for our field as a method of increasing the visibility and professionalism of the field. This in turn will promote the acceptance of the field by others in science, medicine and technology.

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

AAPB PRESIDENT
CONTINUED FROM PAGE 4

can tell, this is the first consistently effective treatment for antisocial behavior disorders and sociopathy.

Jonathan Walker, MD

REFERENCE

1. Surmeli, T., and Ertem, A., "QEEG Guided Neurofeedback Therapy in Personality Disorders: 13 Case studies," *Clinical EEG and Neuroscience* 40:5-10, 2009.

AAPB ED
CONTINUED FROM PAGE 5

- The Annual Conference – you will not find an atmosphere that exemplifies a "family" gathering more than the AAPB Annual Conference. The educational offerings are extensive, advanced, and always of high quality. The overriding value of the education is the openness of sharing among peers and a willingness to help each other in advancing their careers. The social activities are the epitome of networking and professional information exchange.
- AAPB's searchable online membership directory offers members the capability to locate others in their area or others of interest to initiate additional networking.
- Our Divisions and Sections are designed to provide opportunities for individual with similar professional interests to share clinical challenges, research, and other information. Divisions and Sections have the opportunity to meet during the AAPB annual meeting. They also have listservs that allow for an ongoing dialogue throughout the year – an excellent way to stay abreast of technology changes and updates in your specific areas of interest.
- AAPB's teleseminar series offers an opportunity to participate in exceptional education without incurring the cost of travel. A sampling of some of the topics that have been presented include: "Brain Anatomy and Psychology for Biofeedback and Neurofeedback Therapists," "Differential Diagnosis and Management of Headaches," "Psychophysiological Issues in Fibromyalgia: From Theory to Treatment," "HRV and Trauma," and much more.
- AAPB's Job Board and Classified Ads offers the opportunity to find positions available, post help wanted listings, find clinical equipment for sale, or post items to be sold.
- There are many more services to help you maintain your competitive edge. To mention a few, there is the journal, *Applied Psychophysiology and Biofeedback*; our newsmagazine, *Biofeedback*; the online newsletter, *AAPB Presidents Letter*; and AAPB's outstanding publications including *The Neurofeedback Book* and our newly published *Biofeedback Mastery: An Experiential Teaching and Self-Training Manual*. Our new

edition of Evidence-Based Practice for Biofeedback and Neurofeedback is the only publication of its kind providing up-to-date empirical data and clinical research detailing the efficacy of bio and neurofeedback.

As you consider your options for riding out the current economic storm, it is important to know that your professional associate is there to help. We can always accomplish more collectively than anyone can achieve on their own. While it may not always be obvious, we are continually working behind the scenes to influence better insurance coverage, greater public awareness, enhanced acceptance throughout the healthcare community, and gain recognition for the non-pharmacological, long-term benefits offered by psychophysiology and biofeedback services.

Again, these are difficult times. Don't overlook the invaluable resource that you have before you. And don't be shy about offering your assistance and involvement in committees and other volunteer activities. Volunteer involvement is one of the best ways to network and stay connected with your professional family. Make the right choice! Get involved – and maintain your professional alliances.

David L. Stumph, IOM, CAE
AAPB Executive Director

ISNR CO-EDITOR
CONTINUED FROM PAGE 5

Do read and think about his thoughts and views.

Finally, it is with sadness that we mark the passing of Dr. E Roy John of the NY University Brain Research Lab. His contributions to the field of neuroscience will not be matched very soon. A tribute to him is in this edition and hope all will read and remember this fine, lovely man.

Remember the ISNR Conference is just around the corner, so be sure you sign up soon and partake of the generous discount in registration.

See you at ISNR, since the fall edition may get to you just at ISNR Conference time.

Sincerely,

Merlyn Hurd PhD, BCIA/EEG Fellow
ISNR Co Editor of NeuroConnections

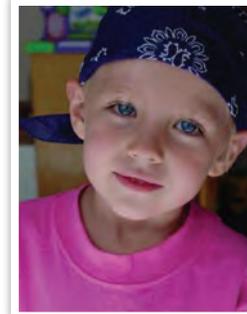
CARLY'S HEALING JOURNEY—PART I



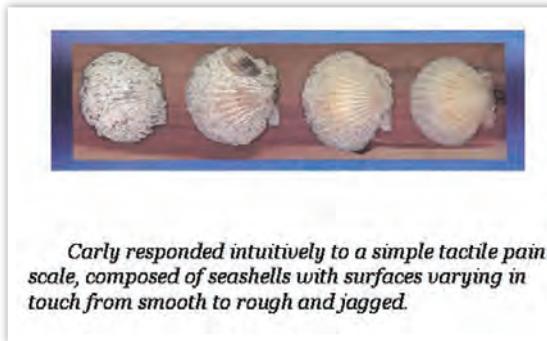
PLEASE LOOK FOR PART
2 IN THE WINTER '09
ISSUE

Elizabeth Stroebel, Ph.D., BCIA-C

At age three, Carly, with increasing leg pain, was referred to Children's Hospital Boston where a spinal cord tumor was discovered. Lab tests confirmed the diagnosis



of Mesenchymal Chondrosarcoma, a very rare aggressive cancer. A rigorous treatment regimen, including nine rounds of chemotherapy concurrent with 35 sessions of Proton Beam radiation at Massachusetts General Hospital successfully arrested the cancer. While repeat scans confirm that she has escaped recurrence of her cancer, Carly has not escaped her daily battle with pain. She will turn 11 in May.



Carly responded intuitively to a simple tactile pain scale, composed of seashells with surfaces varying in touch from smooth to rough and jagged.

CONNECTION

For me, Carly came into my life as one of my younger great mentors and teachers. The first time I met her, Carly was a nine years old. She was cheerful, outgoing and spirited, just like she could do anything. Yet, as she followed me out of the waiting room, I couldn't help noticing her hand tightening

around mine. Here she was walking bravely into another unknown environment, one of many such trips she had taken since age three, the outcome always hanging in the balance. She quickly scrutinized my office with unexpressed apprehension, as she verbally identified safe objects and peppered me with questions—"What's this and what's that?" Soon, she hopped up into the comfortable chair and slipped a small fuzzy blanket around herself, looking back at the door.

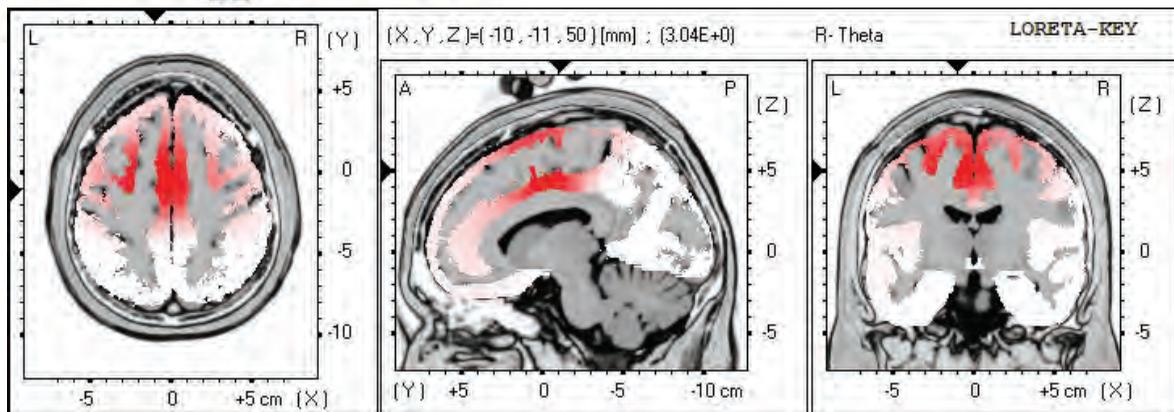
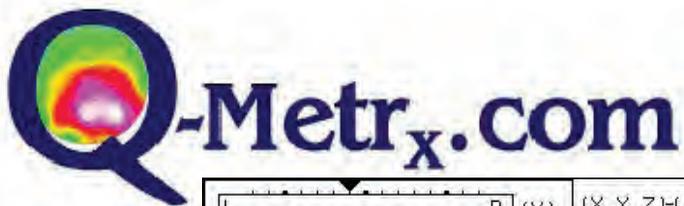
A WARRIOR'S TALE

Carly looked me straight in the eyes with a, "Now what?" expression. "I wish I had a sweatshirt that said, 'I had cancer'," she told me. Before I could respond she continued, "At Children's Hospital, they called me the 'Warrior Princess'." Clearly, she wanted to stake claim to her tough lonely cancer journey and affirm her courageous passage through a harrowing experience. For a second, I thought, "You better be good enough, Liz," to earn this child's trust. Adhering to my eight-second rule of grasping the opportunity or losing it, I hopped up on a couch next to her, without notepad or formal intake papers to create distance between us, and curled up saying, "I want to hear your story. Tell me anything you want, Carly?" For twenty minutes, she talked and talked.

A SAFE PLACE

Suddenly, Carly slouched back into the chair and fell silent. "So, what do you do in this room?" she said, her facial muscles tightening, as she glanced with obvious apprehension at the biofeedback equipment which lined the shelves around her. I wondered about her associations with other equipment-filled hospital rooms in the past, as I reassured her that this was a safe room, her room for now, and a place where we had serious fun for health.

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Database Comparison:

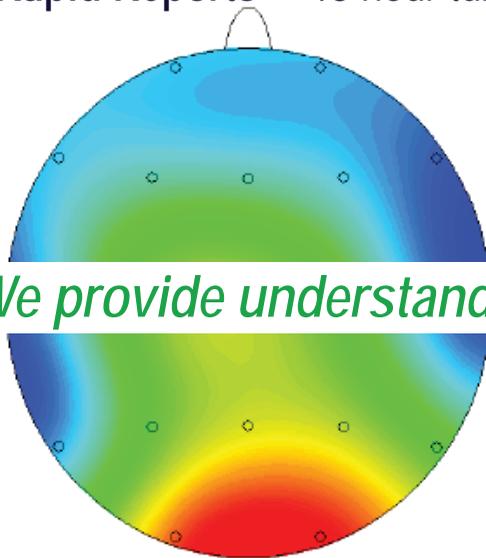
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D. Corydon Hammond, Ph.D.
Jack Johnstone, Ph.D.
Joy Lunt, RN
Margaret MacDonald, M.D.
Leslie Sherlin, Ph.D, QEEG-D
Rob Coben, Ph.D.
Roger deBeus, Ph.D.
William Decker, Ph.D.

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THERAPEUTIC RELEVANCE

Knowing that kids are “doers,” I jumped up and took a hold of some sensors, and said, “Well, Carly, sweetheart, no one gets hurt in this room.” While we kept talking about non-serious things, I nonchalantly slipped my fingers into some GSR sensors and turned on a simple, eye-catching biofeedback display, as her eyes scanned my facial expression, perhaps to see if this process hurt me. “What are you doing?” As I showed her the palms of my hands, I told her I was having a fun conversation with my sweat glands, and that I was helping my heart and breathing quiet down. She laughed and asked, “How are you doing that?”, as she let her tightened hands relax a bit and lowered her shoulders. I said that I had learned some good healthy powers to chase pain away and to soften things that can make us worry, feel afraid, sad and

even angry. “Oh, Liz, I forgot to tell you that I went to Disney on Make a Wish Foundation.” she responded, soon followed by, “I want to try it! Can I try it? Please!” And this was the defining moment of Therapeutic Relevance-Here’s something in it for me.

Without prompting from me, Carly continued to spill out her traumatic story of diagnosis, surgery, treatment and subsequent daily aftercare intertwined with emotions too big for such a small child... anxieties, sadness, expressions of loneliness, anger, fear of dying and bone chilling grief tumbled out of her. “You know what I worry about? I get scared that I’ll get cancer again; I always worry about not getting better and how my life will be. “What if my Grandma dies and my parents?” “Or if I am gonna die.” As she spoke, Carly noticed that the biofeedback tracing was

“At the NeuroDevelopment Center, we often combine peripheral and neurofeedback (whenever it is financially possible for the family) and especially when stress related difficulties are central to the presenting complaints. Although we have not formally measured this, I believe that the rate of improvement has been faster for anxiety disorders with this combination of approaches. This experience has led me to include peripheral monitoring during neuro sessions as part of the training process for grant applications for neurofeedback for anxiety.

I believe that exploration of the complementarity of peripheral and neurofeedback is one of the (many) important research horizons for our field.”

*Laurence M. Hirshberg, Ph.D.
The NeuroDevelopment Center
Providence, RI 02903*

www.neurodevelopmentcenter.com

Carly at age 3...



- **"I don't know what would happen to me without my parents, sister and grandmother."**
- **"I loved my doctors and the staff who saved my life"**

Carly's voice



- **On validation of her experience:** “I get upset when people don't believe me when I tell them I have pain. My family knows I'm telling the truth. Biofeedback on the 'muscle machine' showed shooting stabbing pain in my leg. The graph lines hit the top of the screen, instantly and then went right down like lightning. My mother and Liz saw the spike.”
- **On transfer of training:** When I do my biofeedback it quiets me, and QR says to have an alert mind quiet body. When I see what I am doing on the screen or when pain is too much in school or home, I have skills to calm down.
- **On dysponesis:** It's really important is stop the "Big D" (Dysponesis-faulty bracing). The more you do that bracing stuff, the more you hurt. Biofeedback helps you interrupt it... Let go...

changing and going up. We briefly discussed why that might be. Then she and I practiced quiet easy breathing and talking to our heart. I gave her a gentle hug. She popped up and said, “I feel better already and look, the lines are going down. I want my Mom to see this.” So with Carly feeling empowered, her mom came in and Carly explained about “this biofeedback thing” that doesn’t hurt and that she was talking to her body and that the biofeedback machine was talking back to her.” This was beginning of **Transfer of Training in Action** in the office and to use at home when she felt pain sensations.

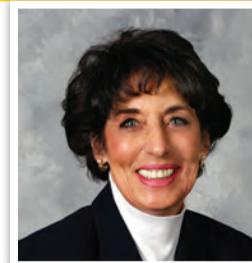
Carly immediately made an emotional connection with the QR characters (see accompanying illustration) illustrating our hospital training materials. Giggling spontaneously, she said, “See, they are friends-great pals who watch out for each other.” I think Q has the problems and R has the solutions.” Then Carly said, “Well, they both might have problems like feeling pain, loneliness, afraid of the dark, scared. They are on a trip together and no one to boss them but they help each other. I wish I had them with me in the hospital, when I was younger...”

I gave her a hug and said, “Just ‘work those skills, Princess Warrior.” She left with a CD introducing the Quieting Response for Kids and some reinforcement cards, “Just in case you might like them, I said.” The connection happened and therapeutic relevance began.

Continued on page 27

SIMULTANEOUS BIOFEEDBACK— THOUGHTS, OBSERVATIONS, & IMPLICATIONS

Stephen Elliot, PhD and Dee Edmonson, PhD



As a BCIAC-EEG practitioner, neurofeedback has been and continues to be a cornerstone of my clinical practice, where I focus on ADHD, anxiety, depression, head injury, learning disabilities, etc. For many years, I've employed electrodermal (EDR) response and hand temperature simultaneously with EEG, and have come to see the well recognized relationship that exists between these biometrics. I'm sure that most of us have seen the natural correlation that I refer to, this being a function of autonomic system status/activity.

Around 2000, I began introducing heart rate variability (HRV) biofeedback to my clients as an adjunct activity, with the goal of facilitating a more productive EEG session. At this time, I was focused on how I could help clients with neurofeedback and HRV biofeedback and somewhat less concerned with how these two fundamental metrics might relate to each other.

However, in 2005 my interest in this matter changed dramatically. It changed as a consequence of what I saw happen to EEG, HRV, and other biometrics when I introduced resonant breathing to the equation. In a nutshell, I could see immediate and dramatic changes in EEG, HRV, EDR, and hand temperature once resonant breathing began. With specific protocols and sites the changes noted were rapid decreases in delta/theta, and high frequency beta, accelerated access to the alpha state, a rapid yet appropriate reduction in EDR, an increase in HRV amplitude and an increase in hand temperature all within a matter of minutes. I see this alignment in metrics with most clients, to some degree. And here began my fascination with the multiple biometrics that we often use, sometimes alone, and sometimes in combination, and how and why they actually relate to each other. (Elliot and Edmonson, 2005, 2006)

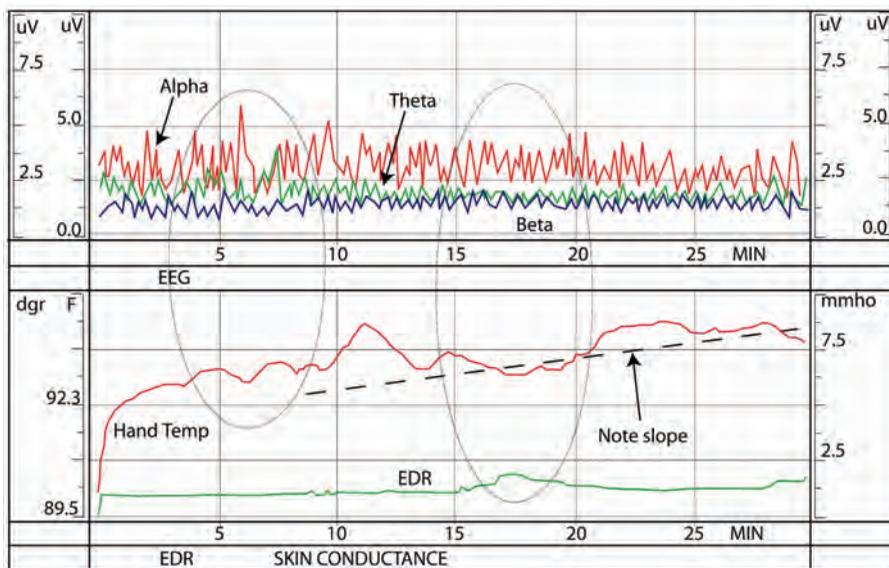
The particular system of resonant breathing that I've employed is "Coherent Breathing" which combines slow deep rhythmic breathing with attention to and relaxation of certain anatomical zones. The clients presented are two of the many clients that I have incorporated a protocol of Coherent Breathing, monitoring of HRV, and EEG-Biofeedback. The first is eyes

closed alpha theta training and the second is eyes open SMR training. In both cases, heart rate variability is only being monitored without visual or auditory feedback.

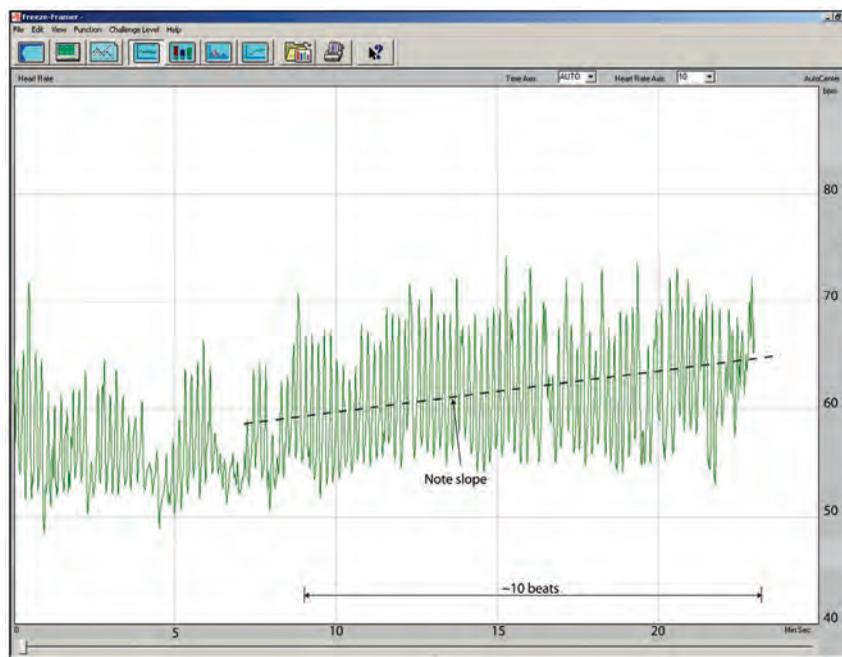
Both clients had previously practiced Coherent Breathing with HRV feedback. Both clients had learned to practice Coherent Breathing alone, without the aid of feedback.

38 YEAR OLD FEMALE WITH STRESS AND ANXIETY

The first two graphs represent a 38 year old female during eyes closed EEG Alpha-Theta training with simultaneous Coherent Breathing while HRV, EDR, and hand temperature are being monitored (without



Graph 1



Graph 2

feedback). She came to the center seeking neurotherapy with the goal of learning how to manage unwanted stress and anxiety without medication. Her baseline assessment included occipital sites O1 and O2, which indicated elevated high beta (19-33 Hz) with eyes closed. Alpha-Theta training was determined to be an appropriate addition to her treatment. Her medical history included a possible “mild head injury” during her college years but did not present any difficulties in her daily life. She had completed college with honors and was very successful in her career.

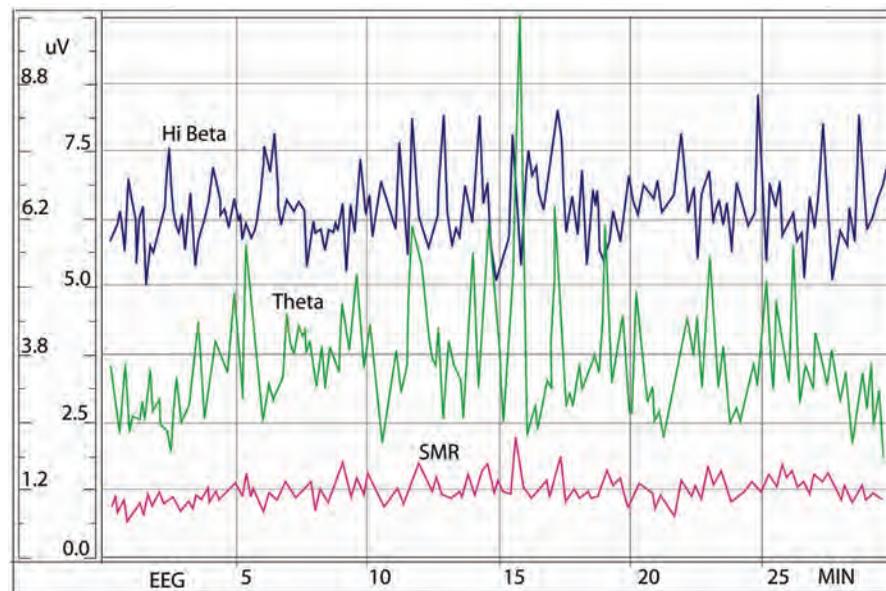
Prior to the EEG session she completed 12 minutes of HRV training with Coherent Breathing, (Elliott, Edmonson, 2005, 2006) attaining her typical HRV amplitude of 20-25 beats. At the time of this session, she was already skilled in the practice of Coherent Breathing. She was seated in a recliner at a 45 degree angle listening to the pacing recording “Clock and Bell” as opposed to traditional alpha-theta music.

The client had previously done alpha theta sessions with music specifically created to enhance and access alpha, but was interested in a technique that she could employ on her own and continue after completing her EEG-Biofeedback sessions. Prior to this EEG session, specific emphasis was placed on continuity of breathing frequency, depth and relaxing during exhalation. With eyes closed at the start of the session the EEG, EDR and hand temperature were reflective of an aware, relaxed, calm state often associated with a meditative state.

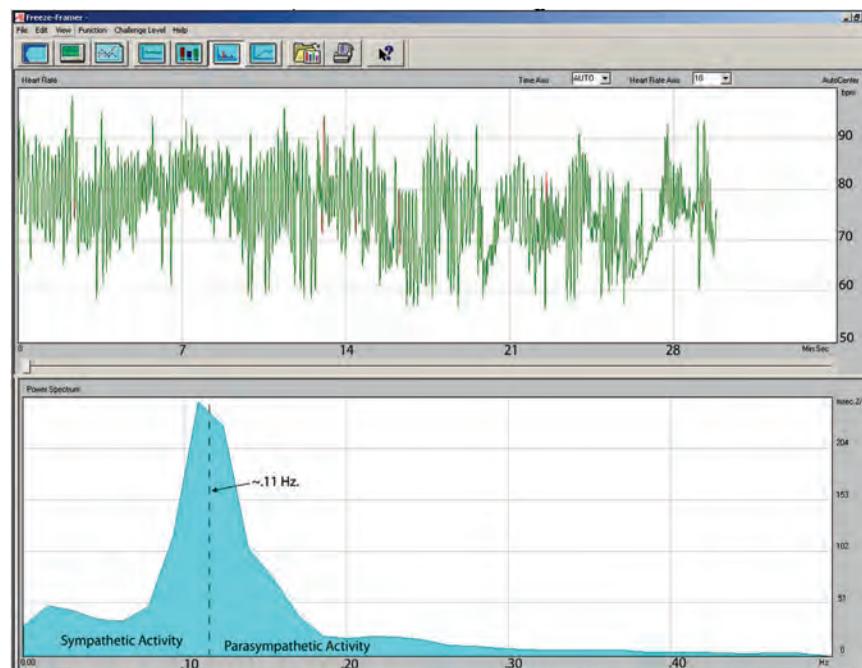
Alpha is accessed immediately and is sustained for the entire session. At the 6-7 minute mark, a noticeable spike in alpha is noted followed by a brief increase in theta with a corresponding dip in both HRV amplitude (lower graph) and hand temperature. Her EDR remains very low (in the 2 millimho range) again indicative of a meditative state.

At approximately 17 minutes, there is a momentary dip in hand temperature and a corresponding increase in EDR; on the EEG Graph there is a slight increase in beta, however, little change is noted in the HRV. At the end of the session, she reported that she felt relaxed yet alert and that mid-session she had experienced an “Aha” moment (Wilson, Peper, Gibney, 2004) gaining particular insight into an aspect of her life situation.

Her average heart beat rate and HRV (monitored without feedback) amplitude varied until ~8 minutes into the session, at which time they become more consistent,



Graph 3



Graph 4

her HRV amplitude leveled off at ~12-13 beats and her average heart beat rate began a very gradual incline. Viewing the graphs of hand temp and HRV there is a corresponding incline in hand temperature and HRV, their slopes being essentially identical.

Prior to incorporating Coherent Breathing adjunctively with alpha theta sessions, my observations noted that achieving and maintaining relatively high HRV amplitude and coherence was atypical of HRV, my observations were that often the HRV amplitude declined to 5-8 beat range and the average heart rate decreased to the 50-60 range. When paced breathing was em-

ployed adjunctively, HRV amplitude tended to be sustained in the 8-12 beat range and heart beat rate in the 60-65 beat range.

In Graphs 1 and 2 her HRV amplitude becomes consistent (approximately 8 minutes into the session), her EEG begins to blend, theta and beta amplitudes being roughly equal. This blending is sustained for the duration of the session.

19 YEAR OLD MALE WITH A HISTORY OF ADDICTION

The client presented in graphs 3, 4, 5, and 6 is a 19 year old male college student who

Continued on page 12

SIMULTANEOUS BIOFEEDBACK
CONTINUED FROM PAGE 11

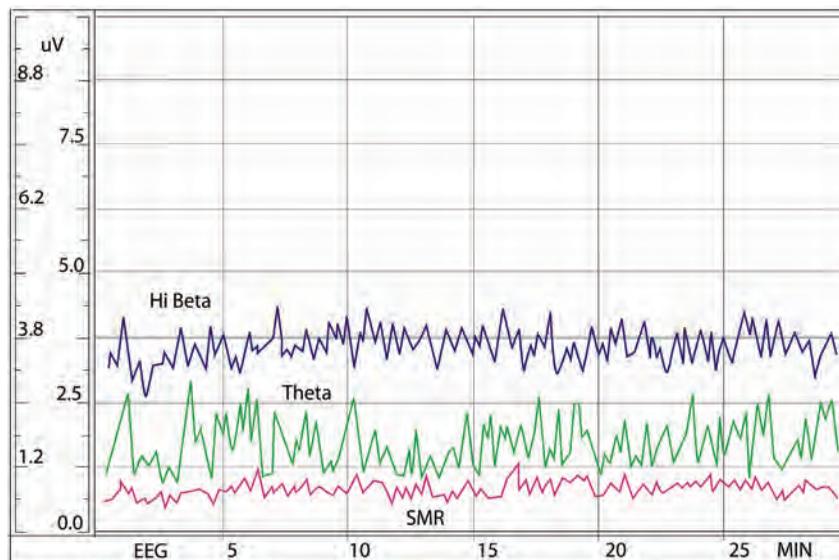
has a record of high academic achievement despite a “lifelong history of anxiety.” His parents referred him to the center for assistance with recovery from long term multiple substance abuses (marijuana, cocaine, and heroin). In the year prior to his EEG Biofeedback training he overdosed twice and was hospitalized. At the time of one of the hospitalizations he was reported to have been in a coma. He attended a residential treatment center post-hospitalization but continued to have cravings, persistent “high anxiety,” and great difficulty with sleep onset. The initial EEG assessment indicated elevated high beta (19-33 Hz) as well as elevated delta/theta (2-7 Hz) at site CZ. Findings also indicated elevated high beta (19-28 Hz) and elevated delta/theta (2-7 Hz) at FPZ. His initial EDR was recorded as 16-22 millimhos on a scale of 0-30. The following graphs are of his second and fourth neurotherapy sessions, separated by 2 days. Both sessions employ eyes open SMR training at CZ with simultaneous Coherent Breathing while monitoring HRV. Breath pacing was facilitated by the audio recording “Clock & Bell.”

Referring to Graph 3, EEG amplitude is elevated, high beta averaging $\sim 6\mu\text{V}$, theta averaging $\sim 3\mu\text{V}$, and SMR averaging $\sim 1.2\mu\text{V}$.

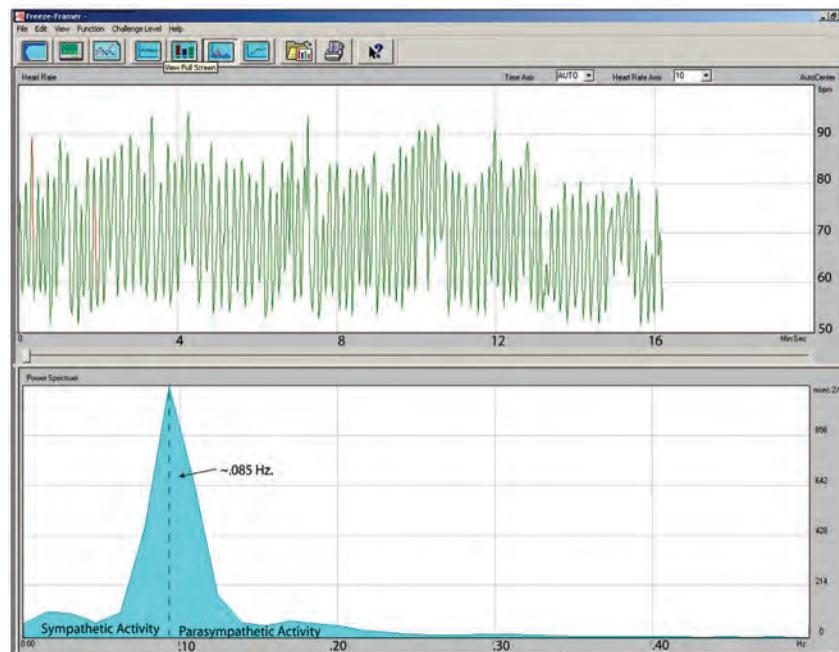
Graph 4 presents the corresponding HRV cycle and power spectrum during the EEG session. His HRV was merely monitored during the EEG session with no HRV feedback provided. The HRV cycle in graph 4 is rather erratic and the power spectrum indicates a significant elevation of sympathetic activity, despite the fact that he is employing Coherent Breathing throughout the session. HRV amplitude varies between 1 and 10 beats; average amplitude is difficult to estimate given the high degree of variation during the 30 minute period. His average heart beat is also quite erratic, varying between 65 and 80 BPM across the period.

At the end of the session his note was, “Worried over personal problems.” His comment at the end of the session correlates well with biometrics demonstrated.

His 3rd session occurred the following day where we focused exclusively on Coherent Breathing with EDR biofeedback. During this session his EDR averaged 16 millimhos. However, his comprehension of Coherent Breathing increased dramatically and he was encouraged to practice the method at home for at least 20 minutes per day. He also used it that night to go to sleep.



Graph 5



Graph 6

Graph 5 presents his fourth neurotherapy session the following day (two days after session 2).

It employs the identical protocol as session 2 and occurs in the same chair, with the same instruments. “Clock and Bell” was played though an open sound system and focus was on awareness of breath. The EEG changes in this session note amplitude is greatly reduced, high beta averaging $\sim 3\mu\text{V}$, theta averaging $\sim 1.5\mu\text{V}$, and SMR averaging $\sim .8\mu\text{V}$, each being reduced by about 50% as compared to session 2. His EDR for this session averaged 3-6 millimhos, a major reduction compared to the previous day.

Comparing Graph 6 with that of session 2, the HRV amplitude averages ~ 20 beats with a significant increase in coherence. Average heart beat rate is also consistent, centered about 70 BPM. The power spectrum demonstrates centeredness around the frequency of respiration with equal frequency components to the left and right of .085 Hz, demonstrating increased autonomic balance. His comment at the end of the session was, “Very calm after session, mind and body are quiet.” Again, his session comment is consistent with biometrics demonstrated.

Continued on page 14



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SIMULTANEOUS BIOFEEDBACK
CONTINUED FROM PAGE 13

CONCLUSION/DISCUSSION

These are just a two of the clients that have demonstrated clear simultaneous changes in multiple biometrics measured in real time— when those metrics are being observed and recorded during a period of resonant breathing. We believe that this is because resonant breathing itself is a key determinant of autonomic nervous system status, and as the autonomic nervous system changes, we see those changes reflected in multiple biometrics, in a generally consistent manner.

We theorize that the primary physiological phenomenon underlying resonant breathing is enhanced circulation, i.e. blood flow and gas exchange.

As we continue to observe and understand how and why these metrics are being affected by breathing, a larger understanding of autonomic nervous system behavior is unfolding. I believe this understanding helps us better employ all forms of biofeedback, alone or in combination. 

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STEPHEN ELLIOTT

Stephen Elliott is an avid life science researcher, developer of the Coherent Breathing method, and a Coherent Breathing practitioner/facilitator. He is the principal author of The New Science of Breath and Coherent Breathing – The Definitive Method, the primary researcher and developer of the Coherent Breathing method, and a primary advocate for the “respiratory arterial pressure wave” theory of heart rate variability. Stephen possesses a unique “systems view” resulting from a synthesis of diverse fields of knowledge including physiology, engineering, esoteric arts, and alternative medicine, as well as a deep understanding of yoga and meditation that can only be forged via direct experience. Stephen is a prolific inventor with

over 30 patents granted or pending in areas of life sciences and telecommunications. He is Founder and President of COHERENCE LLC, Allen, Texas.

DEE EDMONSON

Integrative neurotherapist Dee Edmonson, RN, Fellow BCIA-EEG and Coherent Breathing practitioner/facilitator, is the Director of Neurotherapy Services at Plano Neurotherapy Center. Specializing in the treatment of traumatic brain injury, attention disorder, addiction, depression, and stress/anxiety, Dee works with clients on a partnership basis incorporating conventional and alternative modalities to maximize the body/mind’s natural healing potential. Dee has extensive experience in the fields of cardiology, neurology, and psychiatry, and a lifelong interest in the psycho-physiology of breath. Her career experience includes developing innovative clinical programs for hospitals, consulting for medical equipment manufacturers, and serving as health and well being educator in areas of neurology and heart disease. She has been the recipient of the American Heart Association – Leadership Award. Dee is also a certified Heartmath 1:1 provider.



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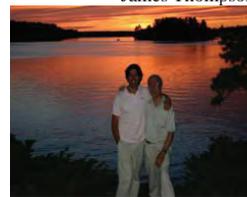
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INTERVIEW WITH E ROY JOHN (AUGUST 14, 1924–FEBRUARY 28, 2009)

Marco Congedo, PhD

I had the chance to work co-operatively with E. Roy John since 2006. I regularly visited his laboratory in NYC and worked closely with him, Leslie Prichep and Bob Isenhardt. I knew Roy not only as a great scientist with endless passion for science, but also as a great man of compassion, love, and fun.

I visited and worked last time with Roy while he was actively fighting cancer in November 2008. On that occasion I asked him a short interview, which I registered on my DAT and loyally transcribed once back in Grenoble. May his wisdom and knowledge be of example for all of us.

MC: All right Roy. You participated to the European campaign with the US Army during WWII. Then you become a major figure in brain research. How did you get started doing brain research?

RJ: I came back to the army to University studying nuclear physics. The nuclear physics become too destructive. I looked to a place to use mathematics and physics in a constructive way and the problem I was attracted [to] was the problem of parallel processing in many pathways within the brain to produce a unified product. Nobody was addressing that. So I tried to move from nuclear physics to physiological psychology by quantifying physiology, basically to replace electrical wave shape by numerical assessment and probability. And from there on it continued a matter of showing that in fact there is a basic coherent structured resting activity of the brain and the brain converges to that basic structure from whatever starting point it has. That is the ground state of any brain and of course the human brain. And now you can describe that in a phase-space and make the basic of that phase-space the normative equation to describe EEG at rest. From now on it is a peace of cake; look at the vector of deviations from the baseline.

MC: You have co-authored the first paper on the P300, lunched the research on normative databases and then entered the difficult arena of consciousness. What do

you consider as your most important contribution toward the understanding of the brain?

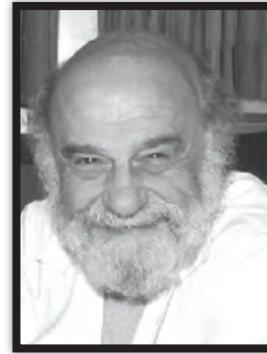
RJ: That the information for the brain is not a thing in a place. It is a process in a system. And it cannot be evaluated by measuring things in a place. It can only be evaluated by looking at the organization of the system. And so what we need is relational descriptive mathematics. We have found in the electrical activity of the brain the fact that there exist a number of parallel systems, operating in parallel, maybe five or six parallel pathways, sharing structures, sharing neuro-anatomical regions performing multitasking integrating this in a way that is like multidimensional scaling. So the question now is to develop the intuitive mathematics and graphics to show the equivalent multidimensional scaling and informational extraction of the multiple parallel pathways operating simultaneously. And we are at that stage now with independent component analysis, with transfer entropy with Roberto [Marqui-Pascual], with of course neurometrics and now hopefully with the resting structure from MEG.

MC: As you know there is useful research and there is useless research, you know, we probably may call it “trash research.” According to you was there more useless research in the 60s and 70s or today?

RJ: The 70s wasted tremendous amount of effort on reductionism. We were looking for a single place, not a process. We looked at single cells, we tried to understand the contribution at the single cell level to processing information, but what we don't understand is that the single cell is important only in so far that there is such a process. We have to look at the process as a whole.

MC: And do you think that today it is better understood?

RJ: With independent component analysis, of course.



MC: How do you see the future of EEG after the advent of MEG, PET and fMRI?

RJ: Ahh! Dramatic! Dramatic! With a small portable equipment that costs \$2,000 with high resolution in the Megahertz you can make brain images at the back side in real time with a laptop and with a chip equipment and normative data that tells you where the abnormality is in the system automatically. No interpretation is necessary. It's all automatic. It's all data reduction.

MC: Neurofeedback: a sunset or a sunrise?

RJ: Ehhhh... who knows. Neurofeedback demands a demonstration of efficacy. You have to show coherence between activity in different places and show that the intervention will change the coherence between regions, between their functional outcome. We tried to do that with coma, to teach people who were comatose to return to consciousness with some success. Right now in a couple of places they are trying to wake up people in coma.

MC: Do you have something to say about the rivalry and bitterness among colleagues in the academic community?

RJ: Sickness, childishness, childishness! We have enormous problems to solve. We have beautiful tools to solve these problems and instead of struggling to apply the tools to push the knowledge forward we struggle to get budget to allow ourselves to do more research. It is a corruptive jungle. Jungle. Jealousy. Like the Middle Ages.

MC: OK, I have the last question for you: the greatest emotion of your life so far?

RJ: To be alive.

MC: Thank you very much, Roy. 

Jonathan E. Walker, M.D.



- Board Certified Neurologist
- Board Certified Electroencephalographer
- President of the Neurofeedback Division of AAPB
- President of the American Board of QEEG Technology
- Pioneer in the field of neurotherapy research and treatment, he has used neurofeedback in his medical practice for over 20 years

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FOLLOWING PIXEL PIED PIPERS: WHY NEUROFEEDBACK LIST GROUPS ARE NOT ALL CREATED EQUAL AND WHY WE NEED TO BE CONCERNED

Steve Rothman, PhD.

As a clinical psychologist who has been doing neurofeedback for almost twenty years, I find discussion lists of Neurofeedback to be of great value. Anyone doing this work for a while must see that it is enormously helpful to share thoughts and ideas about various approaches, to learn of new approaches and techniques, to lean of new equipment... and new uses of old equipment, and to explore ways of integrating neurofeedback with other approaches.

If one thinks of the development of the neurofeedback field as an iterative process, at their best, we all know that list servers can profoundly accelerate our collective learning curve. By allowing the almost real-time exchange of ideas in a medium that permits large numbers of people to participate, we all, therapists, patients, prospective patients, and equipment manufacturers, benefit. What we do, I believe we all do better because of such list servers.

BUT NOT ALL NEUROFEEDBACK DISCUSSION LISTS ARE CREATED EQUAL.

While most lists are owned and moderated (I believe) by someone with no commercial interest in the neurofeedback field, there exist a number of neurofeedback treatment lists hosted by manufacturers. And, then, there are a number of lists hosted by people who are BOTH equipment-software-training manufactures as well as active clinicians. The Othmers', Val Brown's Zengar, Len Och's and the Sterman-Kaiser's lists come to mind.

Lists hosted by this last group, equipment/software/training purveyors who are also clinicians are the focus of this note and will be referred to as purveyor/clinicians list.

At their best, these lists are a mixed blessing for the neurofeedback field. On the positive side: those who host these lists frequently appear to be gifted clinicians who have made positive contributions to the neurofeedback field. It appears that their contributions have manifested in innovated therapeutic approaches and, frequently, in

hardware and software that make possible their approaches. Lists hosted by clinicians who are also equipment/software/training providers can be valuable forums that enable all of us to sharpen our skills and better do our jobs.

But, invariably, these lists have their negative sides. I believe that the negative aspects of such groups represent a disservice. If not a threat...to the neurofeedback field. Such lists share the following tendencies:

1. A tendency on part of the list owners to present their work as the One and Only Truth.

While not always the case, many of these list owners write as if their approach is the one and only approach to neurofeedback as well as the ENTIRE answer to a great many problems. Such presentations decrease the probability that people will be open to and motivated to explore other points of view. And while many of us know that such is not the case for ANY approach, new therapists and the general public who are allowed to participate in some of these lists, may well come away with the idea that it makes little sense to investigate other, or collateral approaches.

2. Many of these lists appear to have a great many virtual acolytes who seem to blindly follow all manner of host-initiated treatment recommendations.

Very often, judging from their online comments, many of these folks appear to follow these recommendations with little critical thought or examination of the information presented.

Below is a comment posted in response to some concerns that I and other contributors posted on the site that had asked critical questions about the host's approach to neurofeedback.

"I find (name redacted, but referring to the co-host therapist of one of the purveyor/clinician hosted sites) to be brilliant and courageous clinical pioneer.

It takes guts to lead a large troupe of groupies into a productive realm that defies understanding. The host (redacted) follows the results and devotees follow (redacted) the host. I'm poised to become a convert."

3. On the part of list owners of these lists, one often observes an indifference—if not outright antipathy—to critical thinking notes that are perceived as critical or as questioning of the opinions of the hosts.

Years ago I posted a note on the list of one of the clinician pioneers in the field who sells software and training. I was considering purchasing the software and my note simply asked the question of whether users of the software had noted incremental efficacy compared to other approaches. The next day I was informed by the host/clinician that my list membership was removed because they had decided that the list should be only for owners of the software. While it is the list owner's right to make such a decision, my being removed from the list came only after it was construed (incorrectly) that I had asked a critical (in the negative sense of the word) question.

4. A tendency to cross the line from providing general discussions to providing specific clinical treatment recommendations.

Inappropriate, in my judgment, on any of these lists. While occurring on all lists, it is my impression that such responses are much more prevalent on the Clinician/Purveyor lists.

5. A tendency for even those therapists with the best training and most experienced to refrain from posting contrary points of view.

Many times in response to some of my notes, I receive notes back channel messages expressing support for what I've written. Often these notes come from PhD trained clinicians who are will-

Continued on page 18

FOLLOWING PIXEL PIED PIPER
CONTINUED FROM PAGE 17

ing to support contrary points of view privately, but not publicly. While this tendency for people to hold back in expressing opposing thoughts seems to be present on all lists, it's absence is all the more notable on the Clinician/Purveyor lists where points of view are so often so obviously unbalanced.

6. A tendency to deny or minimize discussions of neurofeedback negative side effects and risks of harm.

Although in the last month there was a heated discussion of an example of an apparent negative outcome from neurofeedback, for the most part, discussions of negative occurrences (or potential of same) are infrequently seen on these lists.

And when they do occur, it is my impression that there is a tendency, by clinician/purveyors in particular, to deny or greatly minimize discussions related to the risks of neurofeedback. Recently I posted about concerns I have for a particular approach to neurofeedback. Responses by some others on the list suggested that I was

“freaking out,” and the list co-host suggested, that my responses were “fear based” and that such notes are “appealing to fear.”

It is easy to understand—but not justify—such a public minimization of issues related to negative outcomes, especially in such a litigious country as ours. But it seems clear that such minimization of such discussions cannot be of help to our field... or to our patients.

WHY IS THE ABOVE OF CONCERN?

Even on the Purveyor/Clinician lists one can find many examples contrary to the picture I have presented. But I think that any unbiased observer of these lists over time will conclude that there is a strong trend supporting what I've discussed. Even still, if it was only well experienced clinicians, and clinicians well trained to think critically, who provided neurofeedback; I probably would not have written this article. However, such is not the case and the two factors compel me to write these thoughts:

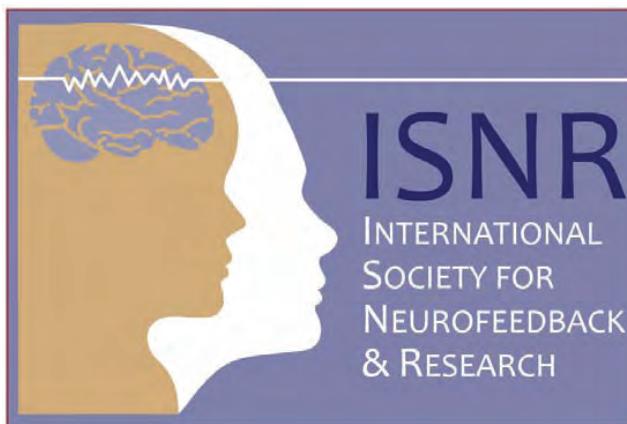
The first factor is that it is well established that neurofeedback can result in negative effects (often of brief duration). What is discussed with even much less frequency is that there is a risk, albeit, apparently, a

very, very, small risk, of neurofeedback causing harm, by which I mean, negative outcomes of long term duration.

The second factor not much discussed is that there are many practitioners providing neurofeedback...even folks with advanced degrees in the health professions...who are not adequately prepared to do so. One only has to pursue lists for a short time to see the number of people who have hung out a neurofeedback shingle who appear not to know a neuron from a nebulizer. Because there is so little regulation of biofeedback, many people jump in and hang out shingles without adequate preparation.

It is the preceding that has me most concerned. And it is for these reasons that my main concern about the lists discussed here are for the newly minted therapist who has hung out a neurofeedback shingle without adequate preparation; who, when providing clinical services for real and often serious clinical problems, comes to these lists to fill clinical and treatment knowledge gaps.

It is for these folks (and their patients) in particular that such lists, with their so often intellectually skewed and biased points of view are so potentially damaging. 



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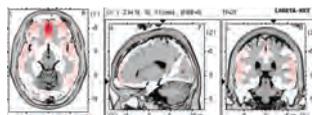
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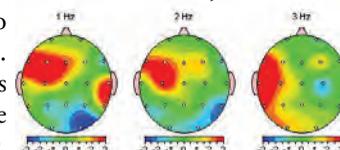
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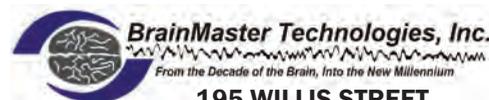
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DELIVERING TACTILE FEEDBACK WITH THE I-CUSH

*Jon Frederick, Ph.D., BCIA-EEG and Marvin Berman, Ph.D., CBT, BCIA-EEG
Quietmind Foundation, Plymouth Meeting, PA*

The I-Cush massage cushion (HoMedics, Inc) is marketed to provide a more immersive entertainment experience by converting sound into a synchronized massage. When we first saw this product in a shop window, its potential for biofeedback was clearly evident. At a current market price of under \$40, we also saw it would be affordable for home training clients.

The reinforcing aspects of most feedback modalities rely, in part, upon the human capacity for delayed gratification. That is, brightness increasing, volume going up, or Pac-Man eating a dot is in some way “symbolic” of a reward, and may not directly evoke mesolimbic dopamine release. Of course, there is some intrinsic reward to modern feedback displays and games that give them more reward salience than, for instance, the light emitting diodes that represented the “reward” state in 1970’s equipment. However, most clients experience the massage pad as directly pleasurable. (However, about 1/4 of our clients prefer to do sessions without the cushion.) Learning theory suggests that memory encoding is strongest when feedback evokes the greatest “depth of processing.” Having a tangibly pleasurable stimulus entering through an additional sensory modality seems like it will increase a client’s learning of self-regulation skills from both a reward potency and depth of processing point of view.

In our neurofeedback practice, we typically reward desired EEG by providing full brightness and volume for a CD or DVD of the client’s choosing. When we first tried the I-Cush, we found that the massage intensity varied widely with the music or movie whenever the volume was on. This is the intended function to make music and video games more entertaining, but this was not optimal for feedback, which we needed to be discretely on or off. The solution was to use a USB sound card adapter, which currently have a market price of under \$10. Thus, two sound devices are used to (a) play music for audio feedback and (b) provide a tone to drive the massage cushion.

When the USB sound card adapter is plugged in, Windows makes the USB sound card the default device for all audio.

The main system audio device needs to be switched back to the original device by going to CONTROL PANEL:SOUNDS AND AUDIO DEVICES:AUDIO TAB, and selecting the original device. Any software that was on before making this change then needs to be restarted. Usually, Windows Media Player will also default to this device. If not, the device can be selected by going to Windows Media Player:TOOLS MENU:OPTIONS:DEVICES TAB:SPEAKERS:PROPERTIES.

Our biofeedback software platform is Bioexplorer, which allows the user to select an additional sound device separately from the system sound card. If you don’t use Bioexplorer, hopefully your software provides a similar option. To make the USB Audio card adapter drive the massage cushion, in Bioexplorer, go to BIOEXPLORER MENU:PREFERENCES:AUDIO TAB, and select the USB audio device for the SYNTHESIZER DEVICE, and click OK.

A tone generator must be used for the massage audio output. These are added to a Bioexplorer design by selecting Tone Generator from DESIGN:ADD OBJECT. The threshold (or multiple thresholds connected to an AND operator) are then connected to the ENABLE port of the Tone Generator. The I-Cush volume dial is then adjusted so it is just loud enough to be detected and converted to the massage stimulus, but low enough that it can’t be heard by the client.

We then use the system’s sound card to deliver sound from the client’s CD or DVD with Windows Media Player. If only listening to music, we recommend G-Force (Soundspectrum.com) to deliver colorful visualizations in Media Player that synchronize with the music. Typically, we resize media player to take up 2/3 of the screen, and Bioexplorer to take up the remaining 1/3.



We use BXAdaptor Advanced (available for download from the files section of the Bioexplorer Yahoo Group) to control the system audio and video. Make the numbers in BX Adaptor look like the figure below. Using the tab key to toggle between fields is the fastest way to move between the fields to change the numbers. BX Adaptor is “always on top,” so move it near the bottom of the screen under Media Player so it won’t cover up anything in Media Player or Bioexplorer.

Note, you don’t change the two numbers to the immediate right of “Light” and immediate left of “Sound.” Those numbers are “meters” that show the current value during the feedback sessions. You might adjust the minimum sound intensity (the “15” under “Sound”) depending on how loud the recording is. It needs to be just barely audible, so that the client will be motivated, but not so quiet that the music completely drops out.

Some systems are not compatible with BXAdaptor. For these systems, the solution is to use the CD and DVD clients in Bioexplorer. If your design includes a DVD player, the following settings need to be in effect. PowerDVD 7.0 or greater must be installed on your machine. Under BIOEXPLORER:PREFERENCES:DVD DECODERS, PowerDVD (Cyberlink) must be selected. Under BIOEXPLORER:PREFERENCES:AUDIO, the CD Audio Volume Device must be the default system device (the name of this device will vary depending on your machine). The CD Audio Volume Device should NOT be the USB audio device. Meanwhile, for the massage cushion, only the Synthesizer Device should be set for the USB. Then, DVD audio will go through your system audio device and the beep will go out the USB audio card to drive the massage cushion.

This technology could be particularly useful for delivering feedback to clients, such as coma patients, who may be unresponsive or lack insight about the therapy situation. The pad can be placed underneath a person and protocols run with music, light stimulation, or other sensory inputs as indicated. We would be interested in coordinating a clinical trial that applies this approach to coma patients.

IT'S ALL NEUROFEEDBACK

John K. Nash, PhD, LP

This is a conceptual article, designed to encourage practitioners to think across the artificial divide of the “mind – body” split, specifically in terms of neurofeedback and “peripheral” biofeedback. Decades of good attempts have been made to develop a unified language that avoids the various artificial distinctions that were inherent in the philosophy of Rene’ Descartes. Such distinctions include the mind/body, the brain/mind and even thought/perception. Thoughts don’t look different from feelings or perceptions on the electrophysiological or chemical level. Waves of oscillating signals looping, modifying themselves and others, this activity is the same at the low level whether it happens in sensory systems, association systems, the limbic system or the brain stem.

Part of the problem, maybe the whole problem, emerges from the language itself. We have this strange tendency to make nouns and adjectives of processes. So we are tensing our muscles, it stops being noticed since it has turned into a sustained habit and before you know it, voila, we say we (or the patient) have a “tension” headache. Then we learn to complain about the “tension I’m under,” losing sight of the fact that there is no tension, there is in fact, tensing- going-on. We do this with “depression”, with “anxiety” and a host of other processes. We turn them into nouns. Nouns, we know, have certain characteristics. Nouns are persons, places or things. Things have permanence as objects and they have separateness. So as soon as we speak of the “body,” the “mind” or the “brain” we have separated reality into “things”—separate, freestanding and somehow independent of each other.

I noticed a while ago that I’d done the same thing with “neurofeedback” and “biofeedback.” I’d started speaking of “peripheral biofeedback,” in fact, to emphasize the distinction between muscle tension, skin conductance, skin temperature and heart rate variability – those “peripheral” measures, versus the measures of the “central nervous system” – the brain. But this is a problem. Neurofeedback reflects the activity, the oscillations and slow potential shifts of only a fraction of the brain’s cells – the cells near the cortical surface, particularly those whose fields are nicely aimed perpendicular to the surface of the scalp and those

that are part of columns of cells that often oscillate in concert.

Below the cortex, of course, there is a huge amount going on, most of which is quite invisible to scalp surface recording. Granted, LORETA feedback may allow some “penetration” to greater depth, but still only the activity of organized cortical cell ensembles is detected. In the mid brain and brain stem, electric fields are certainly generated, but they are very small due to the lack of columnar structure in most subcortical regions. So except for exotic methods like far-field recording of sensory evoked potentials, we don’t have much of a window for neurofeedback of brain stem events. Or do we?

I submit to the reader that in fact the so-called “peripheral” biofeedback modalities are not peripheral at all. When you feed back skin temperature, HRV, SCL or other “autonomic” (another questionable dichotomy in our nomenclature) variables, you are feeding back information about the state of the various large scale systems of the brain. This kind of feedback is fascinating, since it is known to be somewhat “loosely coupled.” For some years early on, stress researchers were puzzled over discrepant findings. One group would use heart rate, one skin temperature, another SCL or “GSR” as it was called. But no single measure performs consistently as a measure of “stress” on the individual or even on the group level. Individual differences in the pattern of stress response are large. Eventually the idea of assessing a psychophysiological profile evolved, with multiple measures being combined to reflect arousal versus relaxation. So one person might be a blood pressure responder but not a skin sweater. Another person, equally stressed or equally relaxed might show it in large changes in skin conductance levels but not much less change in blood pressure. Even within fairly homogenous patient groups, like males with mild hypertension, I saw radical differences in heart rate and blood pressure reactivity, with some people going from 140/90 up to 150/100 mm/Hg during a psychological stress test, while others hit highs of 250/170 mm/Hg.

It is in fact the “autonomic” or “peripheral” measures that give us the very best measures – and our only practical ones – of mid brain and brainstem central nervous



system activity. So I’ve begun thinking of all these autonomic measures as forms of neurofeedback, which don’t happen to utilize measuring the electric fields of neurons. We’re simply picking up a different reflection of neuronal activity when we measure SCL or skin temperature. Except in extremes of vascular pathology, finger temperature has precious little to do with the skin; the blood flow into the skin has precious little to do with the arterioles that are irrigating BETTER WORD the skin. Skin temperature has everything to do with complex decisions being made in the brainstem and midbrain regarding the need for blood flow to the skin and digestive organs versus the skeletal muscle systems. Under states of potential threat and/or potential reward from aggressive action, these systems re-route blood flow to muscle so the flight or flight can be engaged with appropriate vigor – lots of blood sugar and oxygen. So the skin temperature can be thought of as an integrated reflection of the status of very important midbrain/brainstem systems.

Heart rate variability, particularly when combined with other autonomic measures, is another very powerful measure of brainstem activity and the state of much larger scale systems, all the way up to the belief systems and the over-learned habit systems of the brain, cortical and subcortical. HRV has little to do with the heart. Of course the heart “beats itself” and “paces” itself, but the rate, the power and volume of each beat as well as the frequency modulation (heart rate variability) is ultimately accomplished by the brain via both electrical and hormonal regulation. You can easily do the experiment yourself if you have HRV equipment. Get nice and relaxed, gradually slowing your breathing to around 6 BPM, letting the breath go toward being mostly diaphragmatic. Don’t care too much about it, just let it happen. You’ll probably notice a nice coherent pattern set up and grow larger in amplitude, with heart rates dropping on the exhale, then elevating by perhaps 15-20 beats or more on the inhale.

Now, with that pattern running, start telling yourself it is ABSOLUTELY IMPORTANT that you breathe at EXACTLY SIX BREATHS PER MINUTE. Get tight-fisted and precise control over each inhale and each exhale. Watch what happens to your HRV and HRV coherence. If you're really on your own case about this, the HRV will drop like a stone, despite maintaining the same rate of breathing and the same diaphragmatic breath technique. So what was changed? Your belief about the importance of being exact, the degree of struggle, the degree of tight-fisted (as opposed to open handed) control is what changed.

So what about sEMG? This is another measure of CNS activity, isn't it? sEMG gives the most exact, localized and precise measure of activity within the motor cortex and secondarily within the premotor or "motor planning" regions. Further, this control is bidirectional! This is easily demonstrated by observing the blocking of the mu rhythm that occurs contralateral to hand, arm, foot or leg movement. Even more than that, physical constraint clearly causes the emergence of the sensorimotor rhythm. Training the SMR certainly helps produce a calm behavioral state, but one must remember that the physical constraint of being in "the chair" with wires on one's head and being under the social constraint and expectation that you are to remain still will also drive the SMR.

Of course when you deliberately

decide to relax your muscles, slow your breathing, take it diaphragmatic and not care too much about "getting it right," your central nervous system is directing this array of peripheral events, which are in turn affecting changes in the CNS. So there is this constant internal feedback loop.

Thus, our main measures of brainstem and midbrain function are autonomic measures; these measures reflect hormonal and neuronal CNS regulation of target organs as well as interaction between target organs and the CNS. Further, the patterns of autonomic reactivity are idiosyncratic, but highly replicable within individuals. These facts suggest that conceptually we should think of neurofeedback in a much wider way, not just as feedback of brain electrical activity, but as feedback of information about the state of the various major systems of the brain: cortex, midbrain and brainstem. Utilizing multiple autonomic and skeletal muscle measures in combination with EEG gives us the best chance of understanding the experience of the person with whom we're working. This understanding becomes even more important if our bent is toward what James Lynch termed "transactional psychophysiology," observing physiological measures and feeding them back during tasks, including during human transactions. Think about it. Even a simple listening or reading task during electrical neurofeedback is a human transaction and is likely to provoke a wide range

of autonomic reactions in different people. Without autonomic measures in place, you simply can't see what's going on in the midbrain/brainstem systems. On a practical level, this means we should routinely be taking at least some "peripheral" measures. In many cases the peripheral measures are far more specific and revealing than are the central measures. It is possible to show a nice eyes-closed posterior alpha rhythm, but still have one's hands clenched! Of course, getting muscles relaxed and HRV up and coherent and/or skin warm will promote a nice alpha rhythm and vice versa. How much can be added to our treatment effect by incorporating and integrating electrical and autonomic neurofeedback will require experimental demonstrations. But while we await the science, why not do as we usually do, which is integrate, innovate and make careful observations of outcomes, giving the scientists a rich source of hypotheses as well as something to catch up to. Many clinicians have been doing such integrative neurofeedback for a long time. I encourage anyone who hasn't tried it to do so. HRV/SCL systems are very inexpensive. Go look at what happens when you train down excessive high frequency beta and SCL/HRV at the same time. The synergy is quite apparent to me in the clinic. Two papers in this issue of NeuroConnections present evidence for this interesting reciprocal relationship between brain electrical activity and autonomic measures. 

CONFERENCE ECONOMIC STIMULUS PACKAGE FOR ISNR MEMBERS

In light of the current economic situation the ISNR Board of Directors has initiated their own Economic Stimulus Package for ISNR members. Until June 4 the member's conference registration rate of \$395 has been reduced to \$325. This is too good an opportunity to pass up and quite a few members have already taken advantage of this offer. To register for the conference at this special early rate you can download and complete the registration form that is located under the link "2009 Conference" on the ISNR website, or call Ann Marie at 361-949-1738.

The list of keynote speakers who will be presenting include Alvaro Pascual-Leone, Gyorgy Buzsaki who will be discussing Internally Generated Cell Assembly Sequences in the Service of Cognition, and Major League Baseball player Sean Casey who will be part of an optimal performance presentation.

Invited speakers include Marco Congedo (The Open-Vibe Software Platform for Neurofeedback), Dirk de Ridder (Limbic Dysrhythmia), Felipe Fregni (Transcranial direct current stimulation (tDCS): putative mechanisms of action and clinical effects of a simple and powerful method of cortical electrical stimulation), Mark Jensen (Self-Control Strategies for Modulation of Chronic Pain: Clinical and Research Implications), J. Peter Rosenfeld (The Complex Trial Protocol in Detection of Deception and Malinger), and Paul Sauseng (Brain Oscillatory Correlates of Visual Attention and Short-Term Memory).

Don't miss out on this opportunity to save \$70! Register today before the June 4 deadline passes. 



PTSD: EARLY CONSIDERATIONS

John A. Carmichael PhD, R.Psych.

This article will focus on some of the questions practitioners need to consider before launching into interventions for PTSD. By so doing, the client will be better served than otherwise, our field will gain respect for our professionalism, and the practitioner's likelihood of being the target of civil action will be decreased.

WHY DO ANYTHING ABOUT PTSD AT ALL?

This may seem at first glance to be a silly question. However, I have found it helpful to communicate reasons to the client early. It helps in forming a good working relationship and acts as one motivator. Many clients with PTSD would rather not think about the consequences of their condition. However, knowing the realities increases the chances of compliance with treatment recommendations.

First, in addition to the distress of the trauma and the suffering from symptoms, studies demonstrate that, as compared with others, those with PTSD are less satisfied with life, have higher unemployment rates, have higher suicide rates, have decreased educational attainment, and often struggle with marital, family, and other interpersonal difficulties. Such quality of life aspects are more marked among those with PTSD than with any other type of anxiety disorder.

Second, for a variety of reasons, many with PTSD fail to engage in preventative health strategies including exercise, diet, safe sex, sleep, and regular health care thereby giving rise eventually to other conditions and sometimes death.

Third, physical health can be affected with increased symptom intensity with diabetes, cardiovascular disease, GI symptoms, accelerated disease progression, chronic pain, arthritis, and psoriasis. The cause-effect relationship between PTSD and such conditions are not yet established firmly.

Fourth, psychophysiological problems such as headache, chronic fatigue syndrome, irritable bowel syndrome, non-cardiac chest pain, and fibromyalgia syndrome often co-occur with PTSD and can be the direct result of trauma.

Fifth, several investigators have suggested that severe and prolonged trauma may increase the risk of cognitive decline and the onset of dementia among aging individuals. Also, there is reason to believe the existence of a link between trauma and depression in later life.

WHAT IS THE NATURE OF THE TRAUMATIC EXPERIENCE(S)?

Exposure to a traumatic experience is a primary requirement for the diagnosis of PTSD and practitioners should be aware of the definition of a trauma as determined by criteria A-1 in DSM-IV. (American Psychiatric Association, 1994) A reasonable way to proceed is to read the definition to the client and then ask if s/he has had any such experiences. There can then follow a few additional questions to satisfy the practitioner that a traumatic event or events did indeed take place. However, there are two cautions to keep in mind.

First, trying to get all of the details of any traumatic experience usually is counter-productive. Moreover, my experience is that doing so likely will result in an increase of PTSD symptoms and especially among those with duty-related accumulated trauma such as police officers and military personnel. The people with PTSD coming to our attention do not yet have adequate skills to cope with their traumatic experience. That is why they are seeing us. My view is that we should not add to their distress; "do no unnecessary harm" should be one of our dictums.

Second, generally speaking there are major differences between clients who have been exposed to a single-incident trauma as contrasted with those who have experienced multiple or accumulated trauma. The clinician needs to know this because it does have an impact on the treatment interventions chosen.

WHAT WAS THE CLIENT'S IMMEDIATE RESPONSE TO THE TRAUMA?

To meet the A-2 criteria of DSM-IV, the client must have experienced intense fear, helplessness, or horror at the time of the



traumatic event. "What was your reaction?" is the simplest way to obtain this information without putting words in the client's mouth. However, here is where the first conundrum arises. Those who are trained to deal with trauma, such as police officers and military personnel, often do not satisfy this criteria. If their response to every trauma involved such reactions, their lives and the lives of others would be at risk. So learning not to respond in this way is a survival strategy which I do not want to mess with. Some authors have commented that the range of responses needs to be expanded; for example, to include anger which is a common response among police and military following trauma. Otherwise, if the A-2 criteria are adhered to strictly, then many emergency and military personnel with significant symptoms of PTSD would fail to meet the diagnostic criteria. Hence, they might be denied needed services. So, until the listing of responses to trauma is revised, practitioners are left with the choice between strict adherence to the stated A-2 criteria or the application of "creative" thinking.

WHAT ARE THE CLIENT'S PTSD SYMPTOMS?

In order to qualify for a diagnosis of PTSD, certain symptoms and combinations thereof are required. DSM-IV specifies these requirements. The symptoms can be assessed in a number of ways. The one considered as the gold standard for VA is the Clinician Administered PTSD Scale (CAPS; Blake et al, 1997) which consists of questions about the frequency and distress level of each symptom of PTSD. This structured interview takes 30 to 45 minutes to complete. There are a number of quicker screening tools such as the one I use. Known as the Trauma Symptom Inventory (TSI; Briere, 1995) this is a standardized psychological test with good psychometric properties and 3 validity scales. Clients are asked to indicate the frequency with which they have

experienced each of 100 symptoms. The end result is information about the intensity level for overall PTSD, for the 3 component scales of PTSD, and for related characteristics such as depression and anger/irritability. I use both the CAPS and the TSI during the initial interview and then repeat the TSI periodically throughout treatment as one gauge of progress or the lack thereof.

Could the Symptoms Have Been Caused by Trauma?

The symptoms of PTSD following traumatic events have been known for millennia. For example, they are described well in early Greek literature. Although due to accidents, PTSD was known in the early days of the railroad in England as railway spine or tunnel disease. Irritable heart and Da Costa's syndrome were the terms during the US Civil war. WWI brought shell shock while the concept of battle fatigue emerged during WWII. PTSD was finally included in a 1980 version of DSM.

Depending on the particular study published, PTSD rates are as follows: 15% to 60% for military combat personnel, 12% to 32% among troops fifty years after WWII, 50% to 70% for POWs during WWII (29% still had PTSD forty years later), up to 60% in Vietnam veterans (9% to 15% still had PTSD twenty years after combat), 2% to 9% for UN peacekeepers, 12% to 35% for police officers, 6% to 40% for civilians after a terrorist attack, 28% of survivors after physical assault, 9% to 29% of females after a spousal assault, 65% of female victims after a sexual assault, 9% to 88% of citizens after state sponsored torture or other political oppression, 8% to 46% among those involved in a motor vehicle accident, up to 50% of civilians following a human-caused disaster, 5% to 42% of residents after a natural disaster, 16% to 55% among those diagnosed with a life-threatening illness, 15% to 40% of mothers whose child has a serious illness, 15% to 49% of those suffering with a psychotic condition, and 10% to 30% for firefighters and other emergency personnel. And these numbers do not include those with partial symptoms of PTSD.

WHEN DID THE SYMPTOMS FIRST DEVELOP?

PTSD symptoms can develop soon after a traumatic incident, not emerge until following multiple traumas, or not surface for many years later. Knowing this is important for many reasons such as having another piece of information so as to be able to make a connection between the trauma

and the symptoms. Also, if symptoms developed later, knowing this permits identification of potential triggers which is helpful in developing intervention strategies.

DOES THE CLIENT HAVE OTHER PSYCHOLOGICAL SYMPTOMS?

I do not think I have ever seen a client with PTSD who did not have additional symptoms and this is the experience reported by other clinicians as well as in professional publications. Most of my police and military clients have between 2 and 4 other diagnosable conditions. Co-occurring conditions of depression, panic disorder (day and/or night), sleep disorder, generalized anxiety disorder, and various psychophysiological conditions are very common. In fact studies demonstrate that an average of 50% of those with PTSD will meet the diagnostic criteria for major depression.

Why is it important to have this information? One critical reason is that the likelihood of a good treatment response requires effective attention to all co-occurring symptoms/conditions. A second critical reason is that the likelihood of a relapse after treatment increases to the extent that co-occurring conditions were not addressed successfully during therapeutic interventions.

Some of the information about co-occurring symptoms can be obtained through use of a good structured clinical interview, a psychophysiological stress profile, and an omnibus standardized psychological test such as the Personality Assessment Inventory (PAI; Morey, 1991). Practitioners need to be reminded also that the range of co-occurring conditions mentioned above can be reactions to trauma even in the absence of PTSD symptoms. For example, symptoms of depression are common following trauma exposure. Still, PTSD is the most common condition.

DOES THE CLIENT HAVE ANY MEDICAL ISSUES?

A number of medical conditions include symptoms similar to some of those with PTSD. Endocrine disorders such as hyperthyroidism, cardiovascular conditions such as cardiac arrhythmia, sleep disorders such as central or obstructive sleep apnea, and various neurological disorders come to mind. Additionally, symptoms can be related to medication side-effects such as is possible with psychotropics and compounds containing caffeine. These need to be considered when developing a diagnos-

tic formulation and treatment plan.

IS THE CLIENT STRUGGLING WITH ANY STRESSORS ADDITIONAL TO THE SYMPTOMS OF PTSD?

Any stressor whether a significant co-existing medical condition in self or loved one, being overwhelmed with demands, problems at the work site, marital and family issues, and so on make PTSD symptoms worse. Knowing the relevant stressors can lead to ways of decreasing them thereby has a positive impact on PTSD symptoms. For example, decisions can be postponed, tasks can be delegated, time from work can be taken, and a truce can be declared. Also, exposure to stimuli that exacerbate symptoms can be limited. Many of my WWII clients discovered on their own that PTSD symptoms increased while watching TV news so they learned to turn the set off when the news came on. Also, often post-treatment relapse begins when stressors mount and decrease again as they are managed.

IS THE CLIENT SUICIDAL OR HOMICIDAL?

Up to 75% of those with PTSD will entertain thoughts of suicide. An unknown percentage will have such difficulty with anger control or non-alcoholic "black outs" that they pose a risk to others. For example, about 33% of military veterans with PTSD are violent with their partners, a rate 2 to 3 times higher than veterans without PTSD. Thus, the practitioner needs to be able to assess such factors competently and then put plans into effect so as to minimize any suicidal or violent actions.

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SOCIAL IQ

We Do What We're Told

David Kaiser, PhD

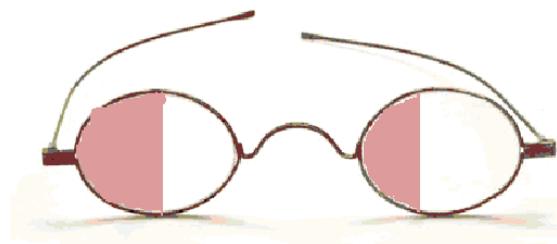
The ability to focus attention on important things is a defining characteristic of intelligence. -- Robert J. Shiller

IS IT USEFUL TO UNDERSTAND OTHERS?

This question is at the heart of being an animal. Most of us live on this rock alone or in a herd, sharing physical places but not mental spaces. Primates are exceptions as we share both. Intelligence is the ability to re-categorize and re-prioritize, and both serve the social more than the natural world. Physical navigation requires a great deal of categorization but very little re-categorization, and animals can learn to prioritize dangers but rarely need to re-prioritize them. But in group life we recategorize and reprioritize all the time. Relationships by their very nature tend to break down over time—affiliations weaken, alliances break down, and new coalitions emerge. Recognizing each change is critical to success in the social realm. Group life is a perplexing mix of people and personalities that forced our primate forebearers to reason and think with analogy, to infer the forging of alliances done outside the line of sight, for instance. Group life made us think about ourselves and others, requiring us to share our mind.

Autistic savants possess what is called “laser-beam intelligence,” powerful faculties limited to a single behavior like calendar calculation or sculpting. Laser-beam intelligences rarely translate well to other parts of life. Like other higher primates, humans can maintain alliances, sympathy groups, and even multiple mates despite rare contact because we possess laser-beam social intelligence, a hypertrophic response to evolutionary pressures specific to our niche. We oriented to each other instead of the environment, which is why it can take forever to solve external dilemmas. It took three million years for our common ancestors with apes to harness fire and another million years before we developed reusable stone tools and other works of functional art.

Social creatures necessarily share both mind and place. Dennett (1987) pro-



posed a method for investigating how much mind an animal shares based on intentionality. Intentionality can be thought of as a combination of beliefs and desires. Zero-order intentionality exists when an animal is incapable of beliefs and first-order intentionality exists when an animal has beliefs but is unable to muster beliefs about beliefs (metacognition). Vervet monkeys, for instance, make specific alarm calls when frightened by different predators but it is not clear the degree of intentionality and social manipulation they are capable of. If a fear elicits a characteristic alarm call, and no further manipulation is intended, we have not shared our mind but merely responded to sensory cues. However, if a vervet cries a leopard alarm because it believes that one is nearby, despite no sensory clues, we have intention being exhibited by the animal. Even without the ability to make a distinction between its own beliefs and another's, a vervet can manipulate others, forcing them into trees or under bushes by vocalizing. To manipulate members of the same species (conspecifics) more effectively, second-order intentionality is required. We must have some conception about how our own state of mind differs from others in order to effectively manipulate the behavior of others. If we possess 2nd-order intentionality, we might sound a leopard alarm call because we want other vervets to believe us, even if we are lying about the state of the world. At third-order intentionality we sound an alarm because we want others to believe that we intend something that may and may not be true about the world; we want to generate a belief in them about a belief in us. Third-order intentionality is necessary for reciprocal altruism (Trivers, 1971) and for human language, although not every culture welcomes mental attribution in conversation (Cheney & Seyfarth, 1990). Most primates possess incomplete theories of mind, incomplete intentional systems. Vervets sound an alarm long after everyone has seen the predator and baboons manipulate alliance partners time and again with the same feint (e.g., faking an injury), although higher primates like chimpanzees resist the use of transparent social manipulations (Whiten & Byrne, 1988).

Deception implies that one attributes a mind to another, a mind innocent enough to be deceived. One example of deception in the wild centers around Figan, a chimp studied by Jane Goodall in her classic *Chimpanzees of Gombe* (1986). Figan would give loud food calls when provided bunches of bananas by an assistant, but when he did this, the others heard his cries and converged on the spot, leaving few bananas uneaten. So the next time Figan was given a bunch of bananas he remained silent, concealing the fact, deceiving the group; though faint sounds were heard coming from his throat (Goodall, 1986). Deception was also investigated in trained chimpanzees by instructing each chimp to indicate which of two containers had food. Either a cooperative trainer (who shares) or an uncooperative trainer (who always eats the food himself) entered and the chimpanzee always provided correct information to the cooperative trainer, but he changed his manner with the uncooperative one, often turning his back. After many trials, some of the chimps gestured at the wrong container (Woodruff & Premack, 1979). So it is clear that deception can be conceived by a 400-gram chimp brain, though only after many exposures to the same scenario.

Evidence of self-awareness is rare for nonhuman primates. The bonobo chimp Kanzi occasionally signed “bad” with his hands before doing something he knew he might be punished for doing (Savage-Rumbaugh et al., 1988). Chimpanzees can generally use their own name when answering questions and this suggests a modicum of self-awareness, but self-awareness may stop there. The results of Gallup's mirror test are also interesting for nonhuman primates. In the mirror test an animal is anesthetized and an ink mark is placed on its forehead. Upon awakening it is shown a reflection and if it rubs or presses the mark, Gallup (1982) argued that the animal was self-aware. But gorillas fail this test, as do human toddlers, though it could be said that both creatures are self-aware but have no interest in cleaning itself. Monkeys can learn to use mirrors to manipulate objects and monitor others, but they too fail the test. The mirror test may

indicate a representation of body parts more than an abstract understanding of identity. Pretend play in younger monkeys and apes, however, requires the ability to distinguish what is real from what is imagined or intended, and entertaining multiple representations of objects and events is necessary for consciousness (e.g., perspective-taking).

For therapists, determining a client's theory-of-mind status may be helpful in exposing the root of some mental illnesses. Autistics lack significant theory of mind and brain-injured adults may lose pieces to our evolutionary toolset, but it's possible that a large range of people walk around with undeveloped social potential and rarely move beyond a basic social compass when interacting with others. Failure to empathize or understand the motivations of others is how many of us wind up in emotional or social straits, and at the doorsteps of professionals.

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EARLY CONTINUED FROM PAGE 9

Carly's story will continue in next issue of *NeuroConnections*.

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Dr. Stroebel is known internationally for her work in the field of applied psychophysiology with children and adolescents, and serves as co-chair of AAPB's Education Section. For 12 years, she worked in the UK with professor Linford Rees, MD, past president of the British Medical Association. She has contributed to developing programs in medical settings in London, Israel and Paris. A graduate of University of London, she has published internationally, most recently contributing to "Biofeedback in der Praxis: Band 1: Kinder" Springer publications, Vienna, 2007. Elizabeth Stroebel has been associated with the Neurodevelopment Center, Providence RI., providing biofeedback-based therapy services within a large neurofeedback practice group for the past three years. Her current project "Sailing Away the Pain with QR" is an in-hospital and aftercare program for children with pain and life-threatening illness. This multimedia program will be released at ISNR this fall.



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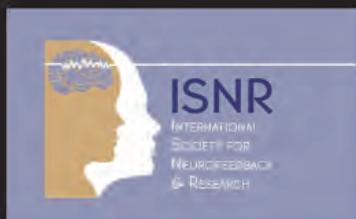
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BIOFEEDBACK AND NEUROFEEDBACK IN SPORT PERFORMANCE: A CONVERSATION WITH WES SIME, PH.D. BCIA-C

Q: Tell us a bit about your background and training. What were some of the important influences in your early career?

WES: I began my career as an exercise physiologist initially developing training protocols for cardiac patients back in the 60s and 70s before there were any standards for physical activity as part of a cardiac rehabilitation program. Prior to that time, cardiologists put their heart attack patients to bed rest for a month until several pioneering risk takers I worked with suggested we could get heart function to return quicker with a slow gradual introduction of aerobic exercise. Extrapolating from the cardiovascular fitness model to the present, I am using the same principle of training applied to the lazy or distracted brain to achieve longer and longer periods of high intensity focus and concentration.

Q: When did biofeedback and stress management become a part of your professional development?

WES: Actually, the direction I took in the exercise science graduate program at the University of Pittsburgh deviated considerably from the norm. I decided to design my doctoral dissertation based upon Edmund Jacobson's Progressive Relaxation training with and without EMG biofeedback. I had gotten to know Dr. Jacobson while in undergraduate school in Chicago partly because Dr. J. would pay students \$6 per session to be subjects for his EMG measurements. After Dr. J. died in 1983, F. J. (Joe) McGuigan and later Paul Lehrer carried the banner for Progressive Relaxation within the International Stress Management Association. Currently under Paul Lehrer's leadership the ISMA is a branch of special interest under the AAPB umbrella. Paul has

been the cornerstone link between biofeedback and stress management with his seminal book, *Principles and Practice of Stress Management* published in several editions by Guilford Press.

Q: So Dr. Jacobson and Progressive Relaxation were an important part of your early interest in this field?

WES: For my dissertation, I did a comparative study of biofeedback and progressive relaxation. I recruited a population of female headache sufferers for four sessions of training. In contrast to the control group I found greater reduction in symptoms and significantly higher awareness of discreet levels of muscle tension in the group which had biofeedback in addition to Jacobson's Progressive Relaxation. Although Dr. J was the first during the 1930s and 40s to accurately measure electrical activity associated with human muscle tone, for his own clinical patients he refused to give them EMG feedback during training. He felt they would learn and retain the sense of residual tension and "letting go" better if the training was done the hard way. That is, Dr. J. allowed his patients to struggle with the frustration of "discovering" by trial and error the location of the effort sense involved in a selected muscle contraction. For example, to bend the hand back at the wrist, as in preparing to make a key stroke on the computer, requires a contraction of the forearm extensor muscles located closer to the elbow than to the wrist. However, most patients erroneously report the feeling of "effort sense" to be in the wrist where the carpal ligament served as a fulcrum for the tendons connecting muscle to the fingers.

Self awareness of discrete levels of tension and subsequently using only the effort necessary to complete a simple task was essence of what I took from Progressive Relaxation a la Jacobson. In EEG work, that subtle awareness of intense focus ver-



sus slippage and mind wandering is what I want the athlete to discover more quickly with EEG feedback and related technology such as HRV training and Interactive Metronome, both of which enhance the ability to become totally absorbed in what I like to call "single pointed focus."

Q: Who were your early mentors in biofeedback?

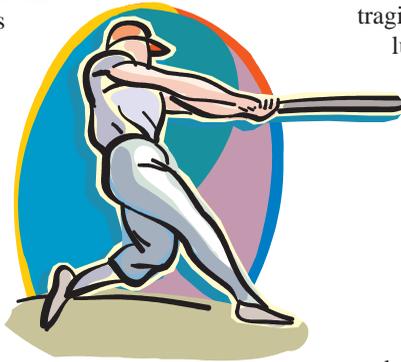
WES: While doing my doctoral dissertation with headache patients at the University of Pittsburgh I had to reach out beyond my own department. Doug DeGood became my mentor and long time friend. He had a laboratory equipped for psychophysiological measurements with sound attenuation and 60 Hz insulation. Periodically I would have to indulge in his discussions about the value of Alpha training, which seemed esoteric until Doug invited James Hardt to do a colloquium in the department. Although I was intrigued by what I heard, his message was way over my head and I ignored the topic until I heard about Joe Kamiya in the early 80s. He connected me with Chuck Stroebel and Joel Lubar. I served on the Item Writing Committee and the Board of Directors for BCIA in 1980 and as chair in 1984.

Q: I understand that you also had personal reasons for pursuing biofeedback and relaxation training...

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**BIOFEEDBACK AND
NEUROFEEDBACK CONTINUED
FROM PAGE 29**

WES: Jacobson's Progressive Relaxation training was very meaningful to me in those early days as it related to my own clinical pain issues. I had been crushed in a farm accident when I was 11 years old. In addition to suffering a ruptured spleen and a subsequent splenectomy, I also had some misalignment of the spinal vertebra. The resulting muscle imbalance led to spasms and sometimes excruciating pain while sitting upright or standing. Although I was initially drawn to Jacobsen's lab by the \$6 reimbursement offered his student volunteers, his relaxation methods soon became one of several



important palliative techniques to get pain relief. In the many years since that early discovery, I have continued to learn other subtle and some very direct methods of relieving muscle pain ranging from physical therapy exercises and training in the Alexander Technique to biofeedback and neurofeedback. Later, while attending an AAPB conference, I stopped at a vendor's booth and discovered that when I used a peak performance protocol suppressing 0-40 Hz I experienced dramatic reduction in muscle pain, a very rewarding positive side-effect.

Q: How did your interests gravitate from health psychology toward peak performance and sport psychology?

WES: I came to the University of Nebraska specifically to work on emotional stress testing with Robert Eliot, the prominent stress cardiologist who had identified sudden deaths among young healthy engineers laid off from Cape Canaveral when the space program lost funding. His book, *Is It Worth Dying For?* became our mission statement for the Hot Reactor model linking emotional stress to heart disease. A few years later I met Steve Wolf through AAPB and he brought me in to work on an Elite Athlete Project for U.S. Olympic athletes using sport psychology among other disciplines. That experience helped me to get

started with Tom Osborne and Nebraska football using biofeedback as the entrée for a new sport psychology intervention in 1986. It was also a key factor in my introduction to Payne Stewart, the PGA golfer known for his Scottish attire and his success winning the U.S. Open in 1999 and later leading the USA to a win in the Ryder Cup.

Payne Stewart's sport psychologist, Dick Coop, gave me a chance to use EMG and EDR to simply demonstrate varying levels of tension and arousal during performance just prior to winning those to golf events. Payne, who later died in a tragic airplane crash, was absolutely intrigued by the subtle awareness (and subsequent reduction) of unnecessary muscle tension he could achieve with great success during golf putting. He was the consummate role model in professional sport and would have been a great advocate for applied psychophysiology in sport had it not been for his untimely death.

Q: You have been doing biofeedback for almost 30 years. What has changed for you in this field over the years?

WES: First off, I became certified in Sport Psychology and became credentialed on the U.S. Olympic Sport Psychology Registry as well. Then in the late 80s I went back to graduate school while still a professor at the University and got a second Ph.D. this one in Counseling Psychology. Getting licensed allowed me to expand applications in broader fields of Health Psychology. I became fully sanctioned to address clinical issues like anxiety and depression, which sometimes were underlying complications in sports such as golf. I found that both EMDR and Interactive Metronome (IM) technology had significant application with clinical issues ranging from PTSD to ADHD and could also be adapted to work with athletes. Rhythm and timing outcomes of the IM serve to train the brain for focus and concentration comparable to EEG training without the trappings of being wired, tied down, etc. More importantly, IM and sport psychology coaching can help a clinician develop the rapport with an athlete (or any elite performer) which is necessary to even get him or her interested in coming to the clinic to begin the EEG training.

Q: Your approach to biofeedback is much richer than simply teaching an athlete or client to control a physiological signal. How does biofeedback fit into your intervention?

WES: I follow a very basic cognitive/behavioral approach involving action solutions first, reality testing second and fine tuning the mind body connection for relaxation, efficiency, focus, concentration and symptom reduction. Because I was a coach at one time and since I consult with end-users of our services in a non-clinical setting such as business, administration and elite performance, I am not bashful about promoting a service that I feel strongly about. There are also many analogies that help potential clients come to appreciate the value of applied psychophysiology services. For example, you wouldn't leave your car running while parked in the garage, why would you want to keep working muscles and wasting brain energy with distractions and residual tension while sitting quietly at work. Consider the cruise control on your car - once you are well trained (in mind body automaticity) you should be able to set the cruise and only use extra effort on the uphill (high challenge situations) while easing off and giving the body and brain a rest break in down periods comparable to rolling along down hill.

Q: What other venues do you see as opportunities for clinicians who want to expand their service populations?

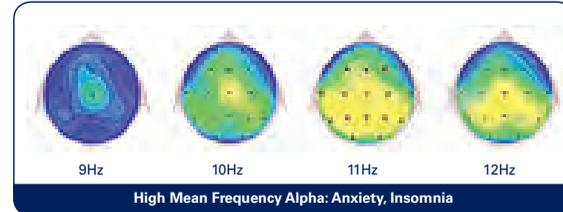
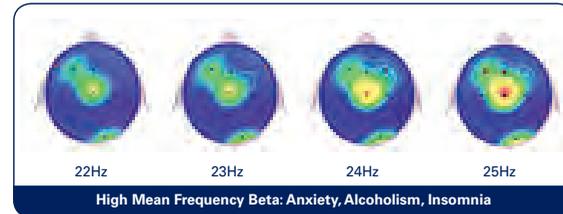
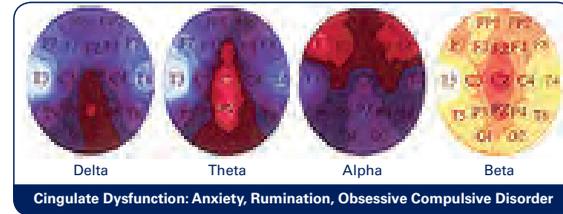
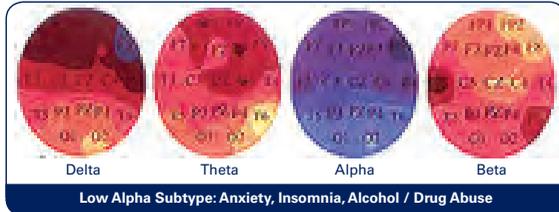
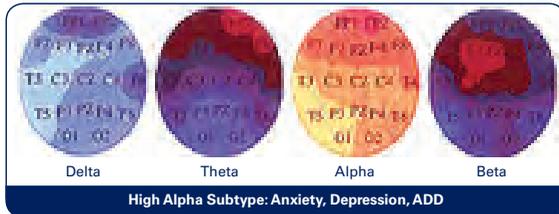
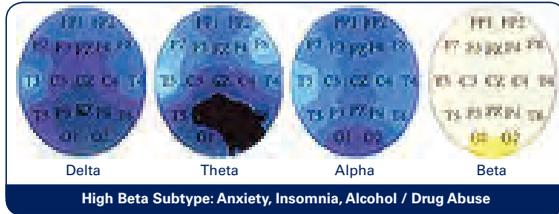
WES: The first is, of course, the great need that exists with returning soldiers from Iraq and Afghanistan. I got a call recently from one of my colleagues in the Pacific Northwest who was excited about the fact that one of her clients (an Iraq war veteran) had such good benefits with NF training that he talked to a general in Washington and she was getting entrée from more client referrals, where the doors had been closed previously. Siegfried Othmer and others have certainly brought the spotlight to this area of great need with his initiative to make services available across the country at no cost to any veteran who presents with a sincere desire to get better. Recently I have had the privilege of consulting on a project helping U.S. soldiers (some wounded warriors) who either want to perform better with less anxiety in the face of constant danger

Continued on page 32

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Established 1982

**BIOFEEDBACK AND
NEUROFEEDBACK CONTINUED
FROM PAGE 30**

or who need assistance to get their lives back together after a devastating injury or PTSD. Ironically it is a sport psychology model with biofeedback as an adjunct that is driving this effort helping soldiers deal with real life pressure. I am very pleased to know that biofeedback can have an important role here.

Q: What is your advice for other clinicians interested in performance enhancement work with biofeedback or neurofeedback and how can they get started?

WES: In the past, several of our colleagues have offered workshops at AAPB or ISNR featuring sport psychology principles. Rae Taetenbaum has lead the way with her work in the expressive arts including music, voice, instrument, etc. Clearly it is her own personal experience on stage that has allowed her to connect with performers who struggle with brain and or body strain under pressure. Another is Michael Linden whose leadership has brought forth a new textbook titled, *Biofeedback and Neurofeedback in Sport* which is about to come out in print in 2009.

The most important way to get started in the performance world is to identify a "Bobo." This term I learned from Gary Mack who wrote the book *Mind Gym: An Athletes Guide to Inner Excellence*. He was a master at identifying and linking with a "Bobo" inside the organization. The term is Italian as he described it to me, but effectively it means, "someone on the inside of the organization" who trusts you, who appreciates your technical expertise and is willing to introduce you to the right decision maker. The other route that may be more expedient is to develop a professional liaison with a performance psychologist in your local area. Find out when and where the regional meetings are being held (from www.AASP.org Association for Applied Sport Psychology), then show an interest with an offer to demonstrate your skills while learning more about who is working with various individuals or teams. You have to invest the time and energy to extend yourself into the professional community.

Q: How do you get prepared to use BF/NF to enhance acquisition of skills in a field you know nothing about?

WES: A few years ago I was asked to work with contenders for the U.S. Olympic Curling team. I know nothing about Curling so I had to do my background work and learn the sport. I interviewed the person who had requested my services, I watched and asked questions for many sessions before I ever made a suggestion about what intervention might be helpful to the athlete.

There are two non-traditional sports that I would like to get involved with and maybe someone out there will lead the way. One of my former students wanted to work with Rodeo contestants, in particular, cutting horse and bull riding events. He never followed through, but every time I see an event on television, I think to myself, there is an opportunity to expand services, I know there is. Secondly, one of my recreational passions besides skiing and golf is Texas Hold'em Poker. You see it on air frequently and there is a lot of money at stake if you can get the \$10,000 buy-in to play in the World Series of Poker in Las Vegas. Reading or disguising the "tells" of a strong hand or weak hand would be very much improved with the addition of remote assessment of psychophysiology during actual play of the game, obviously followed by review and debriefing of the self-report and the actual outcome of the bets, calls and folding of hands in the game.

Q: What is your next important technological advancement in the field?

WES: I am excited about the new Compact Flash technology introduced by Thought Technology. A few weeks ago, I spent three days on a golf course following two elite golfers, videotaping their shots and recording their physiology just before, during and immediately after routine as well as critical shots. The reason I am leaning toward this methodology is that I feel we are too locked down by our office equipment in a setting that is not highly conducive or inviting to a prospective elite client to ask them to travel (some times great distances) to sit in a clinic wherein they must describe "in vitro" the problem they are experiencing during competition. Obviously, what I am suggesting with the Compact Flash telemetry equipment is that we can go portable with instrumentation and webcam to observe in the actual performance environment and learn together with the athlete instead of trying to diagnose and blindly develop an

appropriate intervention without any prior experience or success.

Ben Strack, working with Dick Gevirtz, did this kind of work a few years ago with a dissertation on baseball performance wherein he trained players just before entering the batting cage. HRV was his training parameter and he measured quality of performance with experts evaluating outcomes, e.g., line drive hits, etc. The difference with Compact Flash is that we have great memory capacity to be able to monitor visual and physiological data in real time for 4-5 hours continuously and then compare it later with self-report of emotions recorded shortly after the shot.

Q: What plans do you have for the future that might be helpful to other clinicians in the future using Sport Psychology Principles?

WES: I want to establish a consortium of professionals in several disciplines who might benefit from collaboration centered around applied psychophysiology and biofeedback. For example, at the next AAPB meeting in Albuquerque, we have an opportunity to convene a number of professionals crossing several disciplines ranging from Sport Psychology, Neurofeedback and golf teaching professionals. The goal is ultimately have a network of many small teams of coordinating partners in localities all across the country, possibly across the world. Each team would be equipped technologically and with the expertise to offer sophisticated, multidisciplinary consultation to a wide variety of elite performers in sport or the expressive arts. Soon I hope to have a website that describes the cooperative venture we are hoping to initiate.

Two of the sport psychology principles that overlap most with BF/NF include visualization and attention control. Many of our clinician colleagues are very experienced with these two principles and thus have a great deal to offer in the sport/performance world. I would like to facilitate the interaction between my colleagues in sport psychology and those in ISNR & AAPB to expand the services available. 

Dr. Sime is a Health Psychologist at First Step Wellness Clinic in Lincoln, Nebraska. He is also professor emeritus from the University of Nebraska in Health and Human Performance specializing in Sport Psychology. He consults currently in professional baseball and PGA golf.

BFTI Brainfeedback Training Institute

Presents: *qEEG – Z-Score Neurofeedback – LORETA Workshop*

**June 26-28 2009
Deerfield Beach Florida**



The BFTI (Brainfeedback Training Institute) was founded in 2008 by Dr. Joel Lubar and Steve Stockdale to organize workshops, seminars and training courses for qEEG and neurofeedback practitioners. Since its inception, the bi-annual workshops have become an immense resource to the Neurofeedback field. The BFTI courses teach Neurofeedback theory and applied practice to beginners and advanced clinicians alike. We plan to serve this community for years to come and will strive to teach and demonstrate the most up-to-date technologies as well as the established best practices of the field.

Workshop:



This workshop is intended for intermediate and advanced level practitioners with special evening courses added for those who are new to the field. We will be demonstrating the just released Neuroguide 19 channel Z-Score neurofeedback add-on module. This has been integrated with the Deymed Truscan 32 amps and will show a color map of all 19 electrode locations where each site will change color when the Z-scores moves towards zero. One can work with different frequency bands or band ratios. All of this will occur in "real time" without delays. This training can be done with linked ears, average reference or Laplacian montage. Other topics will be covered including showing how to decrease artifacts during recording and how to quickly identify and remove them. We will cover other features of the neuroguide connectivity suite and Joint-time frequency analysis for artifact identification. We will also discuss bi-spectral analysis and LORETA methods.

For registration information please call us or visit www.brainfeedbacktraining.com

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Workshop fee: \$ 995,
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Gail Farkas at 866-86-OCEAN or
www.comfortinnoceanside.com



visit: www.brainfeedbacktraining.com or call 954-607-4757 - email: info@brainfeedbacktraining.com

ISNR FOUNDATION MOVING FORWARD

The ISNR Foundation is making progress in defining and meeting goals to fulfill its mission of funneling donations to meaningful research projects in neurofeedback. By the next annual meeting we plan to have a donor packet and research strategies developed. It is our belief that in order to approach individuals and foundations who represent substantial resources, that we are required to have a professionally developed and credible appeal.

DONOR INFORMATION PACKET

Along with ISNR the ISNRF has contracted with a public relations firm to create a brochure and donor packet that will lay out our strategies for facilitating research in the hands of competent investigators. Cynthia Kerson is working with Crossroads Creative to develop a handout or "press kit," to introduce the organization to potential donors and others. Advisory board member Andy Merdek points out "such stuff is more likely to trigger donor interest than the specific parameters of proposed studies. I'd also think about study designs aimed at populations that

potential investigators and critique these with the involvement of some of our more vocal critics. This process will enable the Foundation to come up with a credible specific review process and proposals to present to potential donors. Research ideas are discussed regularly by the Research design committee headed up by Dick Stark, M.D. There are many exciting possibilities.

POSITIVE DEVELOPMENTS IN NEUROFEEDBACK RESEARCH INTEREST

The Foundation wants to play a role in encouraging and developing meaningful research in Neurofeedback. Studies funded by the Foundation will serve – in some cases- as pilot data for generating other studies, and researchers funded by the Foundation will add to their credential for further research. The Foundation encourages interest by and funding applications to governmental entities such as NIH .

Tato Sokhadze, a current Foundation Board member and a previous recipient of ISNR research funds, recently presented

THE FOUNDATION WANTS TO PLAY A ROLE IN ENCOURAGING AND DEVELOPING MEANINGFUL RESEARCH IN NEUROFEEDBACK.

may particularly appeal to certain classes of donors or particularly generate some publicity that may prompt other donors' interest." The packet will include technical information in appendices of previous ISNR sponsored research and bibliographies of pertinent research to date, but its thrust will be to inform and engage those not familiar with neurofeedback. The packet will be available to ISNR and AAPB members to pass on to prospective donors for the Foundation.

IDENTIFYING PROSPECTIVE RESEARCHERS

Barry Serman has composed a request for letters of intent to be sent out to individuals and professional organizations with a neuroscience focus and a potential interest in neurofeedback research. We plan to gather letters of intent for research proposals from

on Neurofeedback in addictions at a Grand Rounds at NIDA. The level of interest and questioning, according to Tato, was intense. There seems to be some acceptance of fMRI feedback as valid on the basis of image specificity, yet advisory board member Bob Thatcher points out that LORETA feedback affords the same approach to regions of interest, yet requires substantially less expense (on the order of 1%) for equipment and staffing yet has the same effect size. Both Bob and Tato are experienced investigators who are in process with applications for grants with NIDA and NIMH.

Another pleasantly surprising development was the recent announcement by CHADD's CEO, E. Clarke Ross, DPA, who called on the National Institute of Mental Health this week to use some of the money it will receive from President Barack



Obama's stimulus package to fund research on neurofeedback. Ross's actions this week are a part of a sustained and concerted effort-dating back to 2006-by CHADD to prompt NIMH to conduct research to determine if the procedure is a viable treatment option for attention-deficit/hyperactivity disorder. John Nash, ISNR President and Foundation Board member has extended an invitation to Clarke Ross to attend and speak at the 2009 ISNR meeting. The Foundation totally endorses this effort.

It is clear that neurofeedback research is gaining momentum and interest, and this situation makes the Foundation's work more timely and appealing.

RESEARCH CONSORTIUM AND ONGOING STUDIES

A consortium of ISNR members who are interested in participation in practice-based research has slowly evolved over the last several years. Recently Dick Stark generously agreed to head up this project and build on the work started by Lonnie Nelson and Jay Gattis. Dick is establishing the infrastructure necessary to coordinate data retrieval from multiple sites to generate head to head and other types of studies. The consortium will be able to utilize data already collected in practice settings to generate studies. This project has funding through the Joe Horvat memorial research fund, and the management of that fund is done by the Foundation.

Ongoing studies continue to be hampered by patient recruitment issues. The Jonathan Walker study on TBI will be truncated and be limited to a smaller number of subjects. Mario Beauregard's study on outcome of neurofeedback training on performance tests, QEEG and magnetoencephalography continues.

ISNR RESEARCH FOUNDATION RFP (2009)

The ISNR (International Society for Neurofeedback and Research) Research Foundation is seeking grant proposals for research directed to critical issues in the field of Quantitative EEG brain mapping, and associated clinical neurofeedback therapy. Proposals must be directed to specific clinical disorders and should provide for appropriate control conditions while adhering to specific methodological principles critical to the validity and reliability of findings essential for the ability to compare findings among research labs. A definitive large-scale study is sought, and should also include justification for the size of n as determined by power analysis and/or other statistical consideration.

The critical areas of interest for which sound, empirical research is sought are AD/HD and/or TBI, mild to moderate. Methodologies must be consistent with standardized principles of valid and reliable EEG recording, EEG quantitative analysis, EEG operant conditioning, and statistical analysis of resulting data. Further they must include details describing subject sources and clinical classification/diagnosis, an overview of laboratory space and resources, and an estimated budget (for which funding is currently being sought). Subject inclusion and exclusion criteria and systematic milestone schedules should also be specified. Multi-site studies are welcomed. Follow-up studies should be scheduled at least one year after the completion of treatment.

Proposals must not exceed 15 single-spaced pages. Figures and references may be included as addendum, and do not add to the final page count. Publication format should be used for figures, figure legends and references.

Inquiries and/or Letters of Intent can be directed to the ISNR Research Foundation Executive Director at office @isnr.org. Once received, a full invitation to submit will be provided with procedural details. 



CONFERENCES

American Academy of Clinical Neuropsychology 2009 Annual Meeting
San Diego, CA, USA,
June 17 – 20, 2009

International Neuropsychological Society Mid-Year Meeting 2009
Helsinki, Finland,
July 29-August 1, 2009

Applied Neuroscience Society of Australasia 2009 Annual Conference
From Neuromodulation and Neuroplasticity to Biomarkers and Nutrition
Kingscliff, Australia,
August 1-2, 2009

American Psychological Association
Toronto, Canada, August 6-9, 2009

International Society for Neurofeedback and Research 17th Annual Conference
Current Trends in Neuromodulation: Neurofeedback, rTMS and tDCS.
Indianapolis, Indiana,
September 3-6, 2009
Preconference Workshops:
August 31-September 2, 2009

National Academy of Neuropsychology Annual Meeting 2009
New Orleans, LA, USA,
November 11 – 14, 2009

Research Foundation Contributions since December 31, 2008

DELTA LEVEL:

Ladell Lybarger
Doreen McMahon
Cynthia Perlin
Roxanna Vasiliu
Ron Swatzena

THETA LEVEL

Larry Thomas
Thought Technology

GAMMA LEVEL

Tom Collura (Book Royalties) \$200
Tom Collura (donation of board member travel reimbursement) \$200
James Evans (Book Royalties) \$389.48
Ann Marie Horvat (Joe and Ann Marie Horvat Distinguished Service Award) \$500

TOTAL: \$1,145

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BOOKLET SALES: \$20

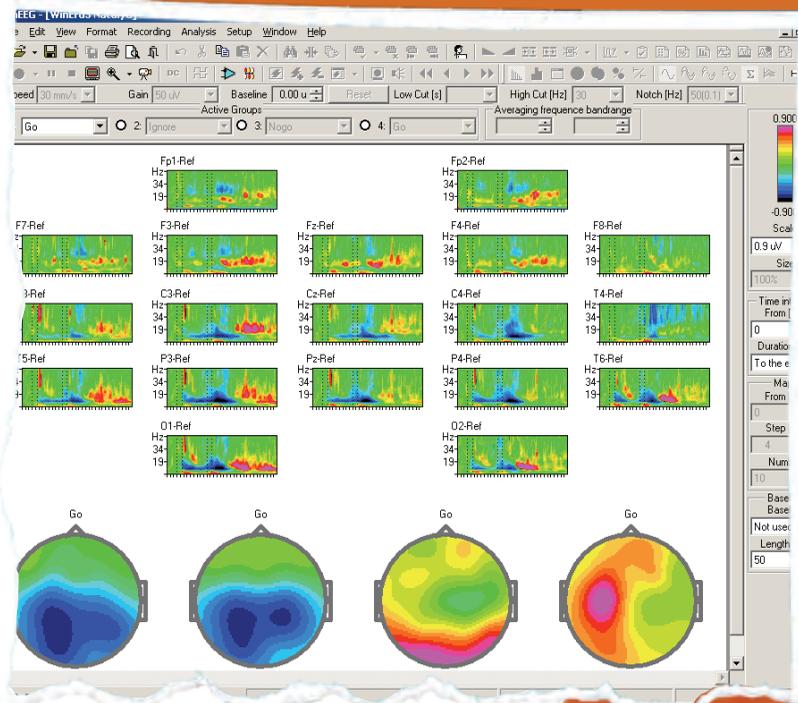
STUDENT FUND:

Thought
Technology \$25



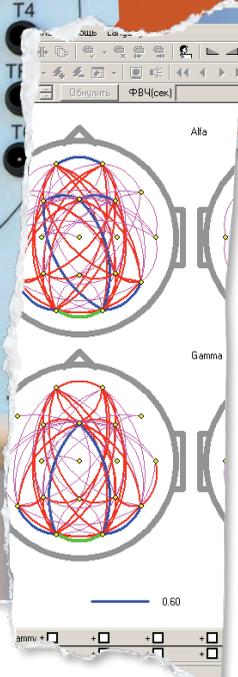
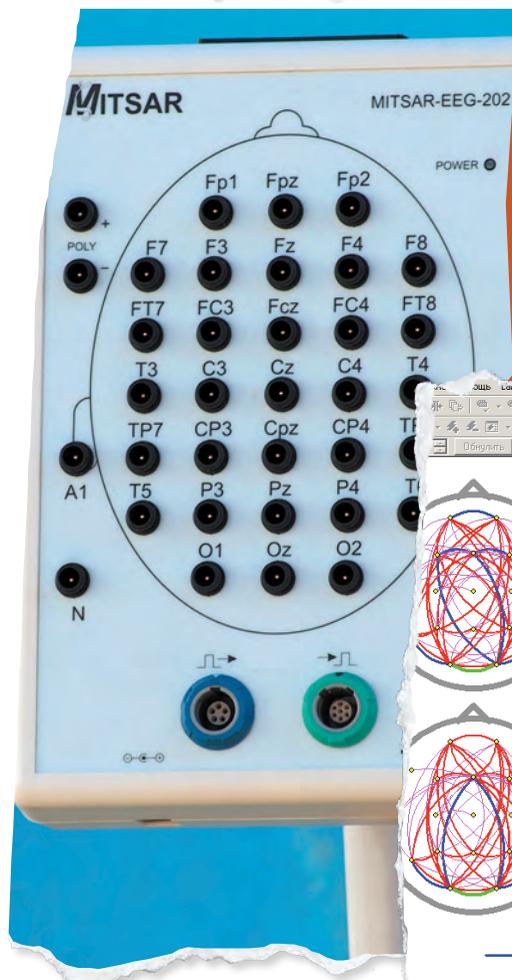
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