

NEURO CONNECTIONS

Fall 2014

Newsletter



A joint newsletter from the *International Society for Neurofeedback & Research* and the *Association for Applied Psychophysiology & Biofeedback, Neurofeedback Section*

Vol. 9 '13

Libert scale ratings before and after treatment
11-year-old boy



Procedure

1. Informative and establish goals for training.
2. Acquire baseline QEEG.
3. Boklat/pENP Detoxification (~45 minutes (event) utilization procedure).
4. Place two pENP coils anterior to the liver and place 2 coils posterior to the liver.
5. Start Neurofield Liver Support Protocol (~15 min) and Inflammation Reduction Protocol (~15 min).
6. Remove coils and place one coil over each abdominal quadrant.
7. Start Neurofield Inflammation Reduction Protocol (~15 min).
8. Review the QEEG report with the client.
9. Boklat/pENP Detoxification (Repeat May 4 procedure).
10. Disconnect: Detoxification Procedure (Repeat 1).
11. Disconnect: Detoxification Procedure (Repeat 1).
12. Drive: NeuroField FT2.
13. Disconnect: Detoxification Procedure (Repeat 1).
14. Drive: NeuroField FT2.
15. Disconnect: Detoxification Procedure (Repeat 1).

Effect is prominent in Occipital lobes: visual cortex

Neuromodulation Techniques to Boost Neurofeedback Outcomes

part 1 of 2



On each second of exposure, the child is...



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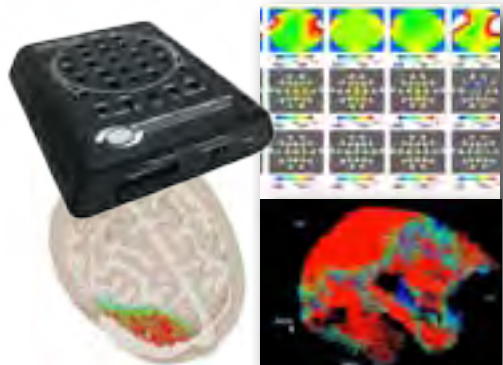
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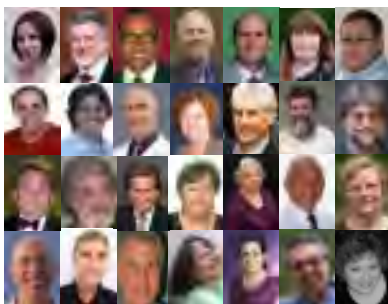
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Technical Foundations of Neurofeedback

Provides, for the first time, an authoritative and complete account of the scientific and technical basis of EEG biofeedback. Combining both a "top down" and a "bottom up" approach, Collura describes the core scientific principles, as well as current clinical experience and practical aspects of neurofeedback assessment and treatment therapy. Whether the reader has a technical need to understand neurofeedback, is a current or future neurofeedback practitioner, or only wants to understand the scientific basis of this important new field, this concise and authoritative book will be a key source of information.



by Thomas Collura
PhD, QEEG-D,
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ISNR Co-Editor: Merlyn Hurd, PhD

merlynh@nyneurofeedback.com

AAPB Neurofeedback Section Co-Editor: Roger H. Riss, PsyD

riss@madonna.org

Managing Editor: Barbara Trumbo

NCManagingEditor@gmail.com

Journalist for MindFull: David Kaiser, PhD

davidkaiser@yahoo.com

Publisher: International Society for Neurofeedback and Research

office@isnr.org

ISNR 2014–2015 Board

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cynthiakerson@gmail.com

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NeuroConnections % International Society for
Neurofeedback and Research (ISNR)
1350 Beverly Road Suite 115, PMB 114
McLean, VA 22101-3633

Office: (703) 848-1994

Fax: (703) 738-7341

www.isnr.org

cyablonski@isnr.org

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AAPB Neurofeedback Section: Biofeedback Scope of Practice in Nevada—An update to our members



*Richard Soutar, PhD BCN;
Roger Riss, PsyD, BCN, BCB Senior Fellow*

Earlier this year, the Nevada Board of Psychological Examiners (NBPE) issued Cease & Desist (C & D) letters to some Nevada biofeedback and neurofeedback practitioners, ordering them to discontinue the practice of biofeedback, under threat of potential legal action. Following enquiries to discover how this situation had come about and what could be done to reverse it, we learned that, following a series of legal events in the state, the NBPE had been advised by the Nevada Deputy Attorney General at the beginning of this year that it was their legal obligation to issue these letters.

The story apparently began in 1995, when hypnosis and biofeedback were added to the list of items that a licensed psychologist could practice in Nevada. At the time, these additions were treated as minor amendments to the scope of practice statutes governing psychology in Nevada. Rather than to restrict non-psychologist practice, the intent at the time appears to have been simply to define biofeedback as within the scope of practice of psychology. Few within the biofeedback community could have anticipated that two decades later, these measures might place their professional practices and business livelihoods in jeopardy.

This intent seemed to have been generally accepted and understood; and since 1995, there had been no attempts to restrict biofeedback practice by non-psychologists, until now, 19 years later. Remarkably, this new initiative seems to have had

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 Section 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 section is organized for the purpose of carrying on educational and scientific objectives and is not to be operated for profit.

its roots in a 2005 playground incident, when a Nevada schoolboy pushed another schoolboy into a teacher. What happened next was a dispute which eventually reached the Nevada Supreme Court in 2009. The Court issued its judgment on various disputed items, one of which was a claim for fees paid by the boy's parents to a biofeedback practitioner to treat the child for the distress caused by the incident. The practitioner was a licensed Drug and Alcohol counselor in the state of Nevada, but the Court took the view that the inclusion of biofeedback in the statutory definition of psychology, but not in the definition of Drug and Alcohol counseling, indicated that he had been practicing psychology without a license, and his fees were not claimable in the court. Among the considerations which guided the Nevada courts was testimony by Drug and Alcohol counseling regulators, who offered the opinion that because biofeedback was not included in Nevada alcohol and drug counselor regulations, it was therefore outside their recognized scope of practice. In subsequent hearings, this opinion was apparently affirmed by two Nevada courts.

In the five years since this judgment was issued, the NBPE has acquired greater enforcement powers, and was advised in the beginning of this year by the Nevada Deputy Attorney General, who works with them on legislative issues, that they were obligated to send "cease and desist" letters not only to non-licensed biofeedback practitioners in the state, but also to members of the other licensed professions, such as medicine, physical therapy, and licensed counselors, warning them that if they offered biofeedback to their clients, they should cease to do so. Even nurses or occupational therapists using biofeedback to treat patients with urinary incontinence would be out of compliance with this broad new interpretation of Nevada scope of practice legislation.

Given that few psychology training curriculums include formal training in the practice of biofeedback, and that the majority of psychologists do not offer biofeedback/neurofeedback services, strict enforcement of this ruling would have potential to severely limit patient access to needed biofeedback services. Fortunately, in response to vigorous education and advocacy efforts, we have been informed that the NBPE voted in its November 7, 2014 meeting to formally withdraw the previously issued Cease & Desist letters, and to pursue alternative methods to clarify biofeedback scope of practice of various health care disciplines within the state. Nevada physicians have already taken initiative to establish biofeedback/neurofeedback as within their scope of practice, while efforts are under way to draft revised regulations explicitly including biofeedback within scope of practice of other interested health care fields. Biofeedback practitioners in Nevada can continue to work, at least for the time being, without the threat of legal enforcement or penalty.

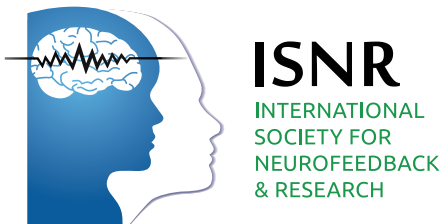
Continued on page 11

Letter from the ISNR President

Rex Cannon, PhD



Greetings to all of the ISNR members. Once again, it is time for our annual conference and this year we find ourselves in beautiful San Diego, CA. I am always regenerated by the conference and the information, collegial atmosphere and discussions we share. If you have opportunity, please express gratitude to our conference committee for their tireless efforts in making this year's conference spectacular! It has been my pleasure to serve as your president for the past year. I have been afforded the opportunity to serve on the ISNR board of directors for several years, in several positions, and am excited to see the progress made and believe momentum will continue to rise. Neurofeedback is quickly gaining direction and mass in the general public as well as professional organizations. As leaders in this field, we must continue to perfect our craft and delivery of services. I look forward to late night discussions at the conference. Additionally, I would encourage YOU to consider service on the ISNR board of directors. We can only make a difference by being involved and serving our fellows. Thank you all for your support. Enjoy San Diego!



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Letter from the AAPB Editor

Roger Riss, PsyD



Welcome to NeuroConnections Fall 2014 issue. In this and the coming winter 2014 issue we focus on the role of neuromodulation interventions in the neurofeedback clinic. A groundswell of functional neuroimaging studies within the past two decades has brought home the lesson that learning, if it is truly effective, will be accompanied by neuroplastic reorganization of the brain. This is no less true for neurofeedback-based operant learning, begging the question, what can we as neurofeedback therapists do to more efficiently promote therapeutic cortical reorganizational processes? In our efforts to potentiate the efficacy and efficiency of neurofeedback-based interventions, clinicians and researchers are increasingly exploring the role of various neuromodulatory techniques both as standalone interventions, and more importantly, for their potential to synergistically enhance neurofeedback outcomes.

Neuromodulation is defined by the International Neuromodulation Society as “the alteration of neural activity to...normalize—or modulate—nerve function...” In the realm of medicine, the term includes a class of medical therapies which make use of high intensity, and in some cases invasive, devices for relief of pain (spinal cord stimulator implants), restoration of function (cochlear implants for hearing) or control of neuropsychiatric symptoms (such as deep brain stimulation for control of tremor in Parkinson's disease, or rTMS for treatment of refractory depression). Such devices typically operate at “sufficient magnitude to induce neural action potentials” (Stade 2011) and override background neural activity.

By contrast, within this issue, the editors have extended use of the term neuromodulation to embrace a family of non-invasive, extremely low energy interventions, used within the neurotherapy community, which typically exert therapeutic effect at a subthreshold level, by modulating and guiding, rather than disrupting normal background neural activity. While mainstream research interest in low energy neuromodulation medicine has exploded within the past decade, neurofeedback practitioners have pioneered neuromodulation clinically for several decades, with both stand-alone, and synergistically paired neuromodulation and neurofeedback interventions, as

illustrated in the content of this issue. In an effort to provide a broad overview of the topic, in this and the coming winter issue, we include contributions highlighting efficacy of a range of acoustic (e.g. Swingle's BrainDryvr), photic (e.g. Och's Photonix), visual (e.g. Siever's AVS), as well as electromagnetic interventions (including tDCS, tACS, and pEMF, for example), which spans several decades of work in the field, and having its roots in research spanning both sides of the Atlantic.

Despite the diversity of interventions reviewed, this editor was able to discern a commonly expressed theme: a synergistic relationship between neurofeedback and well-chosen neuromodulatory interventions which, when paired together, has potential greater than the sum of its parts. Several contributors noted that at least some neuromodulatory interventions with which they have worked seem to be hampered by only short-lasting results when used as a standalone intervention, yet effectively serve to prime client readiness for neurofeedback interventions which in turn, consolidate learning and result in persistent change. These findings parallel the growing trend in neurorehabilitation for traditional physical and cognitive therapies to be paired with concurrent neurostimulation interventions to promote neuroplastic change and potentiate response to traditional therapy. Conceptually, therapeutic neuromodulation techniques arguably serve to provide one half of a "top-down, bottom-up" intervention, which pairs quite well with "top-down" learning-based interventions, including neurofeedback, to optimize neuroplastic change. We hope that you enjoy the issue as much as we have enjoyed working with our contributors in its preparation.

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For now, this issue has been resolved to everyone's relief and satisfaction by very proactive practitioners in Nevada. While this is a great relief, it would be a mistake to be lured into complacency, thinking, "It didn't happen in my state so I guess it's not really a major concern." Oops! We are aware of a similar scope of practice initiative previously attempted in New York state, highlighting an important lesson for biofeedback/neurofeedback providers across the country.

The lesson is clear. Pursuit of specialty training in biofeedback applications specific to one's discipline, membership in biofeedback/neurofeedback professional organizations, and pursuit of appropriate board certification is only a starting point. Regardless of your particular health care profession, investigate with your licensure board whether biofeedback is explicitly included within your discipline's state scope of practice regulations. If it is not, it is incumbent upon biofeedback/neurofeedback providers within each relevant field to organize and advocate, on a state-by-state level, for specific recognition of biofeedback/neurofeedback within scope of practice regulations specific to their health care discipline.

The biofeedback/neurofeedback community has long recognized the potential for this technology to enhance clinical practice in a wide range of health care professions. Consequently, BCIA recognizes a valid license in a health care field as a basis for the certification and practice of neurofeedback. Similarly, AAPB standards of practice recognize that "professions incorporating psychophysiology and biofeedback into their work [may] include teachers, physicians, nurses, dentists, physician's assistants, psychologists, therapists, counselors, physical and occupational therapists / physiotherapists, coaches, corporate trainers, and researchers," while ISNR standards of practice stipulate that "neurofeedback practitioners who hold themselves out as qualified to offer services and work with diagnostic conditions shall be individuals who are licensed by their state, province or country for independent practice within a recognized mental health or health care profession and who are working within the scope of practice of their particular state license."

While we justifiably take great pride in standards of practice within our field, AAPB, ISNR, and BCIA have consistently recognized the obligation of neurofeedback/ biofeedback practitioners to be aware of and conform to, not only to biofeedback/ neurofeedback professional standards, but also to practice regulations within their state, as well as any standards of practice within their particular health care discipline. Whether you are a physical therapist utilizing biofeedback/neurofeedback in neuromuscular retraining, an occupational therapist performing incontinency protocols, or a special educator who includes neurofeedback among intervention approaches for ADHD, review your state regulations, and if necessary, advocate with your licen-

sure board for explicit recognition of these well established approaches within your state's scope of practice regulations, or fail to do so at your own potential peril.

Richard Soutar currently serves President, and Roger Riss as member at large, of the AAPB Neurofeedback Section Board of Directors.

The preceding is adapted from:

Nevada Legislation. <http://hypnotistexaminers.org/free-signals/nevada-legislation/> downloaded 12/3/2014

Public notice of a meeting for Nevada state board of psychological examiners: http://psyexam.nv.gov/uploadedFiles/psyexamnv.gov/content/Meetings/2014-11-07_Agenda_psyexam.pdf downloaded 12/3/2014

Acceptable Degrees: BCIA approved health care fields. <http://www.bcia.org/i4a/pages/index.cfm?pageid=3435> downloaded 12/3/2014

BCIA Professional Standards and Ethical Principles of Biofeedback <http://www.neurofeedbackconsult.com/in-the-news/standards-of-practice-for-neurofeedback-and-neurotherapy> downloaded 12/3/2014

ISNR Standards of Practice for Neurofeedback and Neurotherapy: A Position Paper of the International Society for Neurofeedback & Research. Journal of Neurotherapy. *Volume 15, Issue 1*, 2011

AAPB Standards for Performing Biofeedback. <http://www.aapb.org/i4a/pages/index.cfm?pageid=3678> downloaded 12/3/2014

ISNR Welcomes New Board Members

On Sunday, October 19, ISNR said, "Thank you for your service!" to the retiring board of directors. Join us in welcoming the ISNR 2014–2015 Board of Directors:

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Neuromodulation: The Passive Modalities and Energy Medicine

Stephen Larsen, PhD, LMHC (NY), BCN



I have always sat on a kind of professional fence as to whether the proper term for our discipline should be “neurotherapy” or “neurofeedback.” I am not sure where and when the term “neuromodulation” was first used, but in my archive, I have papers by Herschel Toomim, dating from the 1990s, in which he used the term to describe his near-infrared hemoencephalography (Nir-HEG) method. His method is worth mentioning, perhaps, at the outset of this discussion, because like many methods in our hybrid discipline, it uses a classical biofeedback paradigm (rewarding increased blood flow in the scalp indirectly to affect brain activity as measured in the EEG.) So this presents us an interesting puzzle: Is something that affects the EEG but does not manipulate it directly, to be called neurofeedback or something else? As the example of Herschel Toomim’s HEG method illustrates, the term neuromodulation has grown to have a broader meaning within our discipline than that adopted by our colleagues in medicine, where therapeutic neuromodulation has been defined as “the alteration of nerve activity through the delivery of electrical stimulation or chemical agents to targeted sites of the body”, and is exemplified by interventional implantation of devices such as deep brain stimulators (International Neuromodulation Society, 2013).

I would always see Herschel at ISNR—hence neurofeedback conferences; we became friends, and ultimately I would dedicate my recent book, *The Neurofeedback Solution* (2012), to him (along with Joe Kamiya and Elmer Green—only nonagenarians need apply!) I still doubted, all that time, whether HEG was a form of neurofeedback, because the procedure doesn’t feed-back anything about brainwaves, but it certainly does affect them. HEG does use feedback though, in the classical sense of operant conditioning or incentive training.

In this regard, I think his use of the term neuromodulation was probably the best term (Toomim, 1995). However, in world medical literature we find the term neuromodulation used very broadly, including for pharmaceutical or hormonal influence of the nervous system. In this paper, I shall restrict myself to techniques utilizing energy or information to modify the functioning of neurons or the CNS—hence it is closer to biofeedback, broadly interpreted, or energy medicine.

In a recent (Fall 2013) issue of *NeuroConnections*, the term neuromodulation is used repeatedly in the papers documenting the variety of infra-slow fluctuation (ISF) or infra-low training (ILF) (its predecessor as Mark Smith describes it), or even a dif-

ferently conceived modality mostly developed in Europe: Slow Cortical Potentials (SCP)—which uses either DC stimulation or DC training to influence an AC parameter, the EEG. Here it seems neuromodulation is used the same way that Herschel used it, doing something else, another procedure, which then modifies the dynamic properties of the EEG. The procedure itself doesn't utilize the classical EEG, even though the consequences of the procedure are measurable in the EEG records. (See the articles by Mark Smith and Jackie de Vries in that issue.)

A fascinating recent variation on the theme is Nick Dogris' NeuroField1, evolved over the last six or seven years, which uses a combination of pEMF and operant conditioning z-score neurofeedback training to guide the brain into a regulated state that yields a higher level of functioning. Interestingly, therapy effects are measurable in changes in heart rate variability (HRV) (increased HRV signaling a positive response to the stimulation) as well as changes to qEEG.

Over the years, of course, the field of neurofeedback has documented an important something still unrecognized in mainstream neurology—that modifications in the EEG are correlated with changes in consciousness, cognition, affect, and behavioral functioning. The reading and manipulation of frequencies and/or amplitudes at specific locations may pertain to attention problems, executive functions, depression versus optimism, in the Davidson frontal asymmetry studies for example, or Lubar's theta/beta ratio in assessing attention problems (ADD or ADHD) (Davidson, 1999,2014; Lubar, 1995).

As a rather visible proponent, over the years, of what is now called the LENS (Low Energy Neurofeedback System) innovated by Dr. Len Ochs, and its predecessors, EDS, (EEG-driven stimulation) and FNS (Flexyx Neurofeedback System), I have found myself taking the position that his approach was, in fact, neurofeedback, and thus disagreeing with some very respectable colleagues, among them the distinguished Joel Lubar and neuropsychologist Victor Zelek. Accustomed to the contingency-based operant conditioning paradigm, they asked, in regard to the LENS—and I think rightly so—"So where is the feedback part?" Not so easy to answer; but this essay, and some of the other contributions to this edition of NeuroConnections, may help to frame the discussion in a more sophisticated way. (Without yet having seen the paper, I believe that Len Ochs has made a contribution to the discussion in this issue.)

I would point out to my professional colleagues that the basis for efficacy of the LENS was change in the EEG itself, extracted by familiar leads or electrodes attached to the scalp, fed through an amplifier, and processed by a computer with software, then "fed-back" at an "offset" in Hertz. And then they would stop me. "Exactly what is being fed-back, and through what medium? And where is the reinforcement that changes behavior?" These questions are not so easy to answer.

1 Patent pending

How do you know that it works?

Perhaps the most important underlying question should be introduced first: How do you know that it works? (Private conversations with Lubar, Zelik, Thatcher and others, 2006.)

My answer then—and now—would be simply, because it does! Initially I relied on Len's own clinical experience, as he was my teacher, and he said so! But then my own clinical experience began to accumulate, to the extent that over the eighteen years since I began to utilize the LENS clinically, I have treated over three thousand patients; and I, or my staff have documented more than thirty thousand clinical sessions.

The next question, invisible, odorless, and colorless, but applied with great pomp and circumstance in a doctor or clinician's office: How do you know it's not placebo? And where are the gold-standard placebo-controlled, double-blind studies? (After all, placebo affects people too, that is why we constantly have to control it!)

These are all \$64,000 questions. And they have no easy answers to satisfy the skeptical, scientifically-oriented inquiring mind. The whole field, known somewhat imprecisely as neurofeedback itself, is often disbelieved by the larger scientific community (see Prof. Russell Barkley's consistent put downs of neurofeedback, and assertions that "medications are the only acceptable treatment for ADD"). Inside that (already) questionable field are we who practice the "passive," invisible manipulations called alternately, "energy medicine," "disentrainment," or "stimulation," that seem like neurofeedback, but really aren't (because they do not exactly fit the operant conditioning paradigm (Barkley, 2014).

So what is it? Neurofeedback, neurotherapy, or neuromodulation? Does it work at all, and does framing our language about it affect the discussion? I think it does!

Clinical Evidence

Our field has always been disparagingly accused of having no scientifically demonstrated validity. But at the amazingly rich 2010 ISNR conference in Boulder, Colorado, there were some very distinguished scientists and philosophers of science present. Among them, Alvaro Pascual-Leone of Harvard, Norman Doidge, of The Brain that Changes Itself fame, etc. These speakers reminded their audience of professional practitioners that the entire field of modern psychology started off with single-person studies, clinical observations, detailed record-keeping on a few patients, and thoughtful, grounded inferences based on careful observation.

I have been doing biofeedback since the 1970s. I started with SUNY college psychology students, who diligently kept records of their experiences in my biofeedback lab, and then, at the end of the semester, summarized their experiences in a

psychological journal. I had already trained them in mindfulness techniques and in being good observers. It was their biographical, narrative histories that convinced me that biofeedback was worth dedicating my professional career to.

Some of the results were expected, as when relaxation training using EMG along with autogenic training, produced superb musical performances or outstanding athletic feats. Some of my students were members of what became a national championship soccer team, who swore that their outstanding athletic abilities, quasi-mystical flow-experiences, and ultimately winning the championship, were due to this training. They were more relaxed, hence anxiety-free, and so they found themselves in “flow experience” as Csikszentmihalyi called it, or optimal performance mode (1990). Less expected, especially in those days, were the student narratives based on EEG training. How, I wondered, could the alpha, theta, or alpha-theta training that my students did, lead to better concentration, more focus and improved study habits, when those training protocols were not at all associated in the literature with mental focus? But the students kept telling me their quality of life improved; relationships, self-discipline, creativity and productivity all were stimulated in positive ways by their EEG work.

It wasn't until I began training with Dr. Len Ochs in 1996 that some of this began gradually to make sense to me. Asking the brain to do something different than what it normally does stresses it, but thus exercises it, and ultimately makes it more flexible and stronger—a kind of core strengthening.

When I first exposed my clinical patients, not just students, to the EDS (EEG-driven Stimulation using flashing lights) during the 1990s, the results were similar. People who came to my practice because they had ADD, anxiety, or even OCD, experienced gradual improvement in their functioning. They were less stuck. Ochs' explanation was that repeated “bumps” out of the “parking place” of mere habitual functioning was what strengthened the brain, and made it more flexible. Any kind of neurofeedback, thus, is a type of “Pilates for the brain.”

Scientific Evidence

The 100-Person Study that I presented at ISNR's conference in 2005, with my colleague Kristen Harrington, and later published in Larsen, Harrington, & Hicks. (2006) *Journal of Neurotherapy*. 10.2–3. pages 69–78, still stands; It is important to note, though, that almost all of the treatments that form the bulk of the data were done with the older, FNS-type programs, ancestors of what is now called the LENS.

That data never would have been collected if I hadn't begun (in 2002), a clinical procedure, now used by very many practitioners: the careful collection of symptom-tracking data, in each session, of the client's top five (or eight, or ten, in more complicated cases) most limiting and problematical symptoms—on a Likert scale (with

10 being the worst, and 0 indicating that the problem was resolved.) In that study, which achieved significance at the .0001 level, we were also able to show how an EEG variable (the highest amplitude site, in microvolts) correlated highly with the reported subjective changes. Sterman's—adopted into Ochs—theory, at the time, was that the high amplitudes at the cortex mean that the cortex is not doing its job, that is, not inhibiting the subcortical wave forms that boil up from the limbic system and the thalamic nuclei. (As I understand it, Ochs has now revised that tenet somewhat, as well; based on clinical observations in which when amplitudes go up during treatment, sometimes functioning improves.)

At the time it was published, Ochs hailed the above-referenced study as one of the best-designed studies he had ever seen in the social sciences. The distinguished neuroscientist, Karl Pribram had helped me with the study's design, saying I didn't really need a control group if my *n* was high enough (hence the 100 subjects). He advised that the clinical records on which it was based should be randomly selected (by blinded volunteers) from a much larger sample, the only criterion being that clients had received at least 10 treatment sessions, with before and after measures of the highest amplitude site. Pribram also suggested that I have the data analyzed by an independent statistician (which I did, Susan Hicks being a US government statistician in Washington, who had never met any of the New Paltz patients.) She analyzed the data anonymously, and independently. After the results were tabulated, she said, "In my work [for the US government] we never get statistical significance like this—.0001!" So the (albeit, strange, improbable) method actually works, whatever its energy, or the myths we may hold about it.

My whole, publishable study only cost a few thousand dollars above our normal operating expenses! (And a lot of sweat equity by myself, Harrington, Hicks, and student volunteers who processed the files.)

Neuro-Gen

When I heard that Corey Snook had marketed his own system: Neuro-Gen, based on FNS, an earlier iteration of what is now called the LENS, I became interested. (My colleague Mary Lee Esty loved the early system, and never changed to the newer designs.) We have now been using the Neuro-Gen for about 9 months, and I just bought a second unit for our city office.

I do not want in any way to vaunt one neurofeedback modality against another; they all serve different applications. In fact, the hallmark of the Stone Mountain Center is integrative modalities, depending upon client need and preference. In our office, we have and have used, all of the following:

- Alpha-Stim
- Atlantis (BrainMaster)

- The BrainMaster, Brain Avatar
- Conventional biofeedback and neurofeedback, including EMG and GSR.
- HeartMath® or EM Wave
- pIR HEG (passive Infrared Hemoencephalography), as discussed in Jeff Carmen's article in the [*summer 2014 edition of NeuroConnections*](#))
- ILF (Mark Smith's variety)
- Interactive Metronome (Interactive Metronome, Inc. Sunrise Florida, USA), based on James Cassily's work
- The LENS (and other modalities used on the J&J I-330 Amplifier)
- NeuroField
- Neuro-Gen
- Photonic Stimulation
- SCENAR
- Z-score Training (Done on BrainMaster Atlantis or Discovery 24)

These days we try to do a qEEG before and after, with all complex neurofeedback cases, and prefer Thatcher's NeuroGuide interpretative and diagnostic software. We also do an Interactive Metronome® evaluation for timing problems, TOVA (test of the variables of attention) for ADD evaluations, and use Ochs' CNS questionnaire routinely, as well as the standardized SCL-90.

Not so strangely, we have found it possible to overdose on almost any modality, including the otherwise (for most people) gentle photonic stimulator, or the SCENAR. Much to our astonishment, even the Interactive Metronome® can overdose! About 10 years ago, with a client badly head-injured from a stroke, who had done quite a bit of LENS without mishap, and whose timing was terrible. Trying to do a session on the IM, he got a terrible migraine, and seemed about to faint. We've also seen the same thing happen with the otherwise gentle HEG—the usual overdose reaction being exhaustion.

Most commonly, our sessions include photonic treatment on the extremities (photonic stimulation, Ochs' original contribution, using infra-red light in the 880-940 nm. range), which should include the nail beds of feet and hands, neck and shoulders, or any body part that holds tension or spasticity. Routinely, I try to check people's hands for temperature at the beginning of each session, especially if there is suspicion of Reynaud's Syndrome, or if they have migraines. If hands are cold, it usually means autonomic dysregulation. After the LENS or Neuro-Gen, time permitting, we might do HRV training (usually on HeartMath® equipment) or, if we suspect inflammation, Lyme, or there is a pain syndrome or insomnia, we will include NeuroField, with the appropriate protocols.

At the end of a typical one-hour session, I re-check for evidence of hand warming with a portable electronic thermometer, and often will find that there has been considerable warming.

One highly-anxious patient came to us who felt he had exhausted all treatment modalities. I measured his hands in our first session: 67 F! We did a very gentle NeuroGen treatment, HeartMath®, NeuroField anxiety protocol along with a lot of joke-telling and laughter therapy. He had an increasingly astonished look on his face as the session went on, and at the end smiled and said, earnestly, “You thawed me out!” I laughed and checked his hand temperature, 97 degrees!! He not only felt better, his whole skin color and affect had changed. It boded well, and during treatments he got better and better. We never overdosed him, and he completed therapy a much happier man. (His family thought so too!)

Animal Studies:

When, during the late 1990s Dr. Mary Lee Esty, using the EDS (later FNS) equipment of the time from OchsLabs, ameliorated the symptoms of a woman with 30 years of fibromyalgia, enabling her to walk freely and play golf again, she was invited to face a roomful of doctors at the Benjamin Rush Presbyterian Center in Chicago (mostly MDs), to explain how she had achieved her amazing results. At the end of her presentation, a doctor, who remained skeptical said, “Ok, so where are the animal studies?” Mary Lee, who, at the time used dark glasses with LEDs for the treatment of most of her patients, almost broke out laughing, imagining lots rodents with dark glasses containing flashing LEDs.

When I heard from Mary Lee about the doctor’s disingenuous question, I also laughed, but a couple of years later set out to do something about it, believing that somehow applying the treatment to animals might help to lay to rest the frequently adduced *causa efficiens* of the EDS/FNS treatment, placebo of course!

Because they were a population readily accessible to humans (and often traumatized by them) we began treating domestic animals: horses, dogs, and cats. The successful results were also published in 2005 in *The Journal of Neurotherapy*, and by now have been replicated with hundreds of animals. (Those results would have been much harder—though not impossible—to replicate with incentive-based neurofeedback. I say not impossible, because it was incentive-based SMR that Barry Serman used to elicit SMR in his cats, using tiny portions of milk as the reinforcement.) But I believe that for animals the passive modalities are much quicker and more decisive than traditional ones.

My favorite joke of the time was that “I would not think of doing anything with animals that hadn’t been thoroughly tested on humans first.” What kinds of symptoms can animals possibly have? Same as humans: anxiety, depression, TBI, PTSD,

dyspraxia, etc. Their brainwaves are not so different either. A practiced eye can easily see what makes that poodle panic, or that thoroughbred horse hypervigilant, in the EEG. (See also *The Healing Power of Neurofeedback*, and stonemountaincenter.com website, where we present the case of Gandalf, an attachment-disordered sheepdog, neglected and abused for the first two years of his life. His brain maps resembled the brain maps of children from Siberia or the streets of Bogota, Columbia, at least when we started the LENS, and resolved very nicely over about 14 treatments).

We are also assembling data on the treatment of animals with photonic stimulation and Neuro-Gen, but don't yet have anything as dramatic as the FNS and the LENS with animals.

“It is quite clear from the beginning that the properties of the stimulus applied are open for debate.”

Note that the above methods are used, in some cases interchangeably, on the body or the brain. Of course the central nervous system (CNS), comprised of the brain and spinal cord, reaches down into the peripheral nervous system (PNS), with its afferent and efferent components, and, less directly, into the autonomic nervous system (ANS) with its sympathetic and parasympathetic divisions, plexi and ganglia. The physiotherapist or chiropractor places his electro-conductive pads on the painful area of the back, shoulder or neck, or extremity, and the patient may feel the current moving through and relieving the locked-in pain of the symptomatic area.

The psychiatrist (or sometimes neurologist) who cannot get the patient out of his/her loops of depressive or psychotic thinking, recommends ECT, in which pads are placed on the scalp and many volts, hundreds, in fact are run through the brain, also causing the body to convulse, the theory being that the intervention breaks up a system (ECT, meaning Electro-Convulsive Therapy) that has become locked in some way in a self-destructive pattern.

It is quite clear from the beginning that the properties of the stimulus applied are open for debate. Is it AC (alternating current) or DC (direct current) as in the classic 19th-century debate between Edison and Tesla where, for the most part, for municipal power, AC won out, whereas for micro circuitry and battery-operated devices, DC became the method of choice.

The second obvious parameter is the intensity of the stimulus. Would you use

volts, (as in ECT), or millivolts (as in Alpha-Stim) or microvolts, as in the brain's own output, or such approaches as those now called the LENS (Low Energy Neural Stimulation) or Neuro-Gen?

A corollary question becomes the method of application of the energy. Would it be through wires and electrodes connected to the skin or scalp, as in conventional neurofeedback, where the energy is believed to go just from the electrodes to the amplifier, and the feedback energy is information in the form of a tone, changing display, something happening in a video game or movie, or something coming "back down the wires" as is now believed to be true in the LENS or Neuro-Gen.

The magnetic treatments induce a current in the neurons of the brain through their strong magnetic field (as in the diagnostic scanning methods called MRI, dynamic MRI, or magnetoencephalography, an increasingly-used scanning method some say offers advantages over the conventional EEG). It was noticing such effects during scanning that led to treatments like rTMS (repetitive Transcranial Magnetic Stimulation) a method of stimulation using magnetic coils placed on the head.

To cover the whole comprehensive range of these questions is obviously well beyond the scope of this paper, inviting book-length, or many book-length treatments. My purpose here is to simply raise the issue, both for professional practitioners, and for the intelligent layman, to review the methods of treatment available to them, some of which they may already be using, and to help clarify why and how such interventions may be useful, or contrarily, may actually be counterproductive (as when TENS stops working, or makes pain worse, or when ECT occasions profound memory loss in some patients.) Here some history and accumulated experience will help us clarify things.

Another Look at Neuromodulation:

To bring closure to this essay, I would like to use a clinical case to illustrate the principles of integrative modalities as well as neuromodulation. We remember that in the 1990s Herschel Toomim introduced his form of HEG (Hemoencephalography) as a neuromodulation of the EEG. That is to say, it uses one type of biofeedback (blood flow and scalp oxygen metabolism), to affect another, the EEG.

An 11-year-old boy was brought to us for treatment of the following problems (with symptom severity as rated by his adoptive parents on a ten-point Likert Scale [see Figure 1]).

To summarize the situation, the two boys, 11 and 13, had been abandoned by their biological parents, who had a variety of personal problems. The children came under the care of social services, who then sought for viable parents to adopt them. An older couple, the boys' father's maternal aunt and her husband, themselves at the

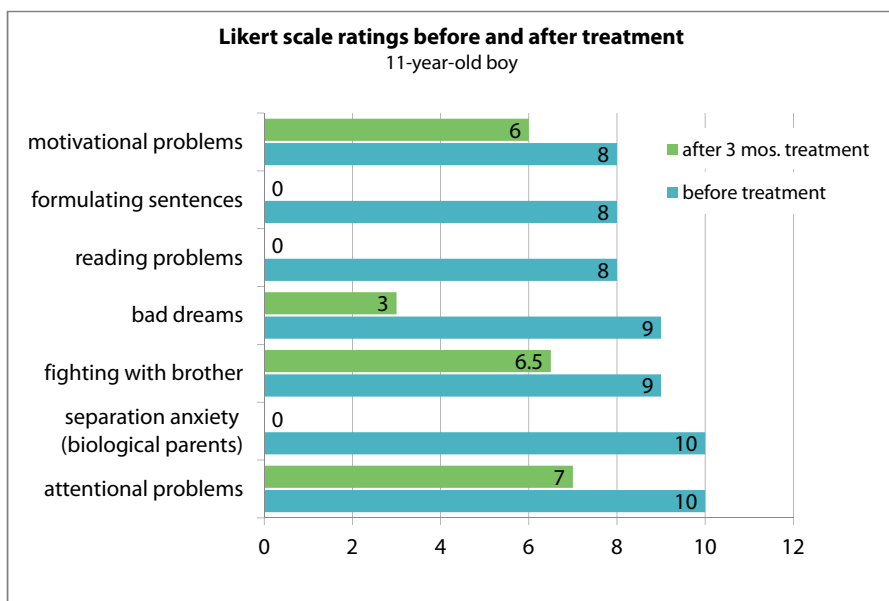


Figure 1

end of long professional careers, “stepped up to the plate, and adopted the boys.”

The younger one, whom we shall call Tom, was the worst afflicted with separation anxiety, including nightmares, nocturnal awakening, and all the affective, attention and cognitive problems listed above. Tom’s full scale IQ was measured at 79, and the neuropsychological ex-

amination showed other serious deficits that placed him in much lower percentiles, cognitively.

The adoptive parents asked two questions: Did I think that Tom’s subnormal intelligence was innate (mildly retarded range) or were the cognitive problems due to the emotional problems (reactive attachment disorder.) A qEEG was suggested and completed, which showed large areas of normalcy in the child’s brain, but a hot spot at F8 dominated the chart with high beta activity. My report said that Tom had a good chance for improving his intelligence if we could dampen down his anxiety and hypervigilance.

The adoptive father, a retired engineer, read both of the author’s books, and was reluctant to do either the LENS, Neuro-Gen or NeuroField, because of his fear that they would “put something into the boys’ brain that wasn’t there.” I did tell him that put us at a disadvantage, because those were the major modalities we used for just this constellation of problems. The boys had been won over by my sand play environment, and the warm and friendly atmosphere. They certainly liked it here, but could we help Tom?

The family was willing to try the HEG, because nothing was put into the brain; Tom picked *Despicable Me* for his movie (that is watched and gets interrupted so he can try to change his temperature in the pIR HEG.

Our entire office has studied with Jeffrey Carmen. We were used to thinking of his protocol as suitable for migraine and ADD—but basically uncomplicated versions of ADD. We had no idea it could help reactive attachment disorder. For several weeks,

while I often briefed with the parents, taking the report, during late May and early June, we had no changes reported. Parents and therapist were equally discouraged at lack of progress, still skeptical and wondering if they should just give up. There was a week of terrible dreams (mostly Tom would not talk about the content.) No change, no change; then...

"Always says 'no,' as usual, but does what he is told" (cooperates); cleaned up room; teachers say, "very focused this week" tutors say, "very kind and agreeable toward others" (day after treatments). Two older sisters—living in separate foster care came to visit; no altercations (unusual, based on previous visits). Mom came to visit, Tom very adult about her coming—and going away again—no big emotional scene, as in the past.

At the end of 3 months of treatment, and 10 HEG sessions, the following Likert scores were elicited. (See Figure 1)

Unfortunately, we have not yet been able to administer another qEEG, so we have no evidence on whether the EEG patterns have changed visibly. Even so, the subjective scores speak for themselves, especially when reported by parents who were originally very skeptical about neurofeedback. I would say that the changes elicited rival any of those we are used to seeing with the LENS or Neuro-Gen.

Dr. Carmen always said, "When you activate the frontal lobes through HEG, the frontal lobes in turn (that is their job) activate the rest of the brain!"

Here I would agree with the term neuromodulation—affecting the EEG and the rest of the brain simply by increasing blood flow.

Energy Medicine:

Energy Medicine,, in which stimulation, neurofeedback, neurotherapy and neuromodulation, clearly fall, is an underappreciated modality and largely unknown to mainstream culture. There is a further division within this field of influencing the body's own energies for therapeutic purposes. One in which an outside stimulus is applied, simply to get things going, or a stimulus based on the body's own energies (as in the shaman "reading the patient's energies," the acupuncturist or massage-therapist basing their treatments on what they find in the body, a number of the modalities discussed above, including, clearly, traditional incentive-based neurofeedback, the LENS, Neuro-Gen, NeuroField, and SCENAR, a relatively unknown physiological modality that reads the body while also putting energy in (see Mike Beasley's contribution in this edition of NeuroConnections).

The real question is this: does the energy used in the intervention (loosely called energy medicine) override and overwhelm the body's (admittedly stuck or dysregulated) systems or coax and lead it to a higher range of functioning within its own

parameters? Clinical observation has been that the gentler, less-is-more-type approaches lead to better, more nuanced outcomes, and have effects that last longer than the ones in which the body is subjected to an energetic onslaught different from its own way of functioning.

My own editorial, as I conclude this essay, is that while energy stimulations of all kinds are helpful, probably the most sensitive and successful are those that are designed to resemble the body's own energies, or best of all, feed-back the body's own energies in a moderated form.

Reference

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About the Author

Stephen Larsen, PhD, LMHC (NY), BCN, is Psychology Professor Emeritus, SUNY, director of Stone Mountain Center, PC, and, with his wife Robin, co-founder of the not-for-profit Center for Symbolic Studies. He is the author of 10 books currently in print, among which are: *The Healing Power of Neurofeedback* (2006) and *The Neurofeedback Solution* (2012). He also wrote, with Robin, *A Fire in the Mind*, the Authorized Biography of Joseph Campbell, the award-winning *The Fundamentalist Mind* (2007), *The Mythic Imagination* (1990) and *The Shaman's Doorway* (1976.) He has presented many papers and chaired symposia at ISNR and AAPB conferences, and published articles in both *The Journal of Neurotherapy*, and *Biofeedback*

A poster for the ISTSS conference. The background is a blue sky with a sunset or sunrise, showing silhouettes of a family (two adults and two children) walking on a grassy field. The ISTSS logo is in the top left, consisting of the letters 'ISTSS' and a stylized circular graphic. The text on the poster reads: 'Healing Lives and Communities: Addressing the Effects of Childhood Trauma Across the Life Span', 'November 5 – 8, 2014', 'Miami, Florida, USA', 'www.istss.org', and 'Register Today!' at the bottom.

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Multi-Modality Intensive Neurofeedback

Jamie Moore, RN, BCN and Erica Kube, BS



Abstract

The objective of this article is to present and investigate the idea of multi-modality intensive neurofeedback (iNFB). This article offers a case study as evidence for the effectiveness of this technique. The following study demonstrates the use of ultra-low pulsed electromagnetic field (pEMF) stimulation, LORETA neurofeedback and other complimentary modalities. Pre-training, intermediate and post-training Quantitative Electroencephalography (qEEG) maps were obtained throughout this 20-session iNFB training program.

Multi-Modality Intensive Neurofeedback

Intensive neurofeedback training modalities have long been utilized by neurofeedback therapists around the world. In recent years, new technologies have emerged in the field of neurofeedback, which have given rise to a need to re-explore the most effective ways to implement these intensive multi-modality training procedures in clinical practice. Intensive neurofeedback training (iNFB) has long been supported in the research to be a clinically effective approach for increasing brain regulation for many clinical diagnoses (Lubar & Lubar, 1984; Lubar, Swartwood, Swartwood, & O'Donnell, 1995; McKnight & Fehmi, 2001; Peniston & Kulkosky, 1990; Sterman, 1982).

Today, there is a growing need for the development of the most effective and time conscious methods for intensive neurofeedback. We are seeing an increasing demand to implement iNFB training modalities for international and out-of-state clients who seek out our services for neurofeedback. As a result of the growing demand, we have been working to explore and develop the most effective iNFB approaches. Offering effective neurofeedback services to clients fills a need for clients who seek treatment in a time-sensitive and cost-effective manner.

This article explores the effectiveness of the latest integrated multi-modality iNFB approach. Based upon clinical data collected from similar iNFB approaches, the following hypothesis was constructed: Utilizing a multi-modality approach that incorporates the use of pulsed electromagnetic field (pEMF) stimulation and low resolution brain electromagnetic tomography (LORETA) iNFB will increase cortical and subcortical neuronal regulation and yield clinically effective outcomes. This approach will be thoroughly explained and demonstrated through a single case study research design. This article will introduce a *disconnect, drive, and reinforce theory of*

pEMF training; the bio-medical pEMF approach to iNFB; and other important complimentary procedures including nutrition, hydration, and adequate rest.

“This article will introduce a disconnect, drive, and reinforce theory of pEMF training...and other important complimentary procedures including nutrition, hydration, and adequate rest.”

Instrumentation

Quantitative Electroencephalography (QEEG)

All clients who elect to participate in iNFB begin their process with a qEEG. QEEGs are acquired prior to the start of training; throughout training, as needed to assess, evaluate and adjust training; and again upon cessation of training. For the purpose of this case , qEEG was acquired using a DC coupled 19 channel EEG amplifier (NeuroField Q20¹, NeuroField, Inc., Bishop, CA) utilizing an Electro-Cap (Electro-Cap International, Inc., Eaton, OH). To ensure a high quality EEG signal, all reference and cap electrodes were confirmed to have <5K Ohms resistance values measured by a UFI Checktrode™ model 1089NP. Eyes open and eyes closed EEG data obtained through the process was analyzed and norm-referenced in both linked ear and Laplacian montages via NeuroGuide software (Applied Neuroscience, Inc., Seminole, FL).

Pulsed Electromagnetic Field (pEMF)

The iNFB program utilizes the NeuroField X3000 system which is a four channel frequency generator that can generate pEMF frequencies from 0.31–300,000 Hz. The pEMF output intensity ranges from 1–50 microtesla (or 1–500 milligauss). pEMF is emitted through four 200-wind coils which can be placed strategically on the cranium and/or body. During iNFB, targeted EEG frequency-specific pEMF may be delivered to the brain either as a standalone treatment or in conjunction with real time z-score (RTZ) training.

The RTZ procedure is a feedback system which can be used to instantaneously measure the effect of each pEMF on brain activity. The RTZ procedure measures and analyzes 4–32 seconds of EEG activity following delivery of each pEMF frequency. The EEG activity is instantaneously analyzed using the NeuroGuide z-score-referenced normative database. The software system will repeat pEMF frequencies which meet the set training parameters for the session. Training parameters are determined using the qEEG and matched client symptoms. The RTZ function can be set to threshold on single or multiple frequency bands at single or multiple 10–20 system (EEG) locations.

1

Patent pending

LORETA Neurofeedback

LORETA is an EEG analysis technique that utilizes measured scalp EEG to model a three-dimensional source distribution of generating electric neuronal activity from multichannel surface EEG recordings (Pascual-Marqui et al. 1994, Pascual-Marqui 1999). LORETA neurofeedback allows clinicians to utilize brain imaging technology to effectively train Brodmann areas, hubs, modules, and brain networks. LORETA neurofeedback software and referenced normative database cited by the authors was developed by Applied Neuroscience, Inc. and has been empirically studied to demonstrate a significant level of sensitivity, accuracy and validity (Thatcher, North & Biver, 2005).

BioMat

Many pEMF-only training sessions in our practice occur in a specialized room which includes an Amethyst™ BioMat 7000mx Professional (Richway® BioMat). The client may lie on the BioMat while receiving their pEMF session. The BioMat incorporates the therapeutic benefits of far infrared rays, amethyst stone and negative ions into each pEMF session.

Training Room

The pEMF and LORETA neurofeedback sessions occur in specialized rooms which are equipped with a 60 inch LED television monitor for the client, six channels of surround sound multichannel audio and a 40 inch monitor for the clinician. This client-centered environment allows the client to become fully engaged in the video and audio feedback procedure which is associated with the regulation of neuronal activity and function. This 360 degree environment is created to maximize each session to its fullest potential.

iNFB Theory and Procedure

Disconnect, Drive, and Reinforce Theory

Each iNFB program is entirely individualized. Aberrant z-scores are matched to client symptoms to develop the locations, frequencies and metrics to be trained. Deviant qEEG z-scores that match client symptoms are targeted and trained to help the system to become energetically rebalanced. The authors of this article have developed a disconnect, drive and reinforce theory for iNFB.

Dysregulated neural activity can be influenced into a chaotic state, allowing the brain to disconnect from its previous maladaptive state of regulation. That chaotic state can then be reorganized into a more regulated state by driving neuronal activity with a pulsed electromagnetic field. The chaotic neural activity will mimic the frequency that it is being driven, creating a more stable and regulated neural environment. When the newly regulated neural activity is reinforced by RTZ and LORETA neurofeedback within 4 hours the brain is not allowed to return back to its dysregulated state.

Figure 1: *NeuroField* dehabituator settings. pEMF frequencies are given to the system within determined frequency (Hz) parameters at randomized durations (ms) and amplitudes (V). Dehabituator protocols are guided by qEEG and client symptoms.

Dysregulated neuronal activity is specifically targeted utilizing a procedure called dehabituatation. The dehabituatation procedure is a function of the *NeuroField* software which can be adopted to influence the

client's dysregulated areas of the brain. Specific dehabituator protocols are guided by qEEG and client symptoms.

The randomization properties of the dehabituator are theorized to influence the brain into a brief chaotic state. To create this chaotic state, pEMF is given to the cranium through the *NeuroField* 200 wind coil system. Each coil is placed on the scalp over the areas of targeted dysregulation. Multiple randomized pEMF frequencies (Hz) are given to the system at randomized durations (ms) and intensities (V) (Figure 1). The energy introduced to the cortical system through this methodology is very low, ranging from 1 to 50 microtesla. When the neuronal system is pulsed by the randomized nature of the dehabituator the brain is not allowed to establish or maintain a dominant frequency. Pulsing multiple frequencies can also function as a “wake up call” encouraging the recruitment of adjacent neurons.

Dehabituatation of the brain through ultra-low intensity pEMF is not known to cause a global depolarization/repolarization of the neural network, as is the case with elec-

Dehabituator Generated Treatment Table

For the dehabituator treatment, parameters can be constrained to fixed values or can be generated automatically with a random number generator. Enter the values on the right as desired and then click the 'Start Dehabituator Treatment' button.

Check to Randomize:
☐ # of Cycles
☒ Frequency
☒ Duration
☒ Amplitude

Fixed Value: # of Cycles: 250

Random Lower Limit: 1
 Random Upper Limit: 8

500
 1500

3
 5

Index	Stim CH1 Frequency	Stim CH2 Frequency	Stim CH3 Frequency	Stim CH4 Frequency
1	4.972	5.02	5.757	7.159
2	2.361	3.976	1.366	4.792
3	6.52	5.798	5.981	7.934
4	4.111	2.576	1.895	1.746
5	6.895	4.485	2.488	2.201
6	1.547	3.265	2.061	5.547
7	6.924	7.6	5.573	4.009
8	5.526	3.194	6.727	2.642
9	5.018	5.548	4.587	3.039
10	1.238	2.642	2.954	2.777
11	7.571	4.161	6.508	3.624
12	1.208	1.823	6.704	7.482
13	4.484	7.137	4.41	7.14
14	6.794	3.282	6.298	6.626
15	7.598	5.834	1.983	1.512
16	4.54	3.445	5.917	2.814

Selected Stim Cycle Channel Enable and Amplitude Control

Check to Enable:
☒ CH #1
☒ CH #2
☒ CH #3
☒ CH #4

Frequency (Hz): 4.018
 5.317
 1.732
 5.254

Duration (msec): 636
 1401
 521
 717

Amplitude (Volts): 4.6452
 4.9683
 3.0957
 4.8315

Standard Dehab SDNN Hits EEG Hits Z Score Hits Start Dehabituator Treatment Close

Click 'Start Treatment' Button to Start Selected Treatment Protocol

troconvulsive therapy (ECT). Ultra-low intensity pEMF dehabitation simply encourages the neural activity to function at varying frequencies which can contribute to a more flexible and adaptive neural network. The clinician may choose to dehabituate the areas of greatest dysregulation within the frequency band of the greatest dysregulation. A brief disjoining or interruption of the frequency band, through dehabitation, is utilized so that the brain can now be introduced to and learn a new dominant frequency.

Immediately following the dehabitation procedure the brain is guided back into a more regulated state using pEMF frequencies. pEMF frequencies and protocols used during this phase are determined through qEEG and symptoms. Neuronal activity, in its temporarily disconnected chaotic state, will begin to entrain upon the pEMF driving frequency, allowing the clinician to gently guide the brain through ultra-low intensity pEMF toward more regulated and energetically balanced neuronal functioning.

pEMF can also have an inhibitory properties. Driving the brain through pEMF can create an environment that will suppress the most dysregulated frequency bands. In the case presented in this article, relative power in the delta frequency band was the most deficient. The delta frequency band was chosen to drive the brain because of its low power in respect to the other frequency bands and its inhibitory effects on the faster beta wave forms.

The last phase of this theory is reinforcement. When the newly regulated neuronal activity is reinforced by LORETA neurofeedback within four hours, the brain is not allowed time to return back to its dysregulated pattern. LORETA neurofeedback provides the brain with a tremendous amount of information about its state of functioning. LORETA neurofeedback functions as an effective training modality to help the brain increase self-regulation, flexibility and appropriateness (Cannon, Lubar, Gerke, Thornton, Hutchens & McCammon, 2006).

Body and Brain pEMF

During pEMF-only sessions, clients relax and enjoy the therapeutic benefits of the BioMat in addition to receiving their NeuroField session addressing brain and body energetic alignments. The BioMat and pEMF can be utilized to target circulatory, detoxification, and inflammation issues. Poor circulation and inflammation often accompanies traumatic and chronic conditions. The body responds to injury with a host of immune reactions to neutralize the system and return it to a homeostatic state (Pavlov, Wang, Czura, Friedman, & Tracey, 2003). Inflammation is essential to the natural healing processes of the body, however, the body and brain often times will over-respond to this need, which may result in delayed healing responses.

The pEMF coils were placed posteriorly and anteriorly to the liver. The liver is the body's primary organ for detoxification. The liver can become compromised by poor nutrition, toxic conditions, unhealthy lifestyle, chemicals, heavy metals and food allergens. Liver toxicity can prevent the absorption and utilization of nutrients vital for healthy functioning. Offering support to the liver can be an important adjunctive method for guiding the body back toward a healthy state of function which may optimize neurofeedback outcomes.

iNFB Procedure

Table 1 illustrates the iNFB procedure implemented for the subject of this study, who received an intensive course of twice daily sessions for a total of 23 sessions over a two week period. The outline of his plan of care includes the recording and analysis of the first qEEG, brain and body pEMF, and the application of the *disconnect, drive and reinforce theory of iNFB*. A detailed outline of the training protocols and procedures are available from the authors by request.

Day (1-14)	Time (AM/PM)	Procedure
1	AM	<ol style="list-style-type: none"> 1. Interview and establish goals for training 2. Acquire baseline QEEG
	PM	<ol style="list-style-type: none"> 1. BioMat/pEMF Detoxification (~45 minutes (min)) utilizing the following procedure: 2. Place two pEMF coils anterior to the liver and place 2 pEMF coils posterior to the liver 3. Start NeuroField Liver Support Protocol (~15 min) and Inflammation Reduction Protocol (~15 min) 4. Remove coils and place one coil over each abdominal quadrant. 5. Start NeuroField Inflammation Reduction Protocol (~30min)
2	AM	<ol style="list-style-type: none"> 1. Review the QEEG report with the client. 2. BioMat/pEMF Detoxification: Repeat Day 1 procedure 3. Disconnect: Dehabituation Procedure (Figure 1).
	PM	<ol style="list-style-type: none"> 4. Disconnect: Dehabituation Procedure 5. Drive: NeuroField RTZ
3-14	AM	<ol style="list-style-type: none"> 1. Disconnect: Dehabituation Procedure 2. Drive: NeuroField RTZ
	PM	<ol style="list-style-type: none"> 3. Reinforce: LORETA z-score neurofeedback

Table 1

Complimentary Procedures

During iNFB, clients experience rapid biological and neurological system changes. It is imperative that clients who participate in iNFB are thoroughly educated on the importance of adequate nutrition, hydration and rest. Each session and accompanied

biological and neurological changes require a large amount of glutamate. Glutamate is the key compound in cellular metabolism and serves as metabolic fuel body and brain function. When the body and brain are not sufficiently supplied with the energy, the successive sessions may be less effective. Before the morning (am) session, clients are recommended to have a healthy breakfast containing a mix of protein (minimum of 15 grams), fat, and carbohydrates. Between morning and afternoon sessions clients are encouraged to consume 10–12 grams of easily digestible proteins and carbohydrates. Clients are encouraged to abstain from caffeine, alcohol and refined sugars.

Hydration is also imperative to iNFB. Clients are recommended to consume 8–16 ounces of water before, between and after each session. Necessary quantities depend upon many factors including: age, weight, lifestyle and activity level. Fluid intake aids the body and brain in detoxification and rehydration at the cellular level. In clients with normal kidney function, urine coloration is a good indicator of proper hydration. Urine that is clear to faint yellow is a sign that the client is properly hydrated. Clients are asked to monitor hydration through urine coloration.

Rest is another essential factor that influences iNFB. Clients are recommended to sleep 7 hours prior to qEEG and neurofeedback sessions. Between am and pm sessions clients are encouraged to relax and avoid strenuous activities. Monitoring sleep patterns is also an effective way to measure clinical outcomes.

Case Study Results

Serial qEEG studies were obtained at three time points during the course of this iNFB case study. The first qEEG was obtained prior to the start of the program (Figure 2). The second qEEG was obtained following 11 total sessions (Figure 3), and the last qEEG was

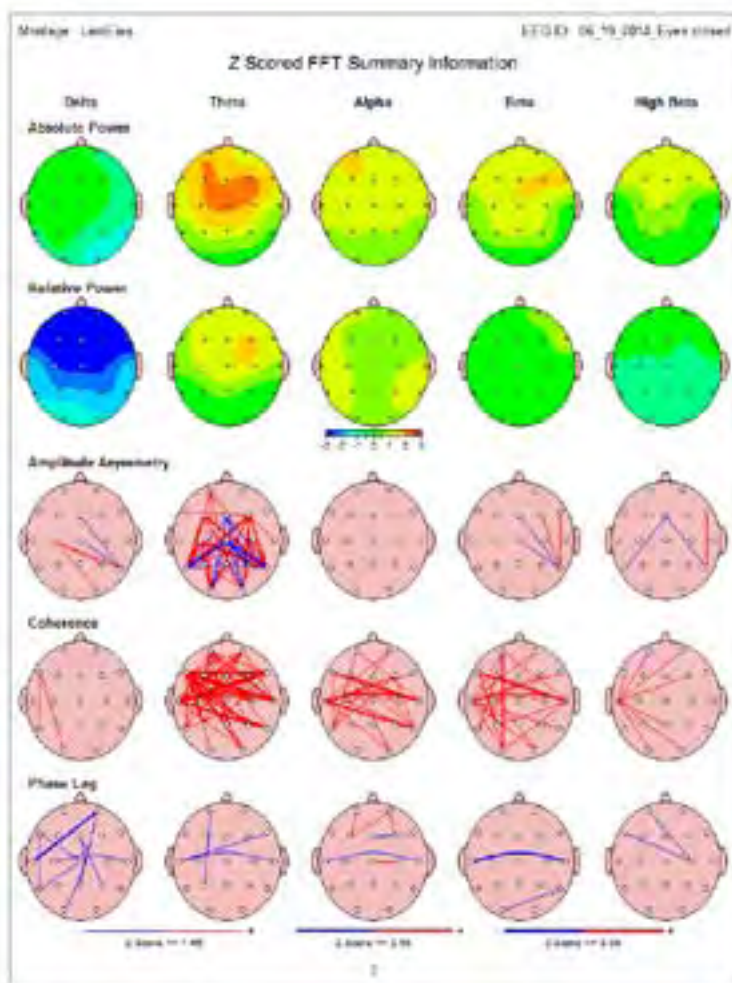


Figure 2: Summary Z-Score Analysis of pre-iNFB training QEEG. Note the pattern of excessive fronto-central slowing in 4-7 Hz bands, as well as diffuse hypercoherence in theta, alpha and beta bands. A pattern of excess amplitude asymmetry in the theta band of 4-7 Hz is also noted.

obtained after 20 total sessions (Figure 4). The qEEG comparisons show improvement of the theta, alpha, beta and high beta frequency bands. Improvements are also noted in amplitude asymmetry, coherence and phase lag metrics. Client symptoms of anxiety, insomnia and depression also decreased correspondingly.

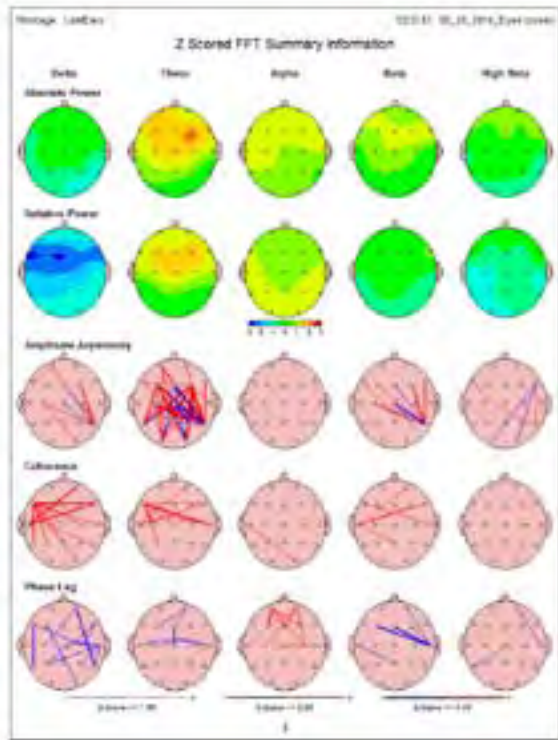


Figure 3: Summary z-score analysis after 11 iNFB sessions. Note the reduction in the pattern of excessive absolute power of fronto-central theta, alpha, beta, and hi-beta bands. Notice also a reduction of hypercoherence in theta, alpha, and beta bands.

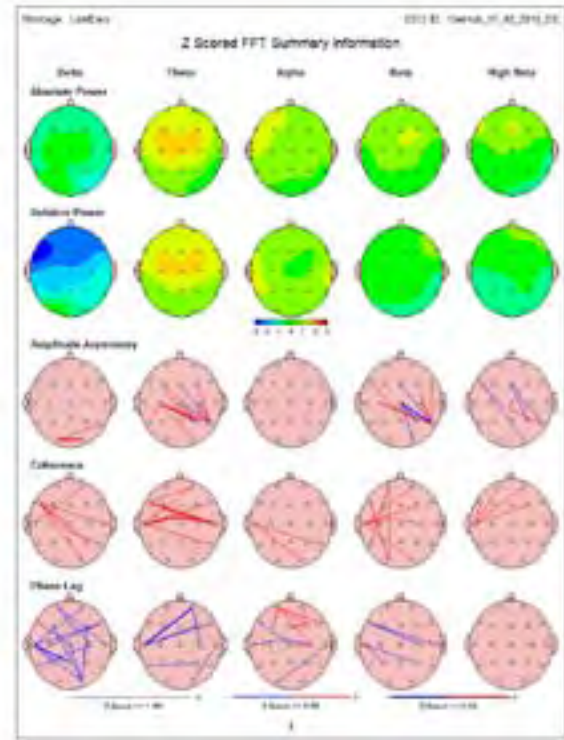


Figure 4: Summary z-score analysis after 20 iNFB sessions. Note the continued reduction in the pattern of excessive absolute power of fronto-central theta, alpha, beta, and hi-beta bands. There is progressive regulation of amplitude asymmetry in theta 4-7 Hz bands.

Discussion and Implications

This case study clearly demonstrates the functional neuroplasticity and adaptability of the brain, highlighting iNFB's potential as a practical and effective treatment alternative to traditional two to three times weekly outpatient treatment models. Further research focusing on the comparison of intensive vs. non-intensive neurofeedback utilizing large subject samples of intensive, non-intensive, and control neurofeedback groups would be helpful.

Increasingly, neurotherapists are coming to understand the critical importance of addressing underlying bio-medical conditions that can affect a positive neurofeedback outcome. Common bio-medical factors include: chronic inflammation, compromised cerebral circulation, heavy metal toxicity, chemical toxicity, nutritional deficiency and hormonal changes. Bio-medical testing and procedures can aid in obtaining increasingly positive neurofeedback outcomes. Underlying bio-medical

conditions are often the missing link when clients plateau or are resistant to change through neurofeedback training. The use of nutrition, hydration, and rest is a very important to consider while seeing clients for neurotherapy.

Taking a comprehensive bio-medical iNFB approach is very important to the continual demonstration that neurofeedback is a promising treatment for even the most treatment resistant psychological and medical diagnoses. In recent years, new technologies like NeuroField's pEMF system have emerged, allowing practitioners to combine the power and properties of pEMF with neurofeedback to address the entire energetic biological system. The most important way to implement this wealth of technology is to know your client. Be sure to obtain comprehensive intake information prior to beginning treatment with any individual. An overlooked underlying biological problem may likely affect treatment outcomes and client satisfaction.

About the Authors

Jamie Moore has been a Registered Nurse for 35 years. He graduated from Saint Joseph School of Nursing in 1979. Jamie spent much of his nursing career as a critical care and Hyperbaric nurse which is where his extensive study of the brain was nurtured. Jamie has studied under many pioneers in the field of neurofeedback, including Leslie Sherlin, PhD, QEEGD, BCN, BCB, John Anderson, MA, LADC, BCB, BCN, QEEGD and Nicholas Dogris PhD, BCN. Jamie has been working in the field of neurofeedback since 2008. Jamie's medical background and experience brings a fresh perspective to the field of neurotherapy. He is board certified in neurofeedback through the BCIA and is the co-founder of Integrated Neurotherapy Center, Inc. located in Omaha, NE.

Erica Kube is a graduate from the program of neuroscience and biology at the University of Nebraska, Omaha where she has received recognition for her achievement and outstanding performance. Through the university, she has authored work which has received top awards for research and creative activity. Erica has completed extensive training with experts in the field of neurotherapy including John Anderson, MA, LADC, BCB, BCN, QEEGD and Nicholas Dogris PhD, BCN. Erica is currently finishing her Master's of Science in Clinical Counseling, degree to be conferred November 2014. She has been practicing neurotherapy since 2010 and is the co-founder of Integrated Neurotherapy Center, Inc. This advanced training and passion for learning the latest, innovative, multi-modality approaches have increased the efficiency and effectiveness of neurotherapy, from which her clients achieve maximum health and quality of life.

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Desensitizing a Super-Sensitive Highly-Reactive Client: A true story...

Lisa Merrifield, PhD



My client was a 54-year-old man who had been receiving multi-drug treatment for AIDS for approximately 14 years. During the course of this treatment he developed AIDS-related CNS non-Hodgkin's lymphoma, and with this a primary lymphoma of the brain that required surgery. His surgery was successful, but triggered the development of intractable left temporal lobe seizures that were determined to originate in the left hippocampus.

When no medication could adequately control his seizures, the client's left hippocampus was removed, as well as part of the left amygdala. He presented at my office still taking anticonvulsant medication and an antidepressant along with a host of medications for the HIV, but his frank seizure events were reduced to approximately two per week. Migraines were still occurring a couple of times a month; and according to his medical records, the remnants of longstanding bipolar disorder had left him stuck in a bit of a low mood.

His affect seemed flat and there was an air of passivity about him, but memory was the major concern. In addition to the effects of multiple brain surgeries, he was living with the awareness that he had small white matter lesions that can develop with HIV infection. So even though he had not been diagnosed with AIDS-related dementia, he had some fears about that possibility, given his memory difficulties.

He complained of a lack of continuity across situations; that as soon as he left a place he would forget what he had just done, seen or heard. In conversations he was too slow with his thoughts and words to be a meaningful participant. This affected his ability to interact fluidly with medical providers, and created a barrier in social situations. He no longer enjoyed movies because he couldn't keep up with the storyline, nor could he recall the movie afterwards. He still could not remember the movement sequences to his daily Tai Chi routine after months of going to the class. Although he had a driver's license he lacked confidence in his ability to navigate around town.

My client had spent years working as professional chef, travelling the world on yachts of the wealthy. He had to give that up when he became ill with AIDS, but he found great fulfillment and community in his church, where he was still able to manage the kitchen on a volunteer basis. So he had retained some of his skills in that area even after the hippocampectomy.

I was not sure how to think about his situation with the memory. After all, he was missing the left hippocampus, which is a major memory structure in the brain. But then I remembered to stick to the basics and asked, “Do your symptoms get worse when you are stressed?” When he replied in the affirmative, I said, “Okay, I don’t know whether I can give a better memory, but maybe I can help you have better access to the memory you already have.” This seemed reasonable to us both, and we agreed to a trial of six sessions to see what might happen before deciding to go further.

I thought perhaps the combination of light therapy plus LENS neurofeedback

“When every sight and sound registers with a person, life can feel burdensome and overwhelming.”

(OchsLabs; Sebastopol, CA) would be the way to go with him. I wanted to avoid abrading the skin because of HIV, so being able to work with a single electrode seemed preferable to techniques that would require a full cap. In addition, given the missing hippocampus, I didn’t know how to think about his data in comparison to a norm-referenced database. (There may be an intelligent way to do this, but if there is, I don’t have that skill set.) It seemed like a self-referenced approach would be more reasonable in his case.

I administered the LENS Sensitivity Questionnaire by interview. He was extremely sensitive to light, sound, and weather changes; moderately sensitive to smells; but did not identify himself as electro-sensitive. He had been highly-reactive, both behaviorally and emotionally, in his youth and prior to his brain surgery. While these tendencies were currently attenuated by medications and the effects of the hippocampectomy, I nonetheless elected to treat him with latent high reactivity in mind. I also treated him as though he were electro-sensitive based on what I had learned from other clients who had intractable seizures.

I began with a desensitization protocol (details follow) that, over time, has become my default initial approach with all new clients. I added pIR HEG at session five, after I knew that he was able to tolerate brief exposures to LENS feedback (usually 1 site Map 100% 2 sec. offset of +20). The first time I just had him hold the electrode between his fingers. In subsequent sessions I placed the active electrode on his head. One week, we trialed several cycles of the Q1000 resonating laser (QLaser Solutions; San Antonio TX) in lieu of LENS. The Q1000 was applied for one–two minutes at each of the 21 sites that comprise a LENS map. Beginning with session 4, and for subsequent sessions, in addition to LENS and Photon Stimulator (OchsLabs; Sebastopol, CA) on the fingertips, he had two cycles (six minutes total) of laser over the heart and one cycle (three minutes total) of Q1000 lasers running simultaneously at both the

forehead and occiput.

We met for 18 sessions over a period of nine months; weekly in the beginning, eventually less and less frequently as he became more confident that the changes would hold. It was gratifying to see his memory problems correct themselves without the addition of effortful targeted interventions such as computerized cognitive rehabilitation exercises. I'm not showing you his LENS map because we did not complete a full map over the course of treatment. (One week I got impatient for a map and tried a few sites of Map 2 sec. brief offset of +20 and he had difficulty sleeping, so I went back to the prior protocol.)

The client reported greater mental clarity. He became able to track conversations and could express himself in group situations. Before treatment, the client had found it difficult to dialogue with his healthcare providers. (He reported that the words to formulate his questions had eluded him. He would have to write them down in a book and call back later to talk to the nurse.) As a result of combination light/LENS/pIR HEG treatment (ezPIR system, Manlius, NY), he became verbally agile enough to formulate and ask questions during his appointments.

My client's Tai Chi instructor commented on his improved ability to retain instruction, and he became more confident about his participation in class. As his confi-

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Infra-Slow Fluctuation (ISF) Workshop

with Mark Smith

Presented by Neurofeedback Services of New York
Seacaucus, NJ • November 7-9, 2014



OVERVIEW

Recent equipment and software advancements, specifically the Discovery and Atlantis amplifiers coupled with the Avatar software, now allow for 2, 4, or 19 channel recording and ISF training. With this innovation we can simultaneously render the signal in a bipolar and referential montage. This improvement makes for a safe, effective, and data rich method of slow-wave training. The ISF method pivots on the determination of an optimum frequency (OF) that is trained for each individual client. In the didactic portion of the workshop, the OF determination process will be demonstrated along with a discussion of the equipment and optimal signal processing requirements necessary to accomplish effective training. The emphasis on the workshop practicum will provide students with the necessary tools to integrate ISF training in clinical practice.

SCHEDULE OF EVENTS

Day 1

Friday | 9:00pm to 6:00pm

- Clinical and technical overview including live demonstrations of Infra-Slow Fluctuation training and initial hands-on component.

Days 2 & 3

Saturday & Sunday | 9:00am to 6:00pm

- Hands on training. Please bring your computers and amplifiers. If you don't own an amplifier, we will team you up with someone who does.
- Extensive practice in the use of the ISF software, training student clients, and setting the Optimum Frequency for training.
- The use of QEEG analysis for evaluating ISF candidates, treatment response, and beginning placements.
- Presentation of Pre/Post QEEGs and neuropsychological tests of ISF trained clients with a variety of presentations including: ADHD, affective disorders, autism, insomnia, PTSD, and more.

LOCATION & HOTEL ACCOMMODATIONS

The workshop will be held at:
HOLIDAY INN SECAUCUS
300 PLAZA DRIVE, SECAUCUS, NJ 07094
Phone: 201-809-4747

Rooms are available at a special rate of \$139/night (king or double). Mention Neurofeedback Services of New York when booking to receive the discount. Reduced room rate special ends October 10th, 2014

REGISTRATION & FEES

Early Bird Special: \$849
(ends October 10th, 2014)
Regular Registration Fee: \$899
Software License for ISF training in the Avatar software: \$150

CONTACT
TO
REGISTER

Neurofeedback Services of New York
212-877-7929
neurofeedbackservicesny@gmail.com

To learn more about Infra-Slow training, visit us at: www.neurofeedbackservicesny.com

dence grew, his perceived driving errors decreased (less frequently lost) and he made some new friends. His passivity diminished, and with it, some of his agreeableness. It became a little less easy for others to take advantage of him and he reported liking this change, even though it felt new and strange to him. He reported feeling happier and not depressed. At discharge he had been seizure free and migraine free for three months.

We discontinued his visits when the rate of change slowed and he seemed to be more in a phase of enlarging his life to capitalize on what the change had made possible. He was discharged back to his referring psychotherapist for ongoing support, with the understanding that he could return to see me if needed. This had been our plan at the outset of treatment.

As my skill in working with medically complex individuals has increased, so has the proportion of my clients who are living with chronic, degenerative, or life threatening illnesses. This has made for some interesting practice management and scheduling issues along the way. Now when I take referrals from other clinicians it is more often with the understanding that the client will eventually return to the referring therapist if there are follow-on aspects of care that do not require the use of neurotherapies.

Now about that desensitization protocol...

Readers of this article who have been trained in LENS will recognize this desensitization approach as a slightly modified version of Dr. Len Ochs' protocol, but it is similar in philosophy and effect. I want to thank Dr. Ochs for his patience and instruction over the years. His encouragement and example have really helped to develop my skill in doing as little as possible.

Super-sensitive/highly-reactive individuals suffer from an inability to screen out and not respond to benign stimuli. The desensitization approach allows me to find the smallest stimulus load that will cause a sufficient shift in the person's physiology to break them out of a homeostatic pattern that keeps them trapped in their symptoms. I want to provide enough stimulation for them to change, but not so much that defensive mechanisms become activated.

Begin by assessing the client's reaction to ambient light.

My office has a bank of large windows with blinds, a few lamps and overhead fluorescent lights. Many of my clients are hypersensitive to light, but some don't know it well enough to take care of themselves. If they enter my waiting room with dark glasses and don't take them off, I turn off the overheads in my office. Otherwise I leave them on to see whether the client will request that I turn them off. If they don't, I watch closely to see how stressed, or not, they seem to be by the lights.

After a few minutes I reach over and turn off the overhead lights and watch the

client for signs of relief. Often they will begin to breathe more deeply, or even do something as obvious as say “Thank you.” If I get a response like that, it doesn’t matter to me how they answer on the self-report questionnaire. I treat them as super-sensitive/highly-reactive. I pay close attention to the amount of light that is comfortable, adjusting the blinds, etc. and note how their tolerance changes over time during that visit and subsequent visits.

Expose the client’s fingertips to light and note the response.

For this I typically use the Photon Stimulator made by OchsLabs. This device produces incoherent 940 nm light at an effective power of 4 watts. Very often with a sensitive individual I will notice that they give a deep sigh after a brief exposure to this light. I stop as soon as they sigh, as what I’m looking for is the physiological shift into a more parasympathetic state. This might take only a few seconds of exposure, but it is generally perceived as a shift into a state of greater comfort. Equally important, it is associated with their being with me and being in my office.

As treatment progresses, the tolerance for light usually increases; this is another way of gauging increased resilience to environmental stimuli. If you don’t have a Photon Stimulator or another infra-red light device, you can substitute an inexpensive laser pointer as described in the next step, but usually the exposure time will be a little more.

Teach the client how to mechanically reduce stress and desensitize him/herself to stimuli.

If a client is sensitive, I always send them away from the first visit with an inexpensive little laser pointer and instructions on how to use it to help him or herself between our sessions. The model that I prefer is a “Light and Laser Pen” that operates



Figure 1: Applying a laser pointer to the fingertips can increase relaxation and help reduce client stress between sessions.

at a wavelength between 630–680 nm with a maximum output < 5 mW. It is available in the office supply section of Walgreen’s drug-stores at the attractive price of \$2.99 or 2 for \$5.00. I suggest that the client expose their fingertips to the light twice a day, and when they realize that they are building up tension. I always demonstrate the light in person, and I hold the client’s hand while I do it. There’s something beneficial about this initial exposure that carries forward positive associations for subsequent use, so the first exposure is very important. For instructions, see Figure 1.

Assess the client’s reactions to internal cues.

Occasionally people cannot easily accommodate the products of their own thinking.

They get stirred up and feel it in their bodies. These are the folks that I like to get into whole body activity as soon as possible—if their physical condition allows it. I once had a client who had been diagnosed with migraines and “Central Sensitization Syndrome” who swore he was fine until he had to think about anything hard (specifically, his work, which was mentally intense). This got me wondering how to better assess for high internal reactivity to mental effort that doesn’t always have an outward behavioral counterpart.

My colleague Melissa Ibanez, LIMHP came up with a little device that we call “The Bee.” You can see a picture in Figure 2. This is a benign device that is composed of a block of wood, plastic gear from a printer cartridge, old electrode, and some black and yellow electrical tape to make it look scientific. The client holds The Bee on one hand and places the electrode tip between fingers of the other hand. Then I ask them to close their eyes and let me know what they notice. Many people will not notice anything; but some folks do. If the reaction is pronounced I explain that it is real, but the reaction is to their own thoughts. So far, my clients have been able to accept this feedback, and even said that it made sense to them. In the small number of cases where this has happened the person was later found to have physical illness with a high inflammatory component.



Figure 2: The Bee is a helpful tool for assessing a client's reactivity to his own thoughts.

[See how they react to grounding the body.](#)

I have the client place their hands on an electrical grounding mat (“Earthing” mat, see Figure 3) and have them report what they notice. Many seizure clients and migraineurs will have some tingling or warmth or buzzing in their hands. Sensitive/reactive individuals seem to carry a higher resting voltage in the body, so that when they touch the grounding mat the static discharge may produce a perceptible shift.



Figure 3: An Earthing mat allows for the discharge of static electricity from the body and has an organizing effect on the client's EEG.

I have found that for these folks, the EEG is more orderly and lower amplitude when they are electrically grounded.

Sometimes I actually have them hold the mat when I LENS them if I am trying to dampen their reactivity to change. It seems to give the physiology a little more ballast and containment for the disruptive effects of the LENS feedback. (Of course, you would never do this with the denser, less reactive clients because they are harder to destabilize.) Some of my clients have purchased Earthing mats

or sheets from www.Earthing.com. This has seemed to be especially beneficial for clients who have high levels of systemic inflammation.

Try LENS off the body.

You can hold all of the electrodes near the client, as shown in Figure 4; or you can put the ear clips on their ears and hold the electrode near the nail bed of a finger. Either way, you'll get non-specific signal that allows the LENS to generate feedback. This information is another type of environmental stimulus.

Have them hold an electrode.

I generally put the ear clips on two fingers and have the client hold an electrode between the thumb and third finger. While I do check to see that the signal quality is good, I don't get too hung up on this because I'm doing it for physiological effect, not for data. My observation is that the farther you get from the brain, the gentler the LENS feedback will be. With most clients I am able to skip LENS off the body and holding the electrode.



Figure 4 Sometimes it is useful to begin with LENS off the body as a very gentle environmental stimulus.

Finally, use LENS with the electrode directly on the head.

With super-sensitive/highly-reactive folks, frontal lobe function is usually poor. I tend to start out with LENS by working in the occipital area.

Work as quickly and efficiently as possible, but avoid pushing the client.

Most of the super-sensitive/highly-reactive clients I have seen have not been very physically hardy and could not easily recover from overstimulation. So I guard against that. Pushing so hard for change that you elicit push-back from the body or psyche is a false economy. The client's trust is precious, and if you blow it by creating additional discomfort for them, it will affect your therapeutic alliance and degrade the treatment effects.

Author's note:

It is my privilege to share what I have learned from working with numerous individuals who give embodiment to the description "thin skinned." Until I started working with LENS I did not let myself appreciate how uncomfortable it can be for some people to simply be in the world. When every sight and sound registers with a person, life can feel burdensome and overwhelming.

I hope that if one of these folks should contact you, you might now feel more confident in helping them by knowing about an approach that has worked for me. Please know that I do not have beneficial interest in any of the products mentioned, and that I do not sell anything. You are welcome to direct comments, questions, or otherwise friendly dialogue to me at psychologics@att.net

Photic Neurofeedback: An Underused Modality

Richard Soutar, PhD, BCN



Entrainment is often defined as a method of producing a frequency following response in the EEG that matches the applied rhythmic pulses of light and or sound. Photic entrainment typically uses LEDs embedded in a pair of glasses in order to pulse light at a specific brainwave frequency and elicit a response in that same frequency. Light can be pulsed at the same frequency to both visual fields of the eyes, but can also be pulsed independently at different frequencies to the left and right visual field to influence the left and right hemisphere independently. For instance, you could pulse alpha to the right hemisphere and beta to the left hemisphere.

Auditory entrainment utilizes sound pulses to accomplish the same effect as photic impulses, and can be monaural, binaural, or isochronic in nature. Monaural presents the same tone to both ears. Binaural presents a tone of different frequencies to each ear and the brain hears a beat that is the difference between the two. Isochronic tones are generated by using a single tone that is presented in sharp beats due to major shifts in volume from minimum to maximum.

When used together at the same time, these two methods are referred to as audio visual entrainment. They are commonly used as stand alone technologies to improve attention, cognitive function, mood, anxiety, headaches, insomnia, PMS, and stress in general.

History

Photic stimulation or audio visual entrainment (AVE) actually has a longer history than neurofeedback. The first scientific investigations with photic stimulation began back in the 1940s. Since that time there have been dozens of studies done on many aspects of this technology. Dave Siever has written a comprehensive text, *The Rediscovery of Audio Visual Entrainment Technology* (Siever, 2000) that is an excellent introduction to the technology that includes a catalogue of the research and the details of the technology and its application. Rob Longo and I included a chapter on the use of visual entrainment with neurofeedback in our book, *Doing Neurofeedback*, as well.

I tested out my first AVE unit, a David Paradise AVE device, in 1998, which I purchased from Mind Alive. Dave Siever accepted an invitation to come down to our office to run clinical trials with us, while using it with neurofeedback. At the time, there

were several other manufacturers, such as Photosonix, producing such devices, but there was little information on the devices and how to use them clinically. To the casual visitor at the professional meetings back in the late 1990s, they seemed to be more of a novelty or a curiosity. Tom Budzynski appeared to be doing most of the research and presentations about this technology at the ISNR and AAPB meetings, and Dave Siever was starting to make appearances as well. Chuck Davis could be found demonstrating his Roshi device regularly at the meetings; not long after, Ray Wolf had a booth for Photosonix as well. There were also dark stories surrounding the devices, such as the one about the FDA removing them from a retail franchise known as The Sharper Image following several reports of seizures resulting from their use. There were even people literally whispering warnings in my ear as I inspected units for sale at some of the conferences. As it turns out, this seizure outcome is very exceptional unless you already have a history of seizure; it is more likely to occur with red LEDs flashing at 15Hz. Since 1998, we have not had a single incident, once we took into account these two simple limitations of the technology.

I have done numerous workshops since the 1990s on this topic at ISNR meetings as well as privately, and I continue to conduct them annually. We use photic stimulation in the office frequently, in conjunction with HRV and alpha training or alpha-theta training, to assist clients in learning to calm their CNS. It is highly effective in altering brainwave patterns and has an immediate impact on EEG distribution when tracking changes with a qEEG, but unfortunately, from a clinical perspective, its effect wears off fairly quickly. Many people experience a post-training euphoria or improved focus that lasts for several hours depending on the frequency used in a session. Research discussed below suggests that it increases blood flow. When Hershel Toomim developed his first HEG device, we tested it with a photic device at his lab and found that photic stimulation enhanced blood flow as recorded by HEG in all the individuals we tested.

Photic Research

How responsive an individual is to photic stimulation has been an important topic for researchers. Individuals vary in their level of response to photic driving (Kawaguchi et al, 1993). Resistance (or lack of responsiveness) was found to usually be due to a blocking effect of internal or external stimulus (Iwahara et al, 1974), suggesting that individuals preoccupied with thoughts and worries might be less responsive to photic driving. The driving response of the photic stimulation also varies daily based on mood, indicating that extreme emotion may also interfere with the effect (Ulett, 1957). Sleep deprivation will alter an individual's responsiveness as well (Ulett, 1957). Individuals with low amplitude alpha are less responsive to photic driving, which seems to support the observation that preoccupation with internal stimuli has a dampening effect on responsivity to photic stimulation (Rosenfeld et al, 1997).

Rigidity of personality is correlated with a reduction in the color and pattern movement response that usually accompanies photic stimulation (Ulett, 1958). This may be related to anxious behavior and hyperarousal of the CNS as reflected in the other research mentioned here. If nothing else, one would expect that the level of response of an individual to photic driving might be a good indicator of anxiety and depression if not disorder in general. Additionally, meditators are more responsive to photic driving (Williams, 1975) and this again implies that those with more or less anxiety might be identified with this technology.

Technical aspects

The technical aspects of photic entrainment are fairly complex but interesting as well. Photic entrainment has the strongest measurable effect in the eyes closed state, while sine wave photic stimulation elicits endogenous EEG that is different from the driving effect of square wave photic stimulation (Townsend, 1975). Of particular interest is the finding that the level of entrainment elicited in an individual correlates with the proximity of the driving frequency to the dominant EEG frequency of the individual being entrained (Townsend, 1975). Optimal entrainment occurs at the alpha frequency which is the dominant eyes closed frequency in the EEG spectrum (Townsend, 1975). The optimal session length to elicit a robust response is 20-30 minutes (Shealy, 1990). Photic theta generates altered states and hypnogogic images, indicating that it may be of use to assist in alpha-theta training sessions when individuals have difficulty generating crossovers (Deiter & Weinstein, 1995). In fact, I have used it clinically in this manner for years and it has consistently proven very helpful.

The mechanisms of action of photic driving have only been investigated at a very general level. The initial response to photic driving, once it leaves the optic nerve, is in the lateral geniculate nucleus and cuneus (Kawaguchi et al, 1993). The photic driving response increases cortical and striatal blood flow, which may explain some of the findings regarding improved mental function. (Mentis et al., 1997; Diehle et al., 1998). Researchers have observed that spontaneous background rhythms appear to be distinctively different in nature from evoked rhythms elicited by photic driving. This distinction may explain why photic stimulation may be helpful during initial stages of neurofeedback training, yet in some cases appears to interfere with later stages of training, as we shall discuss later (Gastaut & Hunter, 1953; Iwahara et al, 1974).

One of the most important findings regarding the application of this technology is that using 15Hz photic stimulation with red lights is more likely to produce photo-convulsive response than any other combination (Takahashi & Tsukahara, 1976). Since many of the early devices used this combination as a preset, it is clear why photic got its early reputation for being unpredictable in its effect.

Frederick & Lubar (2002) were interested in exploring if AVS would be useful in assisting neurofeedback (NFB) training for ADHD. When combined with NFB, they found that stimulating 18.5Hz for seven minutes in the eyes closed condition was more effective than eyes open and was very specific in having its greatest effect at the specific frequency of photic stimulation. The authors suggested that perhaps stimulating at each frequency of interest might be a better approach than to expect the effect to generalize across adjacent frequencies. While training beta, theta increased somewhat but based on what we presently understand about the comodulatory relationship between theta, gamma and beta (Meehan, 2012), it is likely that this is a compensatory response. They concluded that the eyes open condition was too weak to be of use for enhancing NFB and might even conflict with the visual stimulus process of eyes open NFB. They did not, however, do longer sessions or repeat sessions over time; this still leaves the question open as to whether this would have made a difference (we have noted a possible interference pattern).

Frederick et al. (2005) also looked at AVS and coherence. The authors stimulated individuals at their dominant alpha and beta (in the twice dominant alpha harmonic) frequencies and measured their coherence changes. Their findings included significant changes in coherence, with interhemispheric coherence increased in the posterior cortex in higher frequencies and decreased in the frontal regions in lower frequencies. AVS apparently does not globally synchronize brainwaves as often advertised. Of most interest, they found dominant alpha training showed the greatest changes, especially in interhemispheric synchronization. The greatest changes were noted in the first 10 minutes of a 20-minute session, and with few effects persisting into the post stimulation baseline. The authors acknowledged that lack of persistence of photic effect after a session may be offset by repeated sessions over time. The effect over time in terms of behavior changes and changes in qEEG maps, however, has been documented by Cantor and Stevens (2009). It has been hypothesized by one pair of researchers that changes in plasticity might be achieved by this steady state stimulation of electrical activity through secretion and actions of neurotrophins which promote synaptogenesis (Schindler and Poo, 2000).

Published Photic Research on Disorders

Huang & Charyton (2008) reviewed the entire published literature seeking the highest quality research designs investigating the use of photic stimulation for remediation of medical and psychiatric disorders. In their review they primarily focused on controlled group designs and excluded investigations that utilized only a single training session, which, as would be expected, typically showed minimal effects. Their review included the following studies (see Table 1):

Patrick (1996) showed improvement on WISC-III arithmetic measures by training

with 12 sessions over 6 weeks using 12–14 Hz for 40–50min (n=31). The results also showed improved TOVA and WISC-R processing speed scores and improvements in the WIAT. Budzynski (1999) administered 30 sessions of electrodermal biofeedback training, combined with photic stimulation alternating 14 and 22 Hz for 15 minutes, over six weeks (n=16). He observed improved grade point average (GPA) scores in study participants in comparison to controls. Joyce & Siever (2000) conducted 31 sessions over seven weeks, training 16–18 HZ in the left hemisphere and 15 Hz in the

Table 1: Selected Photic Stimulation Studies utilizing controlled experimental designs

Study	N	Protocol	Duration	Outcome
Patrick (1996)	31	12–14 Hz for 40–50min	12 sessions over 6 weeks	Improved WISC-III arithmetic, TOVA, WISC-R processing speed, & WIAT
Budzynski (1999)	16	EDR + photic stim alternating 14 & 22 Hz for 15 min	6 weeks	Improved grade point average (GPA)
Joyce & Siever (2000)		16–18 HZ in the left hemisphere & 15 Hz in the right hemisphere for 20–25 minutes	31 sessions over seven weeks	Improved TOVA & academic performance
Olmstead (2005)	30	Alternating sessions of excitatory program (14 Hz increasing to 40 Hz) & inhibitory program (40 Hz decreasing to 14 Hz)	12 sessions of 35 minutes each over 6 weeks	Improved WISC-III arithmetic scores in learning disabled children
Noton (2000)	55	Photic stimulation 30 Hz, with left eye illuminated, right eye in dark, & then reverse using monochromatic red light 1–3 Hz, option to have eyes open or closed.	30 15-min sessions over 30 days	Decreased migraine frequency by 44% & aborted migraines 53%
Cantor & Stevens (2009)	8	14 Hz	4 weeks	Significant pre-post Beck Inventory changes after 4 weeks, which correlated with objective pre-post qEEG changes

right hemisphere for 20–25 minutes. They found improved attention and reduced impulsivity as measured by the TOVA as well as improved academic performance (n=20) in the active treatment vs. control group. Additionally, Olmstead (2005) trained for 12 sessions of 35 minutes each over 6 weeks, and found improved WISC-III arithmetic scores (n= 30). Noton (2000) trained for 30 sessions of 15 minutes each over 30 days, resulting in decreased migraine frequency by 44% and aborted migraines 53% of the time, if symptoms had already set in (n=55). One of the most convincing photic stimulation studies was conducted by Dave Cantor and Emily Stevens (2009). Utilizing a controlled crossover design with eight subjects in each group, they trained individuals with refractory depression with photic stimulation at 14 Hz and reported significant pre-post Beck Inventory changes after 4 weeks, which correlated with objective pre-post qEEG changes in brain regions associated with mood regulation. Since depression often involves slowed alpha EEG, this makes sense.

A few experiments on stress and anxiety which were not as well designed showed some effect using photic stimulation, but investigations using auditory entrainment that were well designed showed no effect over time (Huang & Charyton, 2008). A study by Carter & Russell, 1993 found AVE effective with learning disabled boys. Anderson (1989) found it effective with headaches. Siever (2000) reports several studies that were not published in peer review journals, suggesting effectiveness with a

variety of disorders. AVE was found effective with attention disorders (Budzynski & Tang, 1998). AVE was found to be more effective than psychostimulant meds such as Ritalin & Adderall (Micheletti, 1998). Fibromyalgia was responsive to AVE (Berg, et al., 1999) as well as seasonal affective disorder (Siever, 2004). Cognitive decline was reduced in a study by Budzynski (2002) and reduced falling in seniors was observed by Berg & Siever (2004). TMD was responsive to AVE (Manns, et al., 1981; Thomas & Siever, 1989) and symptoms of hypertension were diminished (Berg & Siever, 2001). Tom Budzynski trained (N=15) 14Hz for 15 minutes, monitoring for 20 minutes after training, and found peak alpha frequency increased slowly and normalized over that time period.

How we have applied it clinically

Training based purely on symptom presentation or using frequencies based purely on their supposed specific effect with respect to a particular symptom has not shown consistent results in our clinical experience. I believe this clinical approach to applying photic technology is based on a simplistic view of the brain and disorders in general. It is similar to early NFB categorical analyses of disorders and protocols. What has worked better for us clinically is basing frequency selection on single or multichannel qEEG analysis and then watching the response of the brain based on the same analysis method. Figure 1 shows the change in qEEG in a treatment responsive client after 6 min of photic stimulation alone at 10Hz. Power and coherence measures change considerably.

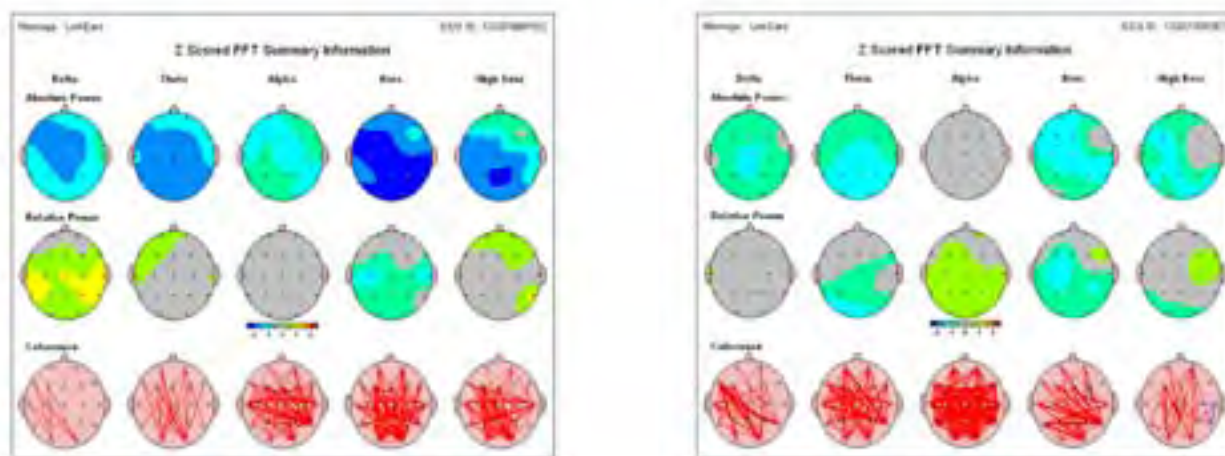


Figure 1: Pre/post treatment qEEG changes following 6 min of photic stimulation at 10Hz. Power and coherence measures change considerably.

Figure 2 illustrates changes in qEEG asymmetry of a depressed client using 10Hz. Note that the red in the left hemisphere in alpha shifts to the right hemisphere. I ran some clinical trials with the device for a year with about 20 clients in 1998 and made many interesting observations, which I reported in a workshop at the ISNR confer-



Figure 2: Changes in qEEG asymmetry of a depressed client following photic stimulation at 10Hz. Red signifies asymmetry dominant, and blue, asymmetry non-dominant hemisphere. Within the alpha frequency band, note the shift from left to right hemisphere dominant alpha asymmetry, predicting a corresponding shift from negative to positive mood valence.

ence that year. We trained clients mostly using photic stimulation as an adjunct to eyes closed alpha neurofeedback training and quickly discovered that the audio component of the training had minimal impact compared with the visual component, so we dispensed with the audio and replaced it with sound reinforcement from the NFB training. Some of our first observations were that people varied quite dramatically in their responses to the photic stimulation. We tried several patterns of training. One was 10 minutes of NFB, alternating with 10 minutes of photic stimulation and then 10 minutes of NFB. We then altered it so the second run of the trial combined photic

stimulation and NFB at the same time instead of photic alone. Figure 3 shows a typical pattern we encountered. The third run of each trial shows an improvement in ability to generate alpha within each trial that also increased across trials.

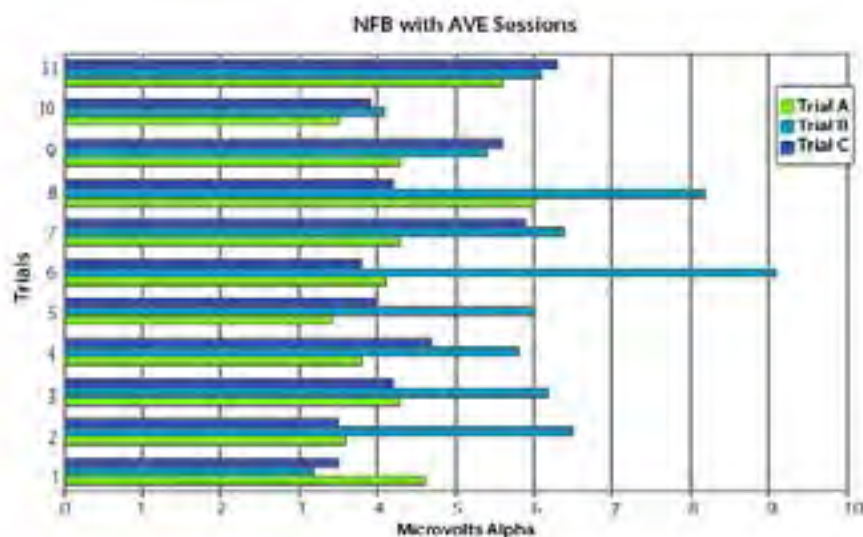


Figure 3: Alpha amplitude value changes over a series of eleven 30-minute sessions. Each session consisted of 10 min. alpha reward NFB (blue), 10 min photo stimulation at 10 Hz (red), followed by an additional 10 min. alpha reward NFB (yellow). Note improvement in client's ability to generate alpha during post-photo stimulation NFB run (yellow) as compared to initial NFB run (blue) within each session, as well as trend toward increased alpha amplitude across sessions.

Our research showed that photic stimulation frequently accelerated

NFB outcomes. It appeared to us that the higher clients scored on the Beck Inventory, the less their EEG responded to the photic stimulation. However, combining photic stimulation with the NFB improved their training response in comparison to either technology used alone. So I introduced the idea of photic stimulation as training wheels for NFB at the 1998 ISNR conference workshop.

One curious aspect we continually encountered using these methods was that following a dramatic initial increase in their alpha in response to photic stimulation, continued photic stimulation actually began to interfere with client NFB performance. Their alpha amplitude values had actually decreased when using photic past a certain point in the training and so we learned that we needed to phase photic stimulation out of later stages of training. Our conclusion was that the growing strength of their endogenous alpha rhythms may have generated phase cancellations with the exogenous driving effect of the photic stimulator device.

We also used photic stimulation for inhibiting theta with similar varied results. Rosenfeld's (1997) research suggested that training at a slight offset from the dominant frequency might inhibit that frequency. Our experiments indicated this was more often not the case. Up training with SMR seemed more effective at contributing to theta inhibition until we tried training the offset of the third harmonic of the theta dominant frequency (yes we did try the second). This actually worked effectively quite often.

Another method we experimented with was to train each hemisphere separately using different frequencies in each eye field while also training with neurofeedback. Dave Siever had the patent on this method and was the first to promote it, so we used his equipment for this as well. The idea was to try asymmetry training by training beta in the right eye field (left hemisphere) and alpha in the left eye field (right hemisphere). We found that it did help many people improve mood as measured by the Beck Inventory but it did not appear to have as dramatic and consistent effect on the measured asymmetry as did simple alpha training with 10Hz photic stimulation.

Since that time, we have switched to using photic driven alpha EEG with eyes closed in conjunction with HRV to reduce arousal related to anxiety. When clients generate the target frequency above threshold it triggers the photic stimulator to begin pulsing and then goes off when they drop below threshold. When the contingent photic driven method fails, and amazingly, it does sometimes despite all the technology, we resort to continuous photic stimulation. Why one works better than the other with different individuals remains for future research to reveal. It has been difficult finding equipment capable of performing photic driven EEG independently in both hemispheres as well as other innovative functions, but both of these features are now available with some equipment presently on the market.

Photic Driving

Len Ochs is reportedly the first one to use a form of neurofeedback-driven photic technology and marketed a device for this purpose. He called it the Flexyx EDS system and it was a version of EEG driven stimulation (EDS) that flashed light at a small offset of the dominant frequency. This device changed in response to changes in EEG dominant frequency (1–40Hz) due to photic entrainment. It would flash at a rate that either lead or lagged the dominant frequency. Variables that could be modified in a session were the magnitude of frequency offset (e.g., lead or lag from dominant frequency) in each of 4 periods per cycle, the length of time per period, the duty cycle of lights in each period, the percent synchrony/asynchrony of light flashes to right versus left eye, the number of cycles per session, the color of the strobing light, and the light intensity in each period; a lot of variables to explore. I spoke with a practitioner in Tucson back in the '90s when I began exploring this technology. He had purchased one of these devices and used it in his clinic. He reported it was a bit tricky to operate and he got mixed results, but often found it effective. Len Ochs appears to have abandoned this project in favor of LENS but there is still a website on it.

Roshi was another device used to combine NFB and photic stimulation. It was a black box affair. Chuck Davis was the key developer and marketed the product. He called it complex adaptive audio visual entrainment and the strategy was to inhibit or disentrain (but the device could also entrain) abnormal elevations of the EEG by following and generating phase differentials between peak frequencies in the various component bands and the photic entrainment frequency using his discrete setting. It apparently took into account the phase differences between the two hemispheres as well. Cory Hammond conducted clinical research with individuals with treatment-resistant depression and found significant changes in anxiety and depression scales on the MMPI after 15 sessions. He also published a case study in the *Journal of Neurotherapy* showing efficacy with depression (Hammond, 2000). Davis went on to develop the pRoshi which was the next generation of his concept but it did not include the EEG component.

Overall this is still a fascinating area with many potential developments and this article only samples a small percentage of it. Audio visual entrainment is highly underutilized clinically and yet shows considerable promise. What is needed, of course, is more experimentation, especially with respect to using it in conjunction with neurofeedback. Part of the problem with the latter has been the lack of proper equipment available to conduct clinical trials. Fortunately, that is no longer the case. Photic stimulation is a fairly benign technology to work with, like neurofeedback, and I would encourage practitioners to give it a try.

About the Author

Richard Soutar, PhD, BCN, has published three books on the topic of neurofeedback and conducted workshops on the various aspects of neurofeedback at conferences and clinics in the US and Europe. As a former professor of psychology and sociology, he has had extensive experience in teaching and training at both the undergraduate and the graduate level. He has also been working continuously over the years as a clinician, director and business administrator of various clinics around the country and presently for New Mind Clinic in Atlanta, GA. He developed the first internet training course for neurofeedback certified by the Biofeedback and Certification International Alliance (BCIA). He has served for many years as secretary of the Neurofeedback Division of the Association of Applied Psychophysiology and Biofeedback (AAPB) and is presently serving as president. He is director of research and development for New Mind Technologies where he is developing equipment, brain mapping databases, assessment instruments and software programs for neurofeedback clinicians.

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ISNR Research Foundation Update

Tato Sokhadze, PhD



There are several important and exciting changes happening at the ISNR Research Foundation (ISNR RF). David Trudeau, MD, establishing president of the Foundation, has decided to retire and step down from the position. The executive committee of the ISNR RF, at our May 2014 meeting, proposed that vice-president Tato Sokhadze, PhD, take over as president. Board members moved to approve the proposal accepting David's resignation in recognition of his wonderful service and contribution, and change his position to President Emeritus, ex-officio member of the board. At our recent Board meeting we opted to retain David as a Board Member with voting rights in appreciation of his leadership over the years of the ISNR Research Foundation.

Our Board has decided to go for another important reorganizational move. We decided to dissolve the executive director (ED) position, and instead hire a part-time administrative assistant to manage ISNR RF business operations. We welcome Rosemary Season, BA, to this position. Rosie is a graduate student at Dominican University of California in San Rafael, CA, located in the neighborhood of our headquarters, which facilitates her access to our office to take care of emails, website maintenance, and other administrative duties. This reformation required certain reallocation of former ED functions to other board members, such as delegating more book-keeping, publishing, and fundraising functions to other board members, as well as more active involvement of other members in book editing, book sales, communication with publishing house, and other on-going projects of the Foundation. We needed new contact persons for communication with the ISNR Board and ISNR ED, so board secretary Jon Frederick, PhD, has volunteered to serve as a liaison in preparation for our annual silent auction, fundraising dinner, and ISNR RF booth at this year's meeting in San Diego. Also, Jerry Gluck volunteered to serve as a liaison with the ISNR Board on professional matters. In addition, Cynthia Kerson, PhD, has joined the ISNR RF Board and will continue some of her executive service in a vice-president capacity to maintain integrity of ongoing projects where she is directly involved.

There may be substantial changes going on at our organization, how-

ever, our key words remain the same: “research”, “neurofeedback”, “qEEG”, “neurotherapy”, “neuromodulation”. We are committed to identify areas of interest for research in our field, recruit qualified researchers outside of our field, and team them up with qualified neurofeedback researchers to help solicit funds for research and clinical trials. An excellent example of this effort is the CNP project that was funded this year by the NIH. Roger Debeus, PhD, will be presenting outlines of this project at the ISNR meeting in San Diego.

Our main missions include supporting innovative research, as well as helping students working in the field of neurofeedback. Our mini-grant programs help award funds toward projects by reviewing project proposals and administering grant awards. Our mini-grant program is expanding. In 2012 we funded only two projects, in 2013 we funded four, while in 2014 we already have three mini-grants offered on the first cycle (generic ISNR mini-grant, the BSI-supported Jay Gunkelman mini-grant on qEEG, a Brain Train-supported mini-grant on combination of cognitive training with neurofeedback, and two more mini-grants offered at the second cycle (a joint ISNR-RF- Foundation for Education and Research in Biofeedback (FERB) grant that combines neurofeedback and biofeedback methodologies, and a Zukor-supported mini-grant on peak performance). In addition, we are administering the Joe Kamyia First-Person Science Award, supported by BrainMaster.

As we continue to apply for federal, society, and private grants, we actively seek more collaborations with other organizations and clinical researchers. Of course, all our efforts and activities are not possible without the contributions and donations of our supporters. The ISNR Research Foundation became an entity fiscally independent of ISNR in 2008, and is now entirely self-supporting. We are grateful for the financial help we received from our colleagues, vendors and professionals in our field. Please continue to help us advance research in neurofeedback and related areas by considering cash donations, a monthly recurrent pledge, by buying books that we publish, supporting our annual fundraising events, or naming the ISNR Research Foundation as a beneficiary in your will, life insurance, retirement plan or estate.

We appreciate constant support and advice from the ISNR Board and are fully committed to build a mutually beneficial relationship with our mother organization in a productive way, in agreement with our Memorandum of Understanding, the main document governing relationships between our

organizations. Our presence at the annual conference and our auctions are always kindly supported by the ISNR and our mini-grant winners are usually supported with travel grants to offset trip costs. We hope to expand our joint activities with ISNR and other organizations operating in the field of biofeedback such as the Association for Applied Psychophysiology & Biofeedback, (AAPB).

We are really pleased by this opportunity to provide updates about the ISNR Research Foundation in this issue of NeuroConnections, which is a joint effort between two organizations, the International Society for Neurofeedback and Research (ISNR) and AAPB's Neurofeedback Section. We will keep you all updated on a regular basis about our activities and recent student funding opportunities.

About the Authors

Estate (Tato) Sokhadze received a PhD in Human Physiology in 1988 (Novosibirsk, Russia). He completed a post-doctoral fellowship in Psychopharmacology at Wake Forest University in 2001–2003, and post-doctoral training in Cognitive Neuroscience at Rice University in 2004. Currently, Dr. Sokhadze is an associate professor of psychiatry and behavioral sciences at the University of Louisville, and is a director of the evoked potential lab. His research interests include application of dense-array EEG/ERP, brain mapping, neurofeedback, TMS, and other applied neuroscience techniques in psychiatric research. Specific psychopathology areas of interest are autism, ADHD, substance abuse, PTSD, depression, and comorbid mental conditions. He has more than 25 years of experience in biofeedback. He is one of the founding members of the ISNR Research Foundation. He served as a president-elect, a vice-president, and from 2014, he is the president of the ISNR RF and chair of the mini-grant program committee.

Rosemary Season has a BA in anthropology with a minor in religious studies, and graduated magna cum laude from the University of Nevada Reno in December 2013. She is now in the graduate humanities program at Dominican University of California in San Rafael, CA. A philosophical study of world religions will be the focus of her graduate studies with the goal of obtaining her MA then continuing on to pursue her PhD and teach at the college and/or university level. She serves as an administrative assistant at the ISNR Research Foundation since August, 2014.

BCIA Offers Mentoring Webinars

Judy Crawford, Executive Director, BCIA



Credentialed health care professionals carry BCIA certifications in 26 countries outside of the United States. There is a need to continue to learn and enhance your neurofeedback skills, which is very difficult for those living and working internationally, due to the cost and difficulty of travel or being limited to only those offerings by the few professionals who travel to your region. In 2012, BCIA took on the additional task of offering affordable, accessible continuing education using on-line learning to accomplish this goal. The first group of 90-minute webinars from the Clinical Update Series were designed to offer continuing education on topics that are blueprint-relevant, selected to cover a wide variety of interest and skill levels, and not tied to a specific piece of equipment or personal theory not yet supported by research.

The initial range of topics included SEMG for chronic pain, HRV, addiction, ethics, and several neurofeedback topics. These webinars attracted attendees from many foreign countries and this was often their first introduction to BCIA. Nobody could have predicted this type of outreach, but was there something additional to offer? What else was needed to ensure that a new clinician had access to the best training available? What could BCIA offer that could be that missing educational piece?

Many new clinicians wanted options for more accessible and affordable mentoring. Learning from real cases by real professionals is an excellent way to learn! Availability has been problematic and sometimes the cost was prohibitive. In many cases the available mentor did not have the expertise in the same client populations nor did they use the same equipment.

How could BCIA find a solution? Group mentoring can be a good way to save money by sharing the hourly rate of the mentor. However, the only way that an applicant can earn certification requirements in a distance-based group setting is through case conference presentations. No credit may be given for hearing other new clinicians discuss a few sessions of their recent work even though there is value in hearing those discussions. Often people paid for group mentoring and were later disappointed to realize it didn't count as they had hoped. They still had to demonstrate completion of their own 100 client sessions as well as personal training and case conference presentations.

In August, BCIA offered the first 60-minute mentoring webinar designed specifically to learn the application of clinical skills. Two more were offered in September

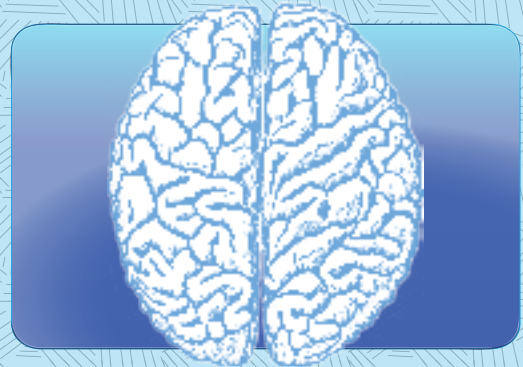
that were specific to neurofeedback and the evaluation comments reported that this was exactly what people wanted and needed. Attendees from outside of the US included: Canada, China, Cyprus, Egypt, Israel, Puerto Rico, and South Africa.

So how does it work? BCIA uses GoToWebinar which allows a registrant to view the PowerPoint™ presentations and hear the voice of the presenter as they move through the slides. There is always a period at the end for questions and answers.

For only \$40, BCIA applicants can earn one contact hour and hear two case conference presentations toward their mentoring requirements. Recertification candidates can earn one hour toward their CE requirement. Prospective attendees may register online and join live in real time or purchase the recording. To earn a certificate to document participation, attendees will be asked to complete a brief online evaluation followed by a quiz covering the high points of what the presenter identified as educational goals.

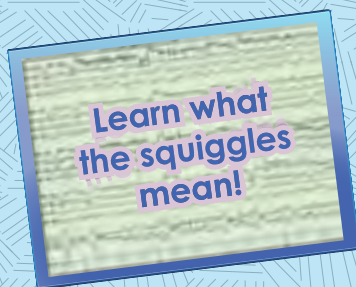
Will BCIA offer more from the Clinical Update Series? Yes. In fact, plans are to offer a webinar on Virtual Reality & Biofeedback later this fall and as well, more mentoring webinars are being finalized. Stay tuned for updates to the schedule. Setting standards in education and training fulfills the BCIA mission and will help the field be "More than qualified—BCIA Board certified!"

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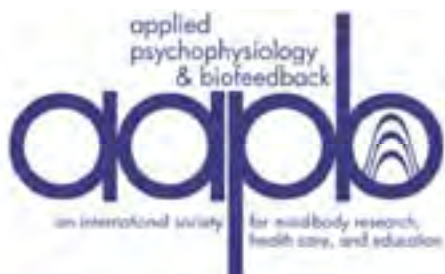
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