



# NEURO CONNECTIONS



January 2008 *Newsletter*

A joint newsletter from the  ISNR  
& the  AAPB Neurofeedback Division

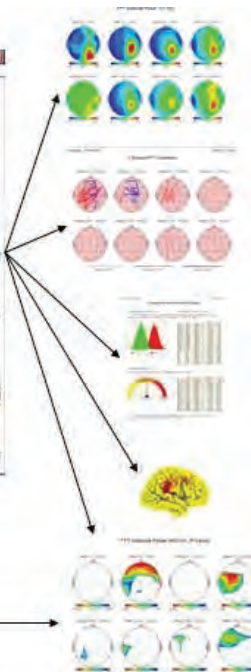
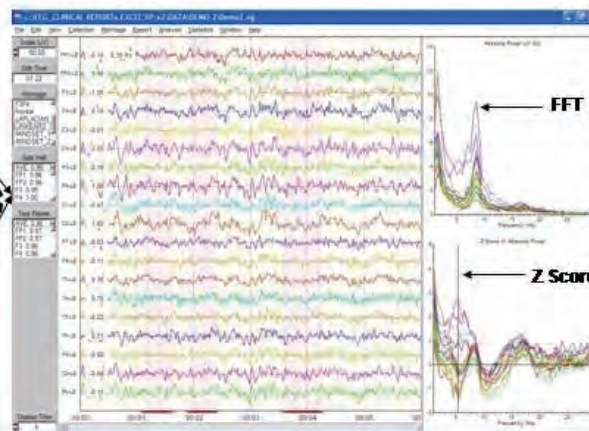




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## NeuroConnections

ISNR Co-editor: Merlyn Hurd, PhD  
[merlynh@aol.com](mailto:merlynh@aol.com)

AAPB Neurofeedback Division Co-editor: Roger H. Riss, PsyD  
[rriss@madonna.org](mailto:rriss@madonna.org)

Managing Editor: Cynthia Kerson, PhD  
[office@isnr.org](mailto:office@isnr.org)

Journalist for Best Practices and Tech Talk:  
Mike Gismondi, MA  
[mikegismondi@frontiernet.net](mailto:mikegismondi@frontiernet.net)

Journalist for MindFull: David Kaiser, PhD  
[davidkaiser@yahoo.com](mailto:davidkaiser@yahoo.com)

Student Editor: Kimberly Weeks, MS  
[breetheasy@earthlink.net](mailto:breetheasy@earthlink.net)

Publisher: International Society for Neurofeedback and Research  
Design: Rosalie Blazej  
[rblazej@pacbell.net](mailto:rblazej@pacbell.net)

### International Society for Neurofeedback and Research 2006-2007 Board

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[annmarie@isnr.org](mailto:annmarie@isnr.org)

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[lhirshberg@neurodevelopmentcenter.com](mailto:lhirshberg@neurodevelopmentcenter.com)

Joel Lubar, PhD  
[jlubar@utk.edu](mailto:jlubar@utk.edu)  
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[nancy@enhancementinstitute.com](mailto:nancy@enhancementinstitute.com)

Web Site Coordinator  
David Kaiser, PhD  
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Research Committee  
Representative  
Kirtley Thorton, PhD  
[ket@chp-neurotherapy.com](mailto:ket@chp-neurotherapy.com)

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ISNR, 1925 Francisco Blvd. E. #12  
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*NeuroConnections* is the official publication of the International Society for Neurofeedback and Research and the AAPB Neurofeedback Division. Opinions expressed herein are those of the respective authors and do not necessarily reflect the official view of ISNR or AAPB. ISNR and AAPB are not responsible for the products or programs of private companies advertised herein.



## LETTER FROM ISNR PRESIDENT



As we begin 2008 ISNR'S Board continues to face the issues of growth; not just the growth of ISNR, but the growth of the field of Neurofeedback as a whole. Under

the able leadership of Past President Judith Lubar we undertook to look inward, re-fashioning the foundations of Board effectiveness: communication and policies and procedures. This work continues—indeed it is ongoing—providing a strong platform from which to focus more on looking outward, that is, finding and securing our place as a valuable field of practice in the panoply of healthcare offerings and becoming much better understood and more familiar to the public, governmental bodies, the media and other fields of practice.

As we begin to tackle these formidable tasks I find myself, as this year's President, fortunate in at least three respects: first, even as the processes of updating ourselves as a Board continues I am fortunate to inherit an organization with a largely refurbished operating foundation and a fine, if lean, staff lead by Cindy Kerson as Executive Director and Ann Marie Horvat heading Membership and Conference Coordination. As you can imagine, the level of work required by a growing organization means they frequently have to "double in brass," as they say, and they do so without complaint. Second, we are fortunate that many of those who worked so hard on that foundation remain on the Board this year, joined by several incoming members who bring us substantial experience in the field and add their perceptions to our delibera-

*Continued on page 6*

## LETTER FROM AAPB NEUROFEEDBACK PRESIDENT



### QEEG AS AN AID TO PER- SONALIZED MEDICINE

Recent advances in molecular biology, genomics, and other biomedical disciplines have

put us in a position to predict, diagnose and treat numerous disorders, rather than using trial-and-error methods. The Brain Resource Company, under Evian Gordon's leadership, has been in the forefront of developing "brain-related personalized medicine." He points out that treatments often do not work in many patients, and some have serious side effects. The goal of personalized medicine is to tailor treatment based on each individual's biological and social profile. The combination of genetic markers with "bio-markers" such as QEEG is leading to better treatments with fewer side effects. He presented information on a cohort of 500 patients with ADHD in the Brain Resource International Database. Using these bio-markers enabled better diagnostic decisions and predicted treatment response to Ritalin, Strattera, and neurofeedback.

At the same meeting, Jay Gunkelman updated his work using "phenotypes," QEEG profiles which predict what type of medication is most likely to benefit that patient. His work focuses on power abnormalities as predictors of response to drugs or types of neurofeedback. If coherence is also measured, even more precise characterization of the person's unique brain dysfunction can be determined. Normalization of both power and coherence abnormalities results in a better outcome, in our experience, than training power or coherence

alone. We can now begin to measure the efficacy of various neurofeedback regimens.

In the only controlled study of the efficacy of QEEG in guiding neurofeedback training for ADHD, Gunkelman and Wright found that using the phenotype approach resulted in a roughly doubled impact on outcome as opposed to a standardized approach. Results are even more dramatic in dyslexia. No standard approach has been effective in remediating dyslexia. If QEEG-guided power and coherence neurofeedback training are used, most, if not all dyslexic subjects can be reading at grade level within a few weeks. In patients with intractable (drug-resistant) seizures, QEEG-guided power and coherence training results in cessation of seizures in most patients. Standardized neurofeedback protocols do not usually result in cessation of seizures, though the frequency of seizures is reduced in 82%. Sterman now recommends QEEG-guided neurofeedback for treatment of seizure disorders, because efficacy is superior to standard protocols. There is also evidence of improved treatment outcomes in autism, using QEEG-guided neurofeedback. Our experience with closed head injury indicates that each patient has a unique set of QEEG power and coherence abnormalities. When all the abnormalities are normalized, the patient experiences maximum improvement.

Based on the experience of these investigators, the use of QEEG as a marker for individualized neurofeedback training represents a significant advance in personalized medicine. If it can be combined with the use of other biomarkers such as genomics, much greater success should be realized.

Jonathan E. Walker, MD 

*Continued on page 5*

### ISNR MISSION STATEMENT

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

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

### AAPB NEUROFEEDBACK DIVISION

#### MISSION STATEMENT

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

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

## LETTER FROM ISNR CO-EDITOR



**WELCOME  
TO THE NEW  
YEAR OF  
2008!!**

This issue is being sent to all AAPB and ISNR members, so we welcome a large group of clinicians and researchers to the issue. Your input on our issues is welcomed and hope that you write us on issues you would like to see examined in future issues.

Reading the New York Times article regarding the predictions of 1908 for this year was quite amazing. Many items such as everyone would have their own telephones makes one look to the future and wonder what 2108 will have in operation. Will Neurofeedback still be an alternative treatment or will everyone have their own brain enhancement machine, say, a tiny one that runs on a watch-like computer with a few wireless sensors that can be popped on the scalp for a few seconds of stimulation or training depending on what is needed. Perhaps, if you are moved to make predictions for one hundred years from now, we could publish them in this newsletter and expect that the clinicians and researchers, who will be around 100 years from now, will dig them up, be amazed at our accuracy or amused at our fantasies. Back to the present and the vitality of our profession. This issue was aimed at Peak Performance information. The articles have a mix of such focus and case studies that instruct us

in new advances in the field.

Sime's article regarding working with athletic personnel with Neurofeedback and Interactive Metronome causes one to wonder why the national sports organizations do not have a "Mind Room" like the Italian Soccer players who won the World Cup. The article gives us a very instructive introduction to the Interactive Metronome and the usefulness of coupling it with Neurofeedback.

The Pros and Cons article regarding marketing Neurofeedback has many helpful ideas that one can implement readily. Mary Abbot has provided a masterful article that can help you whether you are just starting out or have been in the NF market for many years.

Barry Sterman and Mark Smith report on cases that are intriguing and instructive. Barry Sterman uses a case study to illustrate the usefulness of Brodmann analysis to locate the issues in a client. Mark Smith reports on the use of Z score training to reduce seizures and restore a little boy to his healthy robust life.

David Kaiser provides us with another mindful article that causes us to rethink our views. He never leaves us with a simple way of looking at our profession or life and we thank him greatly for that.

This is just a sample of the articles awaiting you in this issue.

Again, I wish to extend a warm greeting to all the ISNR and AAPB members receiving this issue. Hopefully, you will continue to be a part of our organization and receive the benefits of such membership.. Sincerely,

Merlyn Hurd PhD;BCIAC/EEG Fellow  
Merlynh@aol.com

### ISNR CO-EDITOR CONTINUED FROM PAGE 4

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## LETTER FROM AAPB CO-EDITOR



Please plan to join us in Daytona Beach! Mark your calendars for May 15-18, 2008 for AAPB's 39<sup>th</sup> annual meeting, "Expanding the Boundaries of Human Potential," at the Hilton Daytona

Beach Oceanfront Resort. The conference hotel is right on the beach, so pack a bathing suit, to enjoy the sand and surf between sessions! This promises to be a particularly exciting meeting for attendees who have an interest in qEEG and neurofeedback.

Among the highlights for this year's program will be a psychophysiological exploration of hands-on energetic healing. Norihiro Muramatsu, a 45-year-old Japanese healer and practitioner of subtle energy medicine, will conduct an actual demonstration of energetic healing, while conference attendees observe real-time qEEG and psychophysiological feedback from both healer and patients. Muramatsu has a special vision for affected parts of the body. More than 80% of pain patients treated by Norihiro Muramatsu report immediate pain cessation after his energetic healing. Muramatsu's technique is reported to have healed diverse illnesses including cancers, infertility, migraine headaches, back problems, rheumatism and other health problems.

While the final program was not posted at this writing, AAPB had announced two of the keynotes. W. Dalton Dietrich, PhD, Professor of Neurological Surgery, Neurology, and Cell Biology & Anatomy, School of Medicine, University of Miami, Florida, will speak on "Exploring the Boundaries of Neuroplasticity: Implications for Biofeedback and Neurofeedback". Daniel D. Langleben, MD, Assistant Professor of Psychiatry, University of Pennsylvania, Center for Studies of Addiction will bring us up to date regarding the "FMRI of Deception." Other highlights of particular interest to neurofeedback practitioners include "An Evening with Judith Lubar" hosted by the Education Division. The Neurofeedback Division hosts Drs. Elena Festa and William Heindel of Brown University, who will explore recent advances in our understanding of human memory and attention, through studies

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**AAPB Co-EDITOR**  
CONTINUED FROM PAGE 5

using quantitative EEG/ERP and functional brain imaging techniques within both normal and brain-damaged populations.

*NeuroConnections* is a complementary benefit to members of AAPB's Neurofeedback Division, made possible by the generous support of our advertisers. Once per year, we distribute *NeuroConnections* to a wider mailing list of AAPB members who are not current members of AAPB's Neurofeedback Division. If you wish to continue to enjoy future quarterly issues of *NeuroConnections*, you may quickly upgrade your AAPB membership to include the Neurofeedback Division with the enclosed application. See you in Daytona Beach!

Roger Riss, PhD  
AAPB Editor

**ISNR PRESIDENT**  
CONTINUED FROM PAGE 5

tions. Third, I was fortunate to find that the Society remains in sound financial condition, attesting to the able stewardship of past Boards.

This Board year started with a situation that clearly points up the need for us to get our information out there. The American Psychiatric Association (APA) and the American Academy of Child and Adolescent Psychiatrists (AACAP) published an ADHD Parents Medication Guide on the internet that said of Neurofeedback, among other complementary modalities, that "... rigorous scientific research has not found these alternatives effective managing the symptoms of ADHD..." This prompted a number of you to send us comments, which we have taken into consideration, and in response we have shared some of our investigations and thoughts with you on this subject. The Board has developed an appropriate response to the APA and AACAP concerning their statements and you can read this letter on page 9.

Meantime, we are looking at specific means by which to get the Neurofeedback story told and have formed a Public Relations Committee headed by Mike Cohen to coordinate these efforts. At the same time we are expanding our efforts in other areas, such as widening the Society's sources of

research funding and determining how best to direct it, interfacing more directly with governmental and insurance entities to encourage acceptance of Neurofeedback and developing a clear, concise and accurate definition of what is Neurofeedback.

The field of Neurofeedback has a sound history of clinical successes backed by the groundbreaking work of a handful of original researchers that a new cadre of skilled and qualified researchers is developing further. This is evident simply by reviewing the progressively more astute abstracts from ISNR Conference presentations. Until recently it has seemed enough for us to discuss our work largely among ourselves at conferences and on the internet, debating, questioning and offering comment. While we must continue this internal process of refining, enriching and advancing the body of knowledge in our field, it is no longer enough to dialogue largely among ourselves. Neurofeedback has grown to be a field of significance and must now give account of itself as a viable choice among treatment alternatives where it is shown to be effective. Failing to make our best research and clinical work better known and more widely accepted, and to do this well, likely will cost us the growth momentum that now appears to be ours.

The upcoming 2008 ISNR Conference, to be held at the Crowne Plaza River Walk in San Antonio this August is shaping up remarkably well in the hands of the Conference Committee chaired by Board member Leslie Sherlin. The apt and timely theme of the Conference is "Connecting Applied Neuroscience to the World" and promises several exciting new features not to be missed. So be sure to read Leslie's Conference letter on page 33 and begin making your arrangements now. The preliminary schedule can be found at <http://www.isnr.org/2008ConferenceSchedule.cfm>. Remember to check regularly as updates are added, and if you are interested in presenting you can find further information and guidelines at <http://www.isnr.org/2008submissions.cfm>.

As the year unfolds your Board and I will continue to work hard to fulfill the Society's mission and advance its goals. We appreciate your support and deeply desire that you find ever greater benefits from your ISNR membership.

Nancy E. White, Ph.D.  
President, ISNR

## LETTER FROM ISNR ED



I hope your 2007 holiday season left you with the break you deserved and that the time spent with family and friends was a warm reprise from the otherwise busy neurofeedback life you expend. ISNR

has made many advances this year. To keep you apprised, we recently included sending an email to our members that will update you as to the Board of Director's activities. Please use this as an opportunity to communicate with us your reactions, thoughts and, well, compliments should you have any to share. We hope this new feature will encourage you to stay in touch with us.

We're working to improve the Web site even further. These changes should be apparent to the public by the end of February. We'll keep you informed because one of the new features is a more advanced member profile section and we'll need your help by updating your profile further. We hope the updates will make the site even more navigable and friendly. With little marketing effort, we currently receive over 1,500 visits to the site per week. This could double, making the site a viable tool for communication.

This year has afforded us some very good and some not-so-very good publicity. The board has been involved in improving relations with agencies that are important to our public image and to the understanding and viability of neurofeedback to the public and specialists in outlying professional areas. We are working closely with AAPB and BCIA to form a "united front." It appears this effort will keep our attention in 2008 as well.

The Journal of Neurotherapy continues to provide us with exceptional articles related to neurofeedback. But, due to unforeseen changes with our publisher, we are ever more eager to get up to date. If you have a study or theoretical paper you would like published, please contact Tim Tinious or David Kaiser at [tinious@clearwire.net](mailto:tinious@clearwire.net) or [vidkaiser@yahoo.com](mailto:vidkaiser@yahoo.com). ISNR prides itself as providing friendly and open dialog between members and colleagues. The JN is the perfect vehicle for contributing to the history and open communication the association offers.

Wishing you a fruitful, productive and healthy 2008

Cynthia Kerson  
Executive Director, ISNR



## LETTER FROM AAPB EXECUTIVE DIRECTOR

**ADVOCACY: A  
KEY MISSION  
OF AAPB**

It is interesting to see the tide turning for AAPB in many ways. One truly exciting change in recent months is that AAPB finds itself in the forefront on a number of important issues on behalf of its members and the field in general. It has always been a goal of the Association to acquire insurance coverage for Biofeedback services. The past has only seen limited success in this area. However, the volume of inquiries, articles, and news items has increased significantly in the last year and our own involvement in responding to questions related to efficacy of biofeedback services has become a major focus.

The inquiries that we have received recently have come from a variety of sources.

While many such contacts have been indirect, they have come from various licensing boards including New York, California, and Maryland. We have also had direct communication with a number of insurance companies supporting the efficacy of biofeedback as a treatment for various disorders. In one case, we provided support to a challenge from a medical board claim against a member for performing medical services without appropriate licensure. We believe that these entities are beginning to take notice and that our responses are having a positive impact.

Just last week, I met with the Senior Legislative Representative for State Affairs in Health & Long-Term Care from the American Association of Retired People (AARP) to discuss ways that we might work together to achieve greater recognition for biofeedback and insurance coverage. As a result, we will be contacting a number of

states for guidance and assistance in achieving greater insurance coverage.

We have also been actively involved with public media responding to items that have appeared on the NBC's Today Show, a local Denver television news show, and the Seattle Times, to mention a few.

This is an exciting time for psychophysiology and biofeedback! And, your professional association, AAPB, is taking the lead in finding and making contacts that we believe will make a difference. Our challenge to you is to keep us informed as you encounter items that should be addressed. A heightened awareness of biofeedback has thrust AAPB into an advocacy role at a greater level than ever before. We welcome this opportunity and look forward to hearing from you with issues that we can address on your behalf.

*David L. Stumph, IOM, CAE*  
AAPB Executive Director



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of the Biofeedback Institute of Toronto, Canada  
Authors of *THE NEUROFEEDBACK BOOK*  
Invited Presenters & Teachers on 5 Continents

### Guest Faculty:

Professor Vietta Sue Wilson Ph.D.  
Kinesiology & Health Science, York University  
James Thompson, BHK, M.Sc. Ph.D., Applied NeuroSci. Inst., N.Y., USA



## Basic Concepts in Applied Psychophysiology

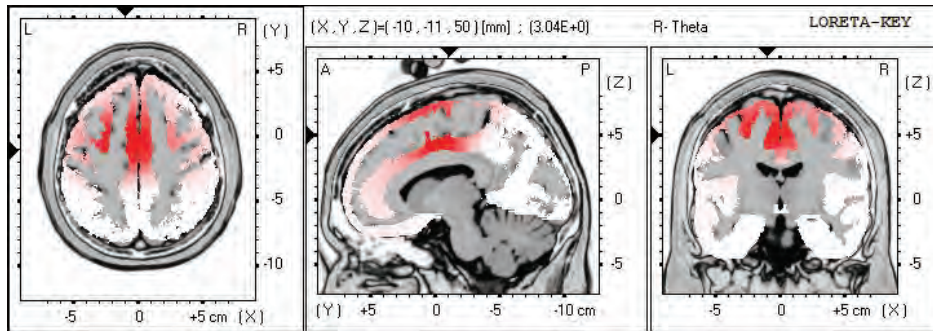
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## qEEG Reporting and Consultation

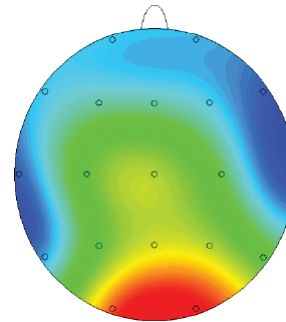
Q-MetrX provides analysis and reports for the full range of your needs from **Rapid Reporting** services to complete integrated reports with interpretation by our **expert panel of neurologists** and technical specialists.

## Database Comparison:

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Connectivity Analysis

We meet the highest standards for effective medical-legal representation of EEG/qEEG.

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### Neurofeedback Panel:

Barry Serman, Ph.D.  
D. Corydon Hammond, Ph.D.  
Jack Johnstone, Ph.D.  
Joy Lunt, RN  
Margaret MacDonald, M.D.  
Leslie Sherlin, QEEG-D  
Rob Coben, Ph.D.  
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LETTER TO THE AMERICAN PSYCHIATRIC ASSOCIATION AND AMERICAN ACADEMY OF CHILD AND ADOLESCENT PSYCHIATRY FROM THE ISNR BOARD OF DIRECTORS IN RESPONSE TO THEIR ONLINE "ADD PARENTS MEDICATION GUIDE" PUBLICATION

DEAR SIRs,

We are writing on behalf of the Board and membership of the International Society for Neurofeedback and Research (ISNR). Our professional organization represents mental health providers and researchers around the world and encourages responsible clinical practice and continuing research.

We have great respect for the American Psychiatric Association (APA) and the American Academy of Child and Adolescent Psychiatrists (AACAP). Many physicians and the public rely on psychiatry for guidance. Our clinical members routinely work cooperatively with psychiatrists to deliver the best help possible for patients with ADHD. Such help often combines medication and behavioral therapies, which includes operant conditioning of the EEG (Neurofeedback). Our members typically document treatment effects with standardized survey and objective tests. Guidance issued by the APA/AACAP certainly needs to be very accurate.

The APA and the AACAP recently published guidelines to the Internet on treatments for ADHD (The ADHD Parents Medication Guide <http://parentsmedguide.org>). Our organization's Board of Directors requests that a particular statement in the Parents Medication Guide be changed. We believe the statement is not warranted based on the research literature.

The statement of concern is as follows:

"Some of the more prevalent unproven treatments for ADHD are . . . BRAINWAVE BIOFEEDBACK. While it would be wonderful if these treatments worked, rigorous scientific research has not found these alternatives to be effective managing the symptoms of ADHD-and they are definitely not 'cures'." This statement is not supported by the current research. There is a substantial body of research showing positive clinical effects of EEG biofeedback (neurofeedback). A course - for 2008 called "EEG Neurofeedback in Psychiatry: Clinical Applications" has been approved and presented at the American Psychiatric annual meeting for the last 5 years. It includes a detailed review of the scientific literature regarding neurofeedback. The course is attracting increasing interest by psychiatrists, including researchers, particularly for patients who respond poorly to medications, refuse to take them, or who have medical contraindications for the medications used with ADHD.

We would be pleased to arrange a meeting between your Guidelines committee and some of our research-oriented psychologists and physicians intimately familiar with the literature. Such a meeting would help insure a thorough review, while speeding up the process of stating most accurately what methods are and are not supported by research. Alternatively, we can provide you with recent summaries of the research supporting neurofeedback as a complementary or in some cases alternative treatment modality in ADHD. We share your concerns regarding some of the unfounded claims that are made about ADHD treatments, much less "cures."

Sincerely,



Nancy White, PhD, President, ISNR on behalf of International Society for Neurofeedback and Research Board of Directors

## MANY ROADS TO ROME: BECOMING FULLY ENGAGED IN THE PERFORMANCE

Wes Sime and Sandy Silverman



*This is the first in a series of articles featuring sport performance as the target for brain training benefits. It is an excerpt from the book, titled "Bio & Neurofeedback for Sport," edited by Linden, Strack and Wilson, 2008. Each of 10 authors in the book have unique methods for enhancing sport performance, some using a traditional sport psychology and others primarily using the latest technological advances in biofeedback and applied psychophysiology.*

### CASE EXAMPLE IN PROFESSIONAL BASEBALL

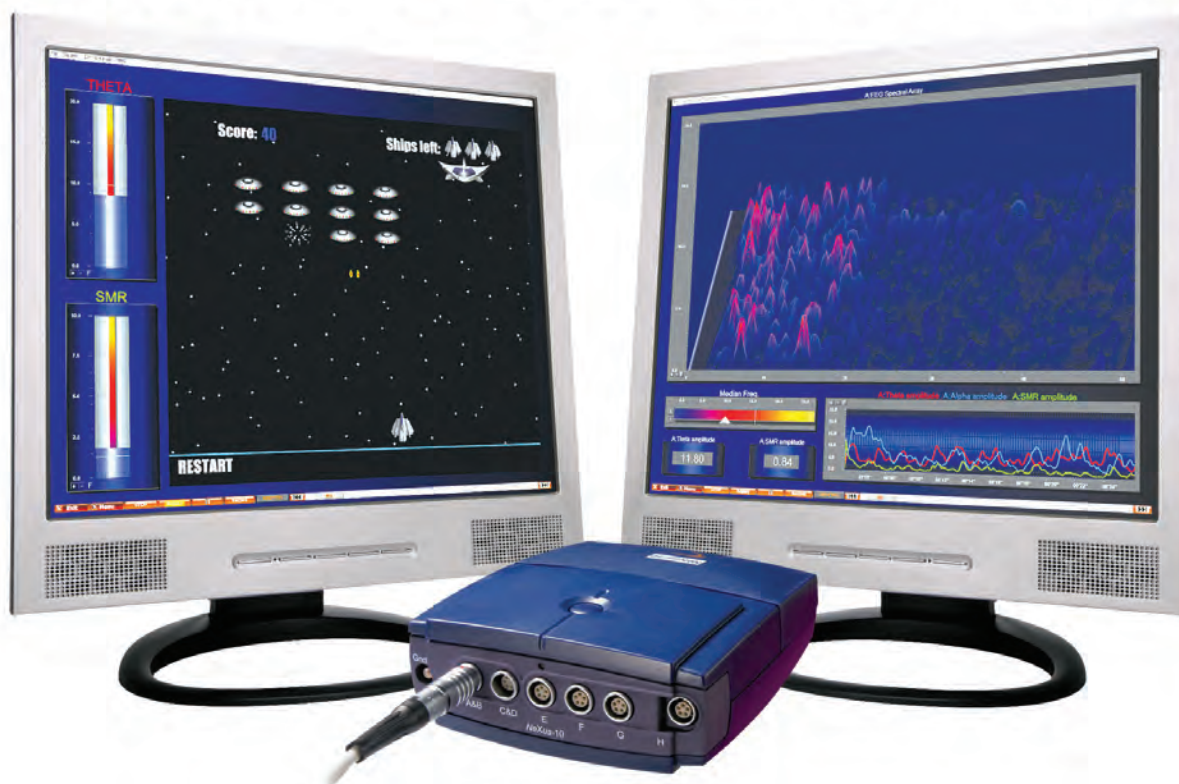
In all the excitement of his first season of Spring Training in the Big Leagues, this player's attention was lax (or narrowed) when two players each threw a ball to him at the same time. He caught the first one and the second one hit him in the face resulting in a fractured orbital socket. Not surprisingly, this young man had great difficulty in the batters box facing pitchers throwing the ball 90+ mph without flinching as if the pain was about to hit him once again. During the initial period of consultation he adapted well, overcoming the fear of playing by learning the rudiments of focus and concentration with traditional sport psychology methods. This is because neither the player nor the sport psychologist realized that he had a brain-wave pattern characteristic of attention deficient disorder (daydreaming, hi theta, etc.) in addition to the post-trauma anxiety. Later the player's wife suggested that he may have an underlying ADD issue, when she said, "I can answer a question he asks me about our plans for the day and ten minutes later, he can't remember that I ever told him."

After many ups and downs in performance, the player finally agreed to participate seriously in neurofeedback training on a regular basis wherein training was administered on a Neurocybernetics device over 20 sessions at C3 training 15-18hz up with a 2-7 inhibit and a 22-30 inhibit. His batting performance improved almost immediately following each 2-3 day intense period of training (during regular season) and then dissipated in the ensuing 6-8 weeks when reinforcement was not possible due to travel and cost. Enticed by the results of his performance shortly after each period of training, the player worked diligently during the next off season participating in another 10 sessions of training at C3 with the same inhibits. His performance during the following season improved once again proportional to the timely proximity of training. Still each year the player waffled in establishing continuity in the training regime which he cited as boring to do. It also costed him valuable leisure time in the hectic daily baseball schedule and the obvious financial cost of professional consultation. Somewhat characteristic of the erratic thinking among elite athletes, this player opted not

*Continued on page 11*



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## MANY ROADS TO ROME CONTINUED FROM PAGE 9

to participate in training for nearly one full season. After experiencing a very stressful period and less than optimal performance, the player called for assistance at the very end of the season and was intrigued with the idea of another adjunctive training procedure. Thus a change was in order. We offered the player an option of adding the Interactive Metronome to the regular NF training. He completed 10 Interactive Metronome sessions along with the neurofeedback training during the six weeks preceding the start of the next season. His hitting performance rose dramatically proportional to the additive effects of both brain training technologies.

It was clear that the neurofeedback training and the metronome processes work very well together in allowing the player to explore the essence of highly intense focus and concentration. We approached this project from both cognitive and physical exercises involving rhythm and timing, i.e., the I.M. It should be noted, however that skills in relaxation and stress management were also integral in this remarkable case study.

Over the course of the past four years we have been utilizing multiple technologies involving neurofeedback, and the Interactive Metronome (IM) together with life skills counseling in a sketchy pattern of intense consultation followed by long periods of only telephone contact. Throughout this extended time period, the player's performance (batting average = .140 to .350) fluctuated up and down in direct proportion to the relative immediacy of consultation, that is, he sought out training when his batting average and his confidence were low. Shortly after beginning the intense training each year (sometimes early, sometimes later in the season), his batting average increased linearly. The training effect lasted in direct correlation with whether he made time and resources available to continue the training every month or two. One might ask why he did not keep up the training on a regular basis. Part of the answer is that training intruded on his very limited leisure time and because he had to bear the entire cost of training, as it was not provided by the professional baseball organization. Furthermore, until the writing of this research report, the player did not fully recognize the strong correlation with the periods of training versus no training and his constantly fluctuating batting average. He has

been greatly enlightened by this process. We provide more specific details about the Interactive Metronome training in subsequent sections.

The highlights of this career included an appearance on the All Star Team in one season and a World Series performance wherein he stepped up with a record-setting batting average of over .500 during which time the consultant was with the player during the playoffs providing very intense (two per day) training. It should be noted that a record setting batting average (over .500) is nearly unheard of in professional baseball. In the last few years Major League Baseball has been tainted by the evidence showing that some players have resorted to using steroids and other performance enhancing drugs. The player in our case study has adamantly opposed and has never used any illegal substances opting for the mental techniques that we have provided instead.

## RHYTHM, TIMING IN SPORT AS RATIONALE FOR INTERACTIVE METRONOME (IM)

To execute performance efficiently at the highest levels of sport, athletes must have precise sensory integration and balance as well as an ideal level of emotional and physical intensity. If an athlete experiences cognitive or emotional interference and improper sensorimotor integration, then timing, tempo, rhythm and balance through motion can be disrupted, thus making it more difficult to produce efficient movement (Libkuman, Otani, & Steger, 2002). Even millisecond errors in the sensory integration and sequence of processing information from vestibular, visual, and proprioceptive subsystems results in imbalances that are evidenced by movement errors in practice or competition. This is where the athlete is either not attending to the task at hand, or is not certain of the best cues to pay attention to the environment. Breakdowns in the early stages of sensory integration, although not seen by observers, can lead to errors in the physical execution of a mental model.

The IM is a computerized electronic metronome that allows athletes to combine their senses of hearing, sight, touch/kinesesthetic and balance through motion as they react to standard visual and auditory cues. The computerized equipment tracks the athlete's deviation from the reference cues at the millisecond level. In essence the athlete hears a stimulus sound at about 1/second and is required to match the timing as

if one were in a marching band. The specific intention of making a definitive sport movement (e.g., jumping, throwing, etc.) is best organized and executed in sequential fashion and at a pre-conscious level (Singer, 2002). However, sometimes an athlete's muscular effort does not respond precisely according to this blueprint because of systemic disruptions caused by stress. This creates inefficient timing and synchronicity between the motor planning and execution stages, ultimately leading to reductions in task performance (Hatfield & Hillman, 2001). In order to make corrections in these cognitive deficiencies, the athlete must learn to use sensory processing as if on automatic pilot rather than to think too much about the outcome. In order to conceive this kind of automaticity in learning, we must acknowledge the concept of neuroplasticity, whereby the human brain can change and grow throughout life.

## HOW DOES THE IM WORK?

The participant performs the various hand and/or foot exercises (e.g., hand clapping or foot stepping) to a rhythmic beat (sound of a cow bell) for a high number of repetitions. In the simplest form of training the client claps their hands with a sensor attached to one hand. While the motion simulates clapping, the movements are kept very simple so that no learning has to take place. The motion is much like clanging cymbals in a circular motion at one/second intervals. The second task is clapping the right hand upon the right hip in a circular fashion. The difference (delta) between the participant's response and the reference tone is measured in milliseconds and is presented as an average score (variation from the reference) at the end of a defined period of performance. The variance between early and late hits is also presented as a percentage, that is, 75% early to 25% late. The number of hits in a row, as registered within +/- one standard deviation from the reference tone is another performance outcome measure. For example, at the end of a 1 minute set, the average deviation for perfect timing is given in hundredths of a second (milliseconds). The range of scores may be 10-20 (near perfect) all the way up to 100-150 (very far off).

In the foot tapping tasks, the client uses a flat sensory pad on the floor for a toe or heel tap. This allows an assessment of and training for precise sensory balance for smooth consistent rhythm in movement simulating the ideal performance in sport. The motion can be used to simulate

*Continued on page 12*

#### MANY ROADS TO ROME CONTINUED FROM PAGE 11

marching in military or band applications. The consultants who purchase and use the system are required to undergo training and certification in proper usage. In essence, we have found that it is nearly impossible to score well on these tasks without being fully engaged mentally and physically such that self-talk simply cannot co-exist during the session.

This system was designed initially for rehabilitation and is used primarily by speech therapists and occupational therapists. Thus, the client athlete must become convinced by the consultant that the underlying sensory integration is the same for routine non-sport exercises as it is for sport-specific exercises and that the core conditioning of the brain in this manner must be achieved in a systematic and comprehensive manner (upper and lower body, left and right sides).

#### I.M. TRAINING FOR ATHLETES TO BE MENTALLY ENGAGED AND PHYSICALLY POISED

In more advanced training or as an initial demonstration to sell the concept to an athlete, we make the rhythmic task appear more relevant. For example, a golfer or baseball player can make a “warm up” swing back and forth as part of the repetitive motion in rhythm with the reference tone. Then we ask the athlete to make contact of the hand sensor as in “clapping” at the approximate point of ball strike, i.e., in the middle of the warm-up swing. We explain to the athlete, that by keeping the beat, the brain is trained to plan, sequence, process, execute and learn from the feedback more effectively. Research has shown that the brain learns through repetition of precise activities when accurate feedback is present. In turn, measurable gains in sensory integration (timing, tempo, rhythm, balance in motion and concentration) produces well defined outcome in physical and mental capacity.

Typically the IM training commitment requires a minimum of 12 – 15 one-hour sessions, conducted over a 3 – 5 week period. The optimum training frequency is 3 to 5 times per week. Training less than 2 times a week may not produce desired results.

#### GET INTO THE ZONE AND STAY THERE

Traditional sport psychologists are just beginning to utilize biofeedback and neurofeedback (Hanin, 2000; Janelle, 2002). The

effects of emotional stress and tension that contribute to the breakdown in performance is appropriately labeled as “choking” (Elchami, 2003). The critical role of stress and coping in sport performance was first introduced by this research team 25 years ago when addressing the issues of Competitive Stress Management in Sport (Zaichowsky & Sime, 1982). Since then, we and many others have continued to validate the physiological effects of psychological stress in a variety of sports (Hatfield & Landers, 1983; Janelle 1999; Sime, 1985; Vickers, 1996). Recent research efforts have benefited from technological advances with a variety of different biofeedback and neurofeedback equipment that enables the precise quantification of physiological indices for correlation with performance outcomes. For example, cold and/or sweaty hands are serious manifestations of stress that adversely affect grip onto the apparatus (golf, gymnastics and the steering wheel in auto racing,) or ball handling (basketball, football, and baseball). Handgrip and dexterity are compromised due to the sweat and the reduced blood flow to extremities associated with increased sympathetic arousal. The application of this technology to other traditional performance enhancement protocols within sport psychology practice is becoming more widely accepted in spite of the resistance found among many sport consultants (Davis & Sime, 2007).

In the recent past, most biofeedback apparatus were cumbersome for the athlete to wear with the array of sensors and wires that are extremely obtrusive to athletic movement (Carlstedt, 2001). And, it is not possible in laboratory settings to capture the same psychophysiological data that would occur within the actual sport environment. However, recent advances in technology which includes wireless remote monitoring with unobtrusive sensing devices may correct this problem in the near future. In essence, coaches and athletes want objective measures related to stress and athletic performance. Thus it is increasingly compelling to present the psychophysiological data in a convincing manner in correlation with relevant outcome measures, i.e., speed, accuracy, endurance and reduced errors.

In addition, any amount of residual muscle tension slows reaction time and the kinetic chain (the process whereby energy travels from spinal cord to feet or hands) that facilitates the fluid, yet whip-like powerful (ballistic) actions observed in the execution of many sport motor movements carried to maximum (e.g., swinging a golf

club, throwing a baseball, or kicking for distance). Since excessive muscle tension is associated with slower reaction time, we believe that functional relaxation training is a relatively simple method of improving a critical aspect of performance in many sports (Fontani, Maffei, Cameli, & Polidori, 1999). Thus functional relaxation is an essential component of our performance enhancement package.

#### CASE STUDY OF NEUROFEEDBACK IN GOLF

At the Leadbetter Golf Academy in Orlando Florida, a former PGA player participated in repeated trials of neurofeedback while he was making practice shots in sets of three. After each set, he reported which was best, which was worst and then was shown the EEG revealing level of composure (0-40Hz inhibit all) along with high alertness (beta). The quality of the player's cognitive focus was confirmed by both performance outcome and brainwave illustrations. The goal of the process was to help the golfer identify trials in which his focus slipped and to then “gear up” his alertness just prior to hitting the next shot. In essence this strategy served to provide the golfer with an aid in identifying mental slips thus preventing mistakes and rewarding high quality shots. Just knowing that he was going to be accountable for his focus or lack thereof in the aftermath with the biofeedback reports proved to be very helpful in the consultation (Sime, Allen, Fazzano, 2001).

In our experience in the early stages of working with golfers, the initial contact occurs on the golf course and it is not until much later that he/she will agree to come in to the clinic or laboratory to participate in highly technological applied psychophysiology training. Therefore it is fortunate that we have some rudimentary strategies which are effective at the outset to demonstrate the potential benefits of any form of mind/body training. In our experience it is helpful to start with training exercises that produce outcomes closely aligned with QEP, but involve with much less costly technology. One of these is balancing a golf ball on the surface of a driver (golf club) while hold the club by the middle of the shaft. It requires near-perfect eye concentration together with eye/hand coordination to keep the ball from rolling off the surface. The exercise serves to sharpen focus during the “down time” moments in the midst of competitive golf events.

Getting back to more technological ap-

*Continued on page 15*



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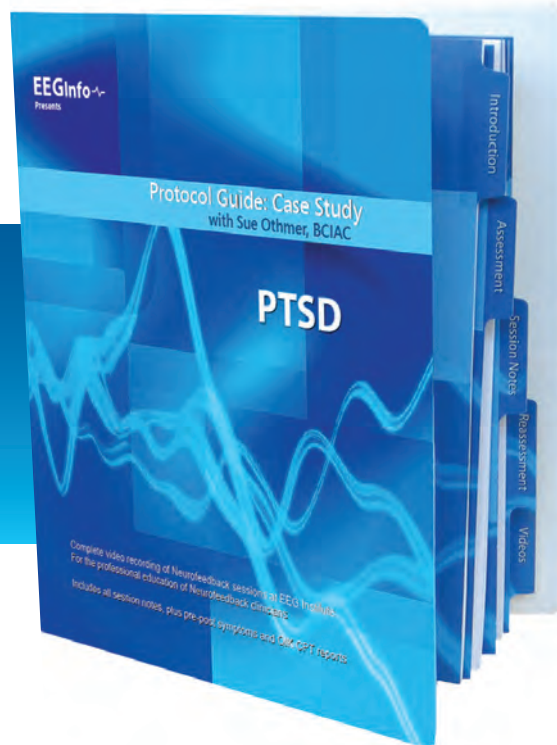
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SF/Oakland, CA	December 15-19



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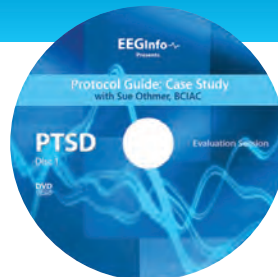
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*After completing the training, Kevin writes, "My father told me years ago he was certain that someone would help me. You are the ones."*

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## MANY ROADS TO ROME CONTINUED FROM PAGE 12

proaches, our colleagues have reported that EEG SMR may be the logical way to train athletes to sport performance (Wilson, Thompson, Thompson & Peper, unpublished). We have discovered over many years of consultation that reduced eye blink frequency serves to aid in the process of quieting cortical activity and accomplishes the same performance outcome as SMR training. Furthermore we have noted that unfiltered measures of EEG (which include the eye blink artifact) can, in fact, be a very useful tool even if measured with rudimentary, less sophisticated EEG measures (Sime, Allen & Fazzano, 2001).

## OUR APPROACH TO NEUROFEEDBACK WITH IMAGERY FOR ATTENTIONAL CONTROL IN SPORT

In the recent past, our approach to optimizing performance began with the analysis and shaping of attentional focus on a moment-to-moment basis using neurofeedback. The procedure featured the capability to separate concentration and alertness by providing distinctly different audio tones. The concentration measure (0-40Hz Inhibit All) was presented as low calming tone that reinforced quiet composure. Simultaneously however, a louder, more shrill and scintillating feedback prompt was introduced upon the appearance of high beta that we discovered would appear during a demanding, high performance, challenging task (Sime, Allen, Fazzano, 2001). This application allowed us to reinforce the capacity to remain as calm as possible yet to be able to rise to the occasion as the more demanding tasks appeared. In essence we were reinforcing a simple relaxing, vigilant process with the capacity to respond intensively as needed.

Some of the outcomes of this training include: improving mental stamina in maintaining high levels of concentration, achieving momentary peaks in alertness and arousal as needed during critical moments, followed by periodic moments to "space off" so as to recharge the brain before taking on the next challenging activity (Sime, Allen, & Fazzano, 2001). This sequence of alternating between high versus low levels of concentration and alertness is the hallmark of elite performance. We strongly encourage consultants to build training models that allow the athlete to focus intensely when necessary but to take momentary breaks by "spacing off" briefly when the

opportunity permits. This is for the purpose of recovery and renewal of complex cognitive processes (Davis & Sime, 2006). In our baseball case study at the beginning of this article, this on/off focusing strategy was reinforced initially using neurofeedback (Neurocybernetics) at C3 rewarding 15-18 Hz with inhibits on 2-7 Hz and 22-30 Hz. The player recognized the benefits of the training toward focus and concentration as long as it was linked with either visual imagery of past performances or with Interactive Metronome, already described.

## IMPROVING CONCENTRATION AND FOCUS IN GOLF WITH NEUROFEEDBACK

Golfers work and work to accomplish a functional task, specifically completing an ideal move through the golf ball, yet it takes only one or more distracting thoughts to hijack the brain causing a small but often critical mis-hit. Even worse is the tendency for the mind to shift gears in mid swing. In a quote from one of our clients, "When you don't know when and why your mind is mentally taking your 'eye off the swing,' you never have the opportunity to correct the situation."

To support performance out on the course and on the range, consider these skills that golfers can develop and refine through neurofeedback which include: 1) increasing alertness; 2) extending the length of time golfers can remain focused on a single task; and 3) increasing the intensity level of the golfer's concentration.

The duration of attention needed to complete a golf swing while In the Zone is not long (1-2 seconds). But if golfers don't guard against it, they can lapse into doubt about club selection, the effect of the wind on the shot at hand, the looming water hazard guarding the green, or on their ability to pull off the shot in the last second or two before completing the swing. Doubt is the death of any golf swing.

*One highly acclaimed legend of golf, Tommy Bolt, had an ideal description for his vulnerability during the critical milliseconds during his swing. The consultant was trying to explain to Tommy how EEG biofeedback could identify the "fragile" nature of attention with an example of a "mirror on the mind" figuratively.*

*While explaining how the mind can be hijacked from its original intent, into a distracting thought or emotion, resulting in a deviant swing change out of desperation or panic, Tommy interrupted the con-*

*versation. He extended his hand and said, "Sonny, I know exactly what you are talking about." Tommy continued, "I'll bet that in my career as a professional golfer, I have changed my mind in mid-swing at least 10,000 times."*

To counter the vulnerability to mind hijacking, we use a tracking exercise wherein the computer's mouse is the controller battling against the randomly generated shifting movement of a golf ball on the screen. This video exercise requires exceptional eye-hand coordination for successfully controlling the shifting of the golf ball. Instantaneously, feedback (neurofeedback as well as score in performance) tells the client how well they are able to remain focused on the task at hand, and how long they maintain an efficient level of attention. This tracking technology is available as a part of our software produced by Thought Technology.

## CLINICAL OFFICE METHODS USING NEUROFEEDBACK AND INTERACTIVE METRONOME

Our focus in working with athletes in the clinical office is to get to know them as individuals, and to guide/counsel them to reach realistic and attainable goals. The initial consultation typically includes the following:

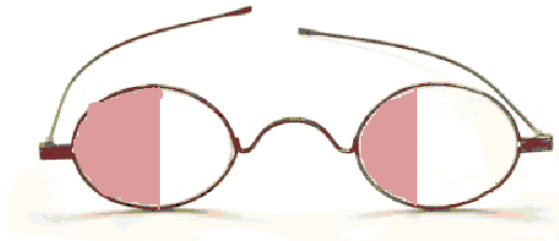
1. We ask about health issues: unusual illnesses, seizures, concussions, surgeries or emotional issues that may impact performance. We then want to know their level of proficiency in their sport and their long term goals. We ask what has helped in the past and what has not worked for them. In one extreme case, an All-American golfer reported that his anxiety and depression was so high that he could only play well if he drank a six-pack before the round. In training he showed improvements in just three visits regarding his focus, but was still overwhelmed and did not follow through. Lesson learned is that there are some clients in some circumstances that simply cannot be helped through their problems.
2. We listen to their words and body language and look at the frustration level and emotional cues that they transmit while talking about what they want to change. We search for unrealistic demands they put on themselves. If they "have to succeed" or "must make it" we may observe other physical signs

*Continued on page 18*

## MINDFULL

## Living up to our Name

David Kaiser, PhD



No species on the planet owes its existence more to climate change than us. Three million years ago Africa went dry and we are the result.

The creative continent released two or three editions of humankind every 500,000 years or so, but most failed when the climate changed. Only a lucky few of us stuck it out. Those who fought off cold, heat, arid conditions, rise and fall of critical vegetation, adapted genetically and culturally and survived—until the next crisis. For good or bad the few has become one. We are Last Standing, the sole bearer of the title of humankind out of two dozen attempts.

Here are the hominid species we've uncovered so far:

1. Sahelanthropus tchadensis
2. Kenyanthropus platyops
3. Ardipithecus ramidus
4. Australopithecus afarensis
5. Australopithecus africanus
6. Australopithecus bahrelghazali
7. Australopithecus aethiopicus
8. Paranthropus boisei
9. Paranthropus robustus
10. Australopithecus anamensis
11. Australopithecus garhi
12. Homo rudolfensis
13. Homo habilis
14. Homo ergaster
15. Homo erectus
16. Homo antecessor
17. Homo heidelbergensis
18. Homo neanderthalensis
19. Homo sapiens
20. (subspecies) Homo sapiens sapiens

We were not the only species affected by climate cycles but we were the only group to win an eternal advantage from periodic chaos. Stormy weather acted like a rogue wave righting a capsized ship. We were restored to Predator. We returned to our mammalian roots, Insect Eater, a method of inspection, response, and pursuit that successfully routed large reptiles and after 100 million years of cohabitation with di-

nosaurus, dinosaurs. Bipedal primates went from being eaten to eaters in moments, geologically speaking, prey to predator. We no longer chewed for a living, afraid for our lives from the Killers; we now ate. When East Africa went dry 2.7 million years ago, we parted ways with earthier cousins (Paranthropus), who chewed for a living and continued to fear Killers, and we tried our hand at hunting. We began small, foraging for an occasional ripe tidbit or an unlucky rodent who crossed our path. But as time moved forward, so did we. As fellow hunters, we now had a chance against the Killers. It took a while, longer than anyone could imagine, but we eventually uprooted the Great Cats from their throne, thanks to Mother Nature and a growing brain. (The aftermath of this great victory, tooling ourselves into Greater Killers, remains with us to this day.)

But Mother Nature was not done with us yet. Our lack of jaw power forced us to use whatever was at hand to meek out a living. Fast-forward a million years and our lack of mandible muscular saved us when Mother Nature threw another curveball at Planet Earth, killing off the vegetation our bamboo-chomping brethren relied upon. Gorillas would eventually repopulate the chewing-for-a-living slot left by our extinct cousins, but we hardly noticed, obsessed as we were with our hands. We motored on, fending off a series of curveballs. The Ice Ages descended and we now faced competitors of our ilk, hominids, in habitats we needed for our continuance, in Asia and Europe. We adapted. We loved our hands, but we added Thought to our arsenal. We responded with response inhibition, thanks to a growing focus on our brain's control of our beloved hands. Response inhibition -- holding off the movements of the hands -- led to volition, the most powerful idea ever created. (Neurotherapy may be used to adjust volition to sustainable levels by training EEG rhythms associated with inhibition.)

Out of volition emerged love, a new way to relate to others, a selection process made by the individual and not the group. Love's first dividend was diversity, enabling us to unite with those like us and unlike us.

We loved, and this meant we grouped more freely, however we chose, while Neanderthals and other hominids grouped only one way, the primate way, tightly. We group tightly (families) and loosely (friends). Our sense of self enlarged. We now had to manage dozens of faces, many times the social capacity of our competitors. And with such numbers grew variety of action and response, creativity and foresight. All of our competitors used tools, but we built more of them, more types, more varieties, more uses. We built hammers and saws and eventually iPods... and all the while we have been living on borrowed time.

We live between ice ages. We are 12,000 years into a warm spell (Holocene era) but everything will rotate back to ice and snow in a few thousand years if we don't intervene. Earth is phase locked on three axes, rotational precession (our wobble), tilt variation (drifting between 23 and 24 degrees), and elliptical eccentricity of our orbit around the Sun. We should expect Ice Ages for some time into the future, unless we change it. And it looks like we have.

We intervened, perhaps prematurely, before we can adapt to a global transformation. Until now, Sun and Earth were to blame for weather, magnetic fields on one side, mechanics on the other. Add carbon and we are faced with a crisis of our doing. Or undoing. Regardless of the source of our current heat wave -- solar system dynamics or red meat production -- we face a crisis, and our species will survive only if we respond maturely. We are faced with the greatest threat to agriculture since its inception, and the eventual return of hundreds of cities to the sea. In our own lifetime we may take a gondola down the canals of New York City.

We need to look past responsibility and consider our response. We are in free fall. Who pushed us off the cliff is significant but probably irrelevant to our strategy. We may be able to slow free fall, but we may not be able to stop it. We need to learn to fly and quickly. We must extend our volition across the planet in wise, appropriate measures. We must learn how to moder-

*Continued on page 30*



# *Jonathan E. Walker, M.D.*



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### MANY ROADS TO ROME CONTINUED FROM PAGE 15

of undue tension. We want to gradually teach the athlete to learn how to be "in the zone" by becoming emotionally, mentally and physically in sync.

3. We do the initial assessments of timing and rhythm on the IM to establish baseline criteria of performance and to demonstrate that they do more poorly when they are "in their heads" with thought and performance fears rather than performing on automaticity. We also do an assessment of the difference in positive thoughts and emotions during neurofeedback and get the person to be able to shift out of a negative brain wave state and recognize this transition. Golf clients are instructed to practice taking their club back in a simulated swing and then review the activity on the screen immediate thereafter to observe the degree to which they had a "quiet mind" as measured by a 0-40 HZ squash protocol.
4. In some cases, it is deemed appropriat-

ed to discuss brain mapping (Quantitative EEG) particularly if there is reason to believe emotional issues are related to the performance problems. This is particularly true if symptoms of ADD, anxiety and/or depression are present. If there are excessive or deficient levels of activity in one or more areas separate or together with asymmetries or coherence problems we can often relate these to specific outcome in poor performance. For those clients having some emotional issues we routinely incorporate neurofeedback based on the brain map.

5. We prefer to do 20 visits incorporating both modalities, using neurofeedback and IM with everybody such that a typical session includes a half hour of IM and another half-hour for neurofeedback. In the orientation with new clients we suggest that the training can significantly help them quiet their minds, improve performance, improve mental and physical timing, reduce distractibility and help them with decision-making under stress, but only if they are willing

to participate regularly and actively in the program described. The methods described above have been used in varying periods of intervention based upon client availability, but mostly for periods of 3-8 weeks.

### MULTIPLE CASE STUDIES IN THE CLINICAL SETTING:

Worked eight sessions with a teaching tennis pro who was 40th in the world in the 1980's and a prior NCAA doubles champion. He was concerned about life skills and *anger management*. On Neurocybernetics he did frontal down training of Alpha (8-10Hz) based on the brain map. The results of training were that he felt more focused and his days at the prestigious tennis club he taught at were smoother with greatly reduced stress in his public relations.

Worked with a top collegiate baseball pitcher highly touted to be a first round draft choice. Initially referred for *ADD and drinking problems* that put his current situation and potential career at risk, he was very receptive to neurofeedback training at



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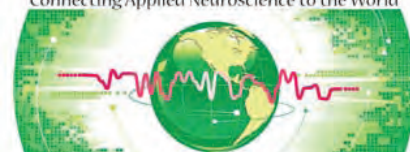
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C3 raising 15-28Hz and lowering excessive alpha, 8-10Hz. He completed 20 sessions of NF together with IM training that resulted in a very successful first year on his college team that almost won the NCAA championship. He reported that the training also helped him a great deal academically.

Worked with a tennis pro who had great potential having previously beaten a former US OPEN winner on the Tour. Emotional factors including a *bad temper* and boredom on the court due to ADD has prevented him from advancing. He did six sessions of IM training and Neurocybernetics frontal training lowering theta and increasing 12-15 HZ. On the IM, we had him do both hands together and right and left hands separately on the IM usually 300 reps. He did not have the frustration tolerance to do longer reps. Ultimately he was unable or unwilling to dedicate the time commitment to continue in spite of his marginally improved focus. We attribute this relatively unsuccessful outcome to the fact the client was never able to grasp the link between the neurofeedback and his performance by way of mental conditioning. This illustrates the continuing difficult challenge of estab-

lishing motivation for training among ADD clients.

Worked with a 14 year-old elite swimmer who became emotionally distraught in competition. She had relocated from another state and was anxious about her competitive status. She was repeatedly vomiting before meets and experienced *mild panic attacks* associated with her social fears. Prior to consultation, she was ready to quit swimming and had considered home schooling because of the *social fears*. We began with frontal down training on Smart Brain Games by reducing theta and increasing 12-15HZ. Within 3 sessions her stress and anxiety was greatly reduced and she did not experience any nausea. She reported an internal calmness while performing that she had never experienced before. Her times improved and she was a very happy camper.

In an ongoing consultation, we are working with a high school golfer whose brain map showed excessive Beta activity particularly centrally and in the posterior sites. In addition, he showed diminished alpha which helped us understand his *erratic performance history*. He trained on Smart

Brain Games and Neurocybernetics to raise alpha (posterior) and to lower high beta. As a result of the initial training this client is now more cognizant of suppressed feelings of an *obsession to succeed* on somewhat of a joyless, self-defeating mission. He had been competing for the attention of his emotionally distant father and against the vague, immeasurable golfing success of an older brother. Subsequently he has been doing IM training as well as having completed six sessions using reps up to 500 and showing very low millisecond scores of 18. He is becoming more reflective and concentrating better. He's now playing much more consistently.

Worked with eight other Gateway Tour golfers using IM and the same neurofeedback programs described above with all clients generally showing improvement with mental attitude and *reduced anxiety* in regard to their reactions to a bad shot or general poor play. Typically they did 200 to 500 reps of hands only. We did consult first to identify what they were anxious about and what set them off when they did not play well. During the neurofeedback, they

*Continued on page 20*

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# MANY ROADS TO ROME CONTINUED FROM PAGE 19

were encouraged to talk about their good and poor performances and to simultaneously examine their EEG. As they visualized poor playing or a shot they missed, we analyzed the Neurocybernetics feedback to identify increasing amplitude on slow activity when negative thoughts came to mind. We worked on controlling the brainwaves through diaphragmatic breathing, and talking through the counter-conditioning of positive thinking and emotions to negative ones.

Worked with a former Cy Young Award Pitcher and Major League Coach who was aware that his own career had been shortened by his inability to focus consistently during intense periods of pitching. He did frontal down training of Theta while simultaneously increasing Beta. Later he was trained on the IM as well. He trained for his own growth as he conveyed a sense of desperation related to his own ADD and focus problems which continued to affect his coaching performance and social life. He was pleased with the results and is interested in helping his team but progress is slow because of the "old guard" resistance so common in professional baseball. We have found a great deal of organizational pushback among all professional sports in regard to any kind of new technology which is difficult to relate to "on the field" performance.

We have documented that it is possible to integrate biofeedback and neurofeedback together with a relatively new technology (Interactive Metronome) to advance traditional performance enhancement in several applied psychophysiology settings. We are encouraging practitioners who have an understanding of sport together with BF / NF skills to expand their horizons to provide services in variety of athletic settings (Carlstedt, 2004; Davis & Sime, 2005). It seems clear that emotional stress and residual tension (non-functional tightness) is associated with choking in sport and that some forms of relaxation, focused attention and various rhythm and timing components are equally well associated with getting into the zone and performing well with automaticity or being on auto-pilot with cruise control of the body. We advocate developing more specific unobtrusive sensing apparatus together with small pre-amplifiers and hopefully with wireless remote viewing capabilities. Lastly we advocate a process of training NF for a calm yet intense

brainwave that reinforces optimal imagery of the performance together with an on/off quality that is under the athlete's control. Our best example of this quality occurring in the free standing population of elite athletes is a video-taped TV commercial wherein Tiger Woods bounces a golf ball off a wedge (golf club) repeatedly amidst several body position changes that interrupt visual contact (would distract anyone else into losing continuity), and then he finishes by hitting the ball out of the air, a feat that requires extreme eye hand contact with intense focus.

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## ADD-ING IT UP: SOY INFANT FORMULA, ADD/ADHD AND MANGANESE TOXICITY

Kaayla T. Daniel, PhD, CCN

### Abstract

Manganese is an essential trace mineral, but high levels are neurotoxic to newborns. Infants fed soy infant formula ingest as much as 80 times more manganese per day than those who are breast fed. Although healthy toddlers, children and adults exposed to excess manganese can usually eliminate most of it, infants cannot because their immature livers are not fully functional. At the same time, their growing brains and other organs are highly susceptible to damage from neurotoxins. This article reviews research showing that neonates exposed to the high levels of manganese present in soy formula are at increased risk for neurodevelopmental abnormalities, including

an impaired ability to make the neurotransmitter dopamine and damage to the substantia nigra, caudate, putamen and globus pallidus areas of the brain. These findings suggest that soy infant formula is a likely contributor to the epidemic of ADD/ADHD and other cognitive and behavioral disorders.

Over the past few decades, soy has become America's favorite health food. Sales of soy foods grew 200% from 2000-2004, and represented a US\$4 billion industry last year. Sales of soy infant formula are also escalating and now represent 25% of the bottle-fed market.

Soy has received so much favorable press that most people would be surprised to learn that that many respected scientists



have stated that the possible benefits of eating soy should be weighed against proven risks. Although this applies to people of all ages, it particularly applies to infants and children whose bodies and brains are still developing.

At greatest risk are babies on soy formula because of their small size, critical developmental phase and the fact that formula is their main source of nutrient. The Swiss Federal Health Service, British Dietetic Association, and Israeli Health Ministry have warned parents and pediatricians that soy infant formula is so dangerous that

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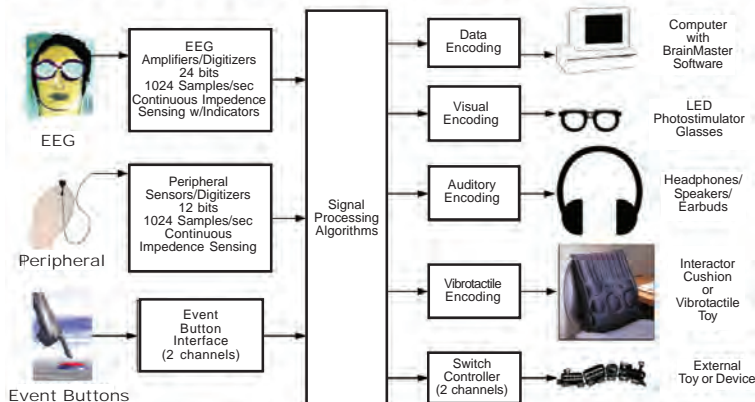
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## ADDING IT UP

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it should be used only as a last resort.<sup>1,2</sup> These agencies are concerned because the plant estrogens (known as phytoestrogens, isoflavones or genistein and daidzein) in soy formula have been linked to premature puberty in girls, delayed or arrested puberty in boys, thyroid disease, ADD/ADHD and other problems. Indeed figures from the Swiss Federal Health

Service that have been reviewed by leading toxicologists indicate that babies on soy formula receive the equivalent of three to five birth control pills every day.<sup>3</sup>

The plant estrogens are not all that is wrong with soy formula. Recently, another danger has come to light—manganese toxicity. Infants fed soy formula take in as much as 75 to 80 times more manganese per day than infants who are breast fed. Per liter, breast milk contains 3 to 10 µg manganese, cow's milk formula 30 to 50 µg, and soy formula 200 to 300 µg. Although manganese is a vital trace mineral, high levels are toxic to newborns.<sup>4-7</sup>

At a conference held in September 2000 at the University of California at Irvine, leading nutritionists, pediatricians and toxicologists warned that newborns exposed to the levels of manganese present in soy formula could suffer brain damage in infancy that could lead to learning disabilities, attention deficit and other behavioral disorders, and even violent tendencies.<sup>8</sup>

Although healthy toddlers, children and adults who ingest excess manganese can usually eliminate most of it, infants cannot because their immature livers are not fully functional. At the same time, their growing brains and other organs are more susceptible to manganese damage. Even tiny amounts of excess manganese are dangerous when stored long term in the body and brain where they do not belong.<sup>9</sup> Hair mineral analysis tests of children with learning and attention deficits have revealed elevated levels of manganese compared to normal youngsters. Youths convicted of felonies are also much more likely to show elevated hair levels. Although few infants are chronically exposed to high levels of manganese from industrial sources, many are exposed to toxic levels through soy infant formula. Indeed, hair mineral analysis tests on infants using soy formula reveal high levels of manganese in their scalp hair, a clear indicator of manganese toxicity.<sup>10-13</sup>

Scientists have known about manganese toxicity for years. In 1980, the U.S.

government set permissible manganese levels at 2.5 to 3.0 mg per day for adults; 1.0 to 1.5 mg per day for toddlers; and 0.5 to 1.0 mg per day for infants.<sup>8</sup> The calculations for the "safe" levels set for infants seem to have been based on their smaller size alone and did not take into account the fact that infants with immature livers cannot successfully metabolize excess manganese. As it happened, the soy industry put little or no effort into keeping manganese under the permissible—but still unacceptable—levels.<sup>8</sup> Soy formulas on the shelves in the early 1980s contained anywhere from 0.2 to 2.2 mg of manganese per quart; during that same period, scientists confirmed the likelihood of risk to newborns from manganese storage in the brain.<sup>10,14-16</sup> In 1983, Phillip J. Collipp, MD, a pediatrician at Nassau County Medical Center, confirmed a correlation of high manganese levels with childhood learning disabilities and speculated that soy based infant formula intake might determine a child's likelihood of developing ADD/ADHD later in life.<sup>13</sup>

Newborns absorb more manganese because of their immature and permeable intestines, fail to eliminate excess manganese because of their immature livers, and are extremely vulnerable to manganese damage because their brains and other organs are still growing. By eight months of age, an infant on soy formula absorbs 1.1 mg of manganese per day above its metabolic needs and deposits about eight percent of that in the basal ganglia cells of the brain. Years later, this manganese may impair the brain's ability to make the neurotransmitter dopamine and trigger behavioral problems ranging from Attention Deficit (ADD) and Attention Deficit Hyperactivity Disorders (ADHD) to violent and sociopathic behavior.<sup>8,17</sup> Bo Lonnerdal, Ph.D., of the University of California at Davis pulls no punches when he says, "Ingestion of soy-based formula in infancy could impair brain development."<sup>16</sup>

Animals fed even small excesses of manganese during the first weeks of life have shown biochemical abnormalities followed by lesions in the substantia nigra, caudate, putamen and globus pallidus areas of the brain. These areas all depend upon dopamine production for proper function and relate to our abilities to think clearly and flexibly, focus, complete tasks and perform well under stress.<sup>6,18</sup>

Trinh Tran, Ph.D., while working with Dr. Lonnerdal at UC Davis, found that baby rats given manganese chloride supplements at levels comparable to the manganese in soy-formula-fed infants showed no

adverse effects until reaching adolescence. At that point in their development, they displayed a range of behavioral and brain disorders, including poor performance on burrowing, detour and shock avoidance tests. Because rats cannot survive without maternal breast milk, investigators fed the animals manganese supplements, not soy formula.<sup>5</sup> Studies on Rhesus monkeys fed with soy formula resulted in higher tissue manganese absorption. Whether the higher tissue levels will result in lowered dopamine levels and behavioral deficits later in life is the subject of future research. This group of researchers plans two prospective studies with human newborns on soy formula that will chart manganese levels and behavior as they grow up.

In a separate study, rat pups fed manganese at levels found in breast milk grew up as healthy as controls. However, if given five times more manganese they showed a 48% decline in levels of basal ganglia dopamine. Given ten times the appropriate amount, they suffered a 63% decline<sup>6</sup>. These results are particularly sobering when we consider that these levels are 75 to 80 times higher than the levels found in breast milk.

Whether manganese enters the body by the mouth, lungs or injection, the metal lodges in the basal ganglia. Neurology and toxicology textbooks have reported disorders known as "Manganese Madness" and "Manganism" since the turn of the century. Until soy formula entered the picture, most cases involved miners exposed to manganese dust or people who breathed in high amounts of tetraethyl lead in the emissions from tail pipes or methylcyclopentadienyl manganese tricarbonyl from gasoline. Symptoms of manganism include instability, impulsivity, irrationality and hallucinations, or, with chronic exposure, the paralysis agitans of Parkinson's Disease.<sup>8,19-21</sup> The area of the brain most affected in Parkinson's is the dopamine system, the very part of the brain now associated with ADD/ADHD.<sup>22</sup>

According to toxicologists, "manganese toxicity arising from excessive intakes of the elements in foods was never reported" and "virtually impossible except where industrial contamination has occurred."<sup>23</sup>

In the past few decades, cases have begun to emerge, with the most frightening reports of manganese poisoning happening to very sick babies and other patients receiving parenteral nutrition.<sup>23</sup>

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## ADDING IT UP

CONTINUED FROM PAGE 22

Manganese toxicity rarely exists in isolation. Fluoride—found in most of the tap water used to mix soy formula, can increase manganese absorption.<sup>24-36</sup> Zinc, calcium and iron deficiencies can also push manganese absorption up to toxic levels.<sup>27-29</sup> Animal studies suggest that an infant born to a pregnant woman, who is low in calcium or iron, may be more susceptible to this condition.<sup>30</sup> Sub-optimal liver function can also contribute to manganese toxicity. These and other indications of higher manganese consumption and accumulation in the brain have spurred some scientists to study more thoroughly the impact of low-level manganese-induced neurotoxicity on the rate of aging.<sup>31</sup>

Manganese deficiency is commonly associated with hypothyroidism, but excess manganese may be a problem as well. To date, scientists have linked toxic levels of manganese to goiter in female and castrated male mice. Castrated male mice treated with ordinary levels of testosterone, however, did not form goiters<sup>32</sup> suggesting that testosterone confers some protection. But infants and others who eat soy tend to experience a lowering of testosterone levels because of the soybean estrogens.<sup>3</sup> Altered T4, T3 and TSH levels have also been linked to manganese accumulations in the pituitary gland<sup>33</sup>. Finally, manganese-related autoantibodies have been found in patients with Graves disease<sup>34</sup>. These studies are particularly interesting in the light of the many reports of damage to the thyroid caused by soy infant formula and other soy foods over the past 60 years. Clearly manganese deserves to join the list of soy goitrogens, the best known of which are the isoflavones.<sup>3</sup>

When interviewed by David Goodman, Ph.D., an expert on neurological disorders, John Lasekan of Abbott Laboratories shifted the focus from manganese toxicity to manganese's role as a trace metal essential for life and claimed that deficiencies are the problem—at least for premature and low birth weight babies.<sup>8</sup> Because babies are not able to store manganese until they are born, premies need manganese, but at the minuscule, appropriate levels found in breast milk, not high levels that put the neonatal brain and other organs at risk.<sup>37</sup> Mardi Mountford, a spokesperson for the International Formula Council, told Goodman that there are “no reports of manganese toxicity in healthy infants fed soy formula.”<sup>38</sup> This may very well be the case. Healthy infants—by defi-

nition—don't manifest manganese toxicity early in life although there can be negative effects later.

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Contact: Dr. Kaayla Daniel 505-984-2093  
[wholenutritionist@earthlink.net](mailto:wholenutritionist@earthlink.net)  
[www.wholesoystory.com](http://www.wholesoystory.com)

## ABOUT DR. KAAYLA DANIEL

*Kaayla T. Daniel, PhD, CCN, earned her PhD in Nutritional Sciences and Anti-Aging Therapies from the Union Institute and University in Cincinnati, is board certified as a clinical nutritionist (CCN) by the International and American Association of Clinical Nutritionists in Dallas and a member of the Board of Directors of the Weston A. Price Foundation. She specializes in whole solutions for healthy aging, cognitive enhancement, digestive disorders, women's reproductive health issues, infertility, children's nutrition and recovery from vegetarian and soy-based diets. She is the author of The Whole Soy Story: The Dark Side of America's Favorite Health Food (New Trends, March 2005).*



## CYTOARCHITECTURE: WHAT THE BRODMANN ANALYSIS CAN TELL US.

**M. Barry Stermán PhD**

*Professor Emeritus, Geffen School of Medicine, UCLA*

Brain imaging and analysis continues to evolve and provide us with more information upon which to base our clinical decisions. Brodmann mapped the cortex according to types of neurons and their density in different cortical layers. The areas he numbered (1 to 52 in each hemisphere) followed the variations in the cellular architectures he observed. The Brodmann area information has been employed for more than a century. Recently the SKIL database has provided the capability to subject the raw EEG to an analysis that employs the Brodmann areas as the focus of inquiry. Following is a QEEG analysis of a client in which the Brodmann analysis was the major factor in locating the abnormalities.

The client is a 65 year-old female who was referred by her physician. She evidenced no cognitive or gross motor abnormalities upon presentation. The client is currently in severe, unremitting sciatic pain which she reports to be worse in the right leg. She has a history of failed back syndrome and back surgery. The client's family history includes maternal arthritis and fibromyalgia. Her three brothers also have back problems. At 17 years old, the client was in a car accident in which she experienced whiplash and possible rotational injuries. The client is an accomplished dancer, attorney and film producer. She has consulted many physicians regarding her treatment and is considering the implantation of a morphine pump. The client is currently taking the following medications: Oxycontin, Dilaudid, Zanaflex, Neurontin and Keppra.

### FINDINGS:

EEG data were effectively cleared of artifact and viewed using several different referencing montages. Reliability of findings was confirmed with multiple independent recordings. Because of the distorting effect of the many medications currently on board in this client, a distortion which raised slow frequencies at all sites, attention was directed primarily to the Laplacian re-configurations, which negate common features and emphasize unique characteristics where they occur. The program utilized here provides for three different perspectives on functionality. These include amplitude characteristics, temporal coordination, or timing characteristics, and anatomical characteristics based on the cytoarchitecture of cell types provided by the Brodmann classification system.

A different functional disturbance was revealed through analysis based on specific cortical cell types as classified in the Brodmann cytoarchitectural classification. This analysis showed that activity in the faster frequency range was uniquely increased in supplemental motor areas, extending into a region buried beneath the anterior temporal lobe, called the operculum (Corresponds approximately to the opercular part of the inferior frontal gyrus) (figs. 1 & 2). This effect was restricted to the left hemisphere with eyes closed but became bilateral (but still greatest on the left) when the eyes were open. When the EEG was configured according to the Brodmann area system fast and sharp activity was revealed in the signal from these areas (fig. 3).

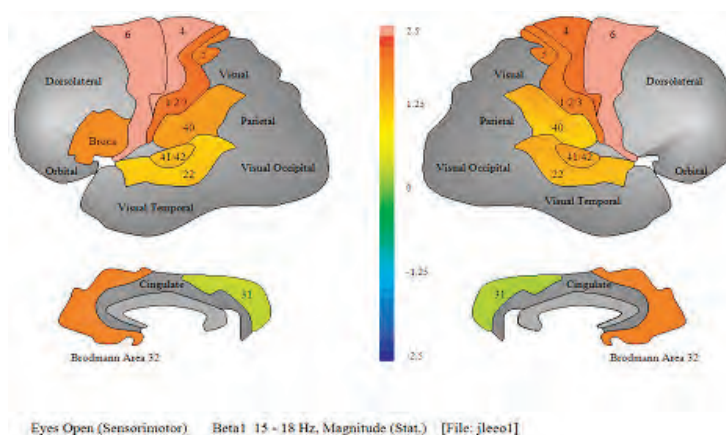


Figure 1 Brodmann maps with eyes open based on cortical cell type and focused on sensorimotor and dorsal temporal regions. Pink color in areas 4 and 6 indicate significantly elevated fast 15-18 Hz activity bilaterally. These include secondary and opercular motor areas.

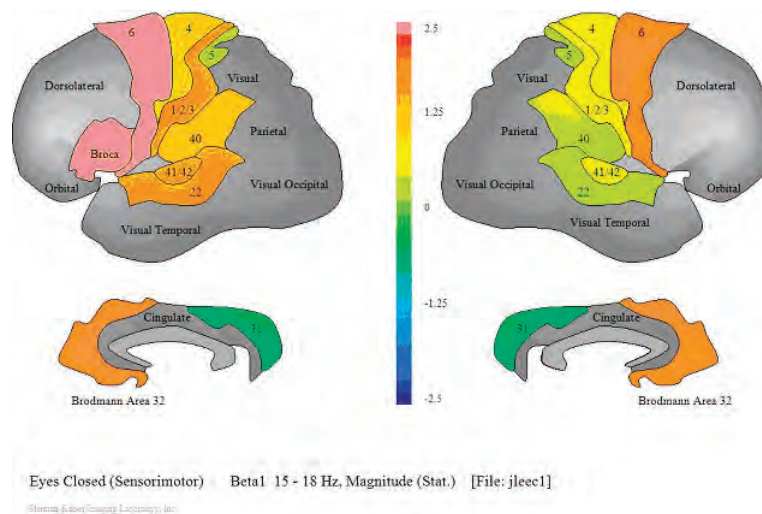


Figure 2. Brodmann maps as above but with eyes closed. Elevated fast activity is limited to left hemisphere here and extended to include Broca's speech area.

### CONCLUSIONS:

It is important to point out at the outset that the various medications (5) prescribed and used by this client have clearly altered the EEG and made interpretation of findings a true challenge. However, reliance on multiple recordings across a series of functional states, together with a battery of varied and unique quantitative measurement tools, made it possible to identify valid and reliable disturbances in her Central Nervous System.


The most significant of these is the evidence of hyper-excitability in the operculum (and associated supplemental motor areas) as seen



**CYTOARCHITECTURE:**  
CONTINUED FROM PAGE 25

clearly in both EEG tracings and quantitative maps when data were configured using Brodmann area Laplacian analysis (figures 1-3). Characteristic sharp, fast, and slow waves were seen here in all test recordings, often most evident in the left hemisphere. This is a highly significant finding for this

case, as a body of recent evidence has indicated that this area may be the projection target of afferent pain fibers reaching the cerebral cortex. Thus, as noted above, we can propose that this cortical reception area for pain is in a state of chronic hyper-excitability, a condition which may be the root cause of her unrelenting pain, particularly in her right leg. It is unclear how this important finding may relate to the evidence

for elevated slow activity at 4-5 Hz in temporal and left centro-parietal areas, as well as disturbed coordination at 10 Hz in the left centro-parietal area. Suffice it to say that disregulation in pain centers likely also disturbs cognitive and perceptual functions in ways that are not clearly understood at present but can be exposed with sensitive analytic methods. 

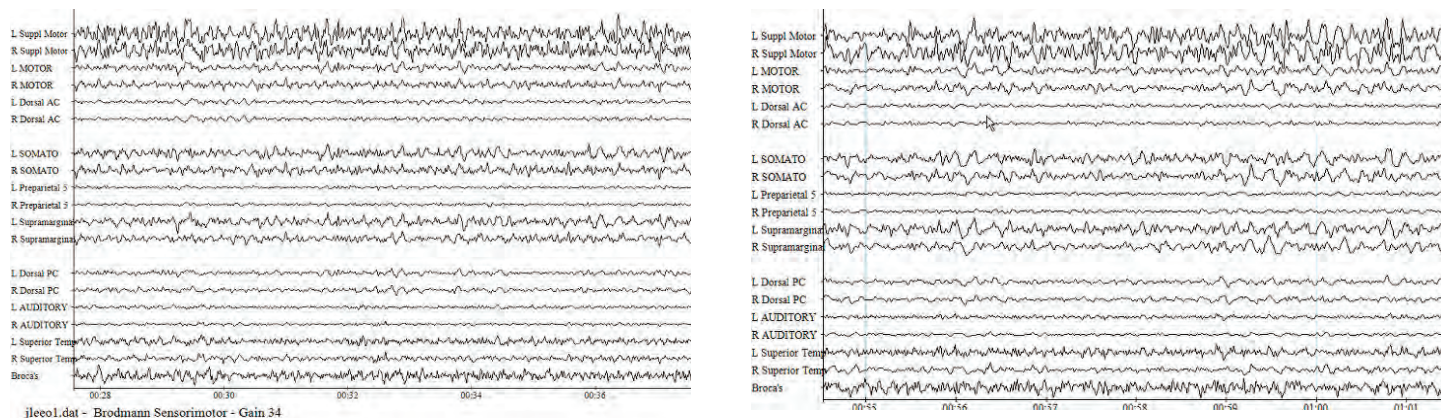


Figure 3. Samples of EEG with eyes open (top, 10 seconds) and during reading (bottom, 7 seconds) derived from Brodmann Laplacian montage and showing EEG characteristics in each anatomically defined region. Note sharp waves, fast (beta) bursts, and trains of slow activity in supplemental motor (including operculum) region in top 2 channels of each sample. This disturbance was seen in all states.

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## INNOVATIONS IN NEUROTHERAPY, ASSESSMENT, AND TRAINING

*Don DuRousseau, Executive Director, Human Bionics LLC*

Human Bionics LLC (HB) is a neuroscience R&D Company that provides military, industrial, and commercial products and services in the area of comprehensive mental healthcare. Located within the DC Metropolitan area in Northern Virginia, Human Bionics has been awarded several technology development grants from the National Institutes of Health and Department of Defense. CEO, Don DuRousseau, has been developing innovative neuroimaging technologies for the past twenty years, including the eExecutive Load Index (XLI) and the line of Quik-Gel, Quik-Cap, and MagLink products sold by Compumedics, Inc. Through a two-year development effort, HB recently released for sale an easy-to-use EEG sensor placement cap, 40-channel poly-signal recorder, and a suite of advanced signal processing products for realtime denoising of eye, heart, and muscle artifacts. These technologies were



*Figure 1 Child wearing an elastic cap with quick-insert electrodes that can be easily placed into reinforced holes located according to the Intl. 10-20 EEG Placement System.*

demonstrated at the 2007 ISNR meeting in San Diego, CA and are now available for purchase by neurofeedback providers and equipment makers.

The EEG recording and analysis products designed by HB offer a practical solution to the difficult and time consuming process of accurately locating electrodes on the head according to the International 10-20 Nomenclature.<sup>1,2</sup> Additionally, the even larger problem of artifacts in the EEG has been overcome with the Company's new Artifact Buster™ Software, which is capable of removing eye movements, blinks, EKG, and muscle contamination from the EEG prior to neurofeedback training. Figure 1 shows the elastic cap and quick-insert electrodes used by HB as part of the Company's Wearable Ambulatory Monitoring (WAM) system, which was developed under a Phase II Grant for field assessment of IED-induced traumatic head injury.<sup>3</sup> The WAM provides distributed realtime collection of artifact free physiological data and instantaneous collaboration between first responders and medical specialists over a secure network. From a twenty-year history of ambulatory recordings, sponsored R&D, and a growing neurotherapy service, the use of fast cap sensor systems provides a natural transition from the lab into the office. Finally, all the advantages of a rapid triage sensor system are now available to help standardize and speed up the process of neurofeedback training.

For more than seven years, HB has been developing poly-physiological signal processing applications for realtime moni-

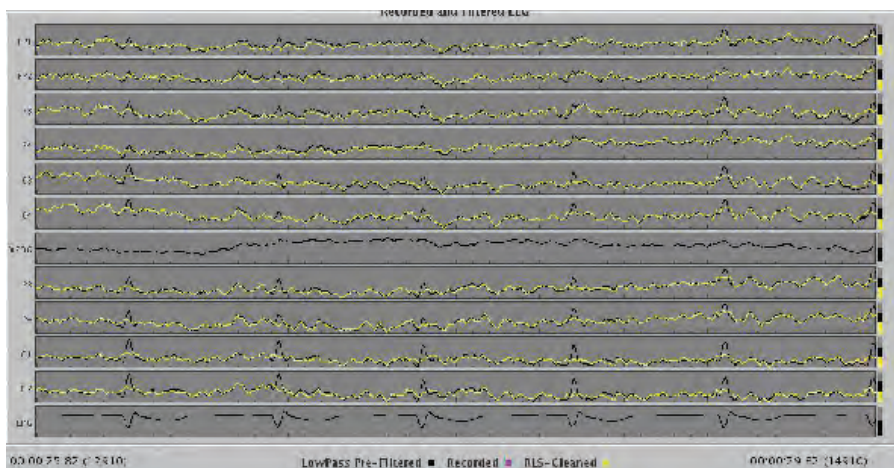


toring and assessment within closed-loop brain-computer systems.<sup>4,5</sup> An imperative of this effort has been the creation of very fast Recursive Least Squares (RLS) denoising algorithms to clean the EEG prior to analyses used to identify task related brain patterns with adaptive neural-network classifiers. Figure 2 is a representative Artifact Buster™ screen capture used to display: 1) the raw EEG that is contaminated with artifacts (Purple Line); 2) an adaptive filter that's fit to the EEG and artifact signals (Black Line), and 3) the de-noised EEG with the selected eye, heart, or muscle artifacts removed (Yellow Line). The adaptive filtering is accomplished using machine learning algorithms that output to an RLS filter to identify and separate the artifacts from the EEG (VEOG & EKG channels in this case). Mandatory to market growth and consistency of practice, HB offers the best in EEG caps, sensors, and artifact removal methods to advance the field of neurotherapy into the 21<sup>st</sup> Century.

Through the creation of easy to use, repeatable, and reliable tools that accurately place sensors and clean EEG signals, both novice and expert alike will be able to improve their standard of care. Importantly, improved electrolytes are available as well that do not require abrasion of the skin prior to electrode placement. Just think, no more scraping the skin with Omni- or Nu-Prep®! Just by using the Quik-Gel® electrolyte, which chemically removes oil and moisture from the skin to rapidly lower the impedance, electrode placement time can be cut by 1/3. Thus, our neurofeedback cap system offers a significant advancement over the outdated measure, mark, and tape method of positioning sensors on the head.

The stretchable fabric neurofeedback caps we use have reinforced holes at the original 19 sensor locations but come without the electrodes installed. These anatomi-

*Continued on page 28*



*Figure 2 10-channels of referential EEG are shown along with vertical EOG and EKG bipolar artifact signals. The raw Recorded data gets displayed in Purple (Not shown), while the Low Pass filtered data is shown in Black. On a point-by-point basis, the filtered output from the artifact channels is subtracted from the EEG using a realtime RLS algorithm. The resulting denoised data is shown in Yellow.*

# INNOVATION IN NEUROTHERAPY CONTINUED FROM PAGE 25

cally correct caps, which are routinely used in dense array clinical EEG and Evoked Potential studies, provide a shell with a high degree of placement accuracy that accepts the quick-insert electrodes. When used for neurofeedback, the practitioner identifies the appropriate site to be trained and merely slips a quick-insert electrode into the appropriate hole for the EEG and ground connections. Conventional ear clip or mastoid electrodes can be used for the reference signal, as long as the metal is the same as in the quick-inserts. By placing only the electrodes needed rather than carrying all 19 sensors and a mass of lead wires the cap becomes simpler and faster to use, allowing more people to be seen in a day. Elastic caps are typically made from a light breathable fabric that dries within an hour or so. Rarely is it necessary to have more than two of any size cap in a typically sized practice seeing multiple clients per day.

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*Don DuRousseau is Founder and CEO of Human Bionics LLC, a neurotechnology company specializing in physiological-based systems that measure and gauge complex cognitive, behavioral, and autonomic processes. Human Bionics Clinical Division is focused on providing quantitative electroencephalography (EEG) and neurotherapy services, which complement the company's nutrition and psychological counseling practice. Mr. DuRousseau is an internationally recognized neuroscientist, neurotechnology developer, and entrepreneur with twenty years experience designing realtime systems that respond to the electrical activity of the brain and body. Educated at The University of California, Don earned a bachelors degree*

*in Neurobiology where he majored in neuromuscular systems. After ten years of practical experience, he earned an Executive MBA in International Business from George Washington University and started Human Bionics with proceeds from the sale of a neuroimaging patent and other IP rights.*

*Don has extensive basic and applied research experience in the neurodiagnostic industry and, since starting Human Bionics, has successfully completed several R&D contracts and grants from the DoD and NIH to develop technologies that range from a simultaneous EEG/fMRI imaging device to a telediagnostic system for assessing traumatic brain injury in the field. The latter, was developed under the Defense Advanced Research Project Agency's (DARPA) Augmented Cognition Program. Prior to founding Human Bionics, Don was primarily involved in the development of epilepsy source localization systems, integrated EEG/fMRI devices, and transcranial Doppler ultrasound technologies. Don's present interests lie in expanding the ethical uses of neurotechnologies in the 21<sup>st</sup> century for the treatment of traumatic brain injury and other central nervous system conditions like AD/HD, Autism Spectrum Disorder, anxiety, depression, and their associated behavioral problems.*

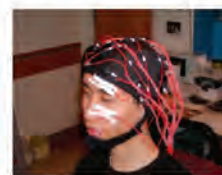
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## 2007 ISNR CONFERENCE: SUMMARY OF CLINICAL CORNERS

John Carmichael, Ph.D.

Clinical corners were included again at the 2007 conference wherein participants had the opportunity to share their experiences and learn from colleagues. Unlike previous years, the focus this year was on topics of importance other than attention to various diagnostic entities as was true in years past. The time and efforts of the volunteer moderators (Ed Hamlin, Judith Lubar, Joe Horvat, Elsa Baehr, Merlyn Hurd, John Carmichael, Joel Lubar, David Trudeau, and Peter Fagerholm) is acknowledged with thanks along with the critical activity of the "scribes" from whom this summary is compiled (Vladimir Vandalov, Rex Cannon, Bojana Knezevic, Mirjam Kouijzer, and Tamara Lorensen).

During the topic of **Augmenting NF**, a range of ancillary methods were considered including audio-visual entrainment, breath re-training, heart rate variability,

evoked potentials, temperature training, aromatherapy, binaural beats, and HEG. The consensus of the clinical corner was that while the clinical experiences of attendees supported their use, major questions remain such as which ancillary approaches are most effective and the optimal timing of introducing them during NF training.

In regards how best clinicians could participate so as to **Advance a Research Agenda**, attendees at this clinical corner topic proceeded from a discussion to the development of an action plan. One approach considered was to have many clinicians submit data from a few clients to a committee thereby yielding a respectable pool of subjects for a publication. A committee is to be formed to address key issues such as inclusion and exclusion criteria in subject selection, standardization of pre-post protocols, and data collection. Subsequently,

clinicians within ISNR will be invited to forward their data.

A great many issues were considered during the clinical corner on **NF Protocol Selection**. The significant value of a QEEG over other approaches, the importance of also examining the raw EEG signal over time, the usefulness of ICA, and information from LORETA were seen as important assessment tools for protocol development. Nevertheless, the consensus was that the alpha asymmetry protocol was often effective in the treatment of depression. Also, attendees re-emphasized the need for reliable data by attending to the basics of eliminating contamination, artifact rejection, and appropriately low impedance levels. The limitations on discussion of a very large group of attendees and the extensive range of relevant sub-topics gave direction to any future corner on this topic.



## EXPANDING THE BOUNDARIES OF HUMAN POTENTIAL



AAPB 2008 CONFERENCE  
MAY 15-18, 2008  
PRECONFERENCE WORKSHOPS  
MAY 13-15, 2008  
DAYTONA BEACH, FLORIDA  
[www.aapb.org](http://www.aapb.org)



For complete information on the Association for Applied Psychophysiology and Biofeedback (AAPB), its Neurofeedback Division, Annual Conference and other educational resources, please visit the AAPB website at [www.aapb.org](http://www.aapb.org).

## CLINICAL CORNER 2007 CONTINUED FROM PAGE 29

The corner on **Using Consultants/Mentors** concluded that this was of value especially to clinicians in the early stages of their NF career. The group then proceeded to consider some of the selection logistics including how best to determine who is available for mentoring (a section of the ISNR web-site was suggested), the credentials of the consultant, the value of both parties being interested in similar diagnostic entities and possessing similar NF systems, the merits of close geographic proximity versus consultation via telephone or e-mail, the costs and whether clinician or client would be responsible for them, and the importance of clarifying the amount and timing of available support as well as issues of legal responsibility.

## AS THE 2008 CONFERENCE COMMITTEE IS ALREADY WELL INTO PREPARATIONS, THIS IS THE TIME TO SUGGEST TOPICS FOR ITS CLINICAL CORNERS.

A number of **Adjunctive Approaches to NF Training** were considered by one clinical corner to be helpful in reaching the goals established by clinician and client. Many of these were considered to be helpful because they give control over the interventions to their client, increased client's responsibility in the process, and optimized training results. In addition, they facilitate generalization of learning from the office to the environments where clients live and work. Among the approaches considered were family therapy, Wild Divine, transitional objects, and a range of interventions from biofeedback including respiration and heart rate variability training. Repeat QEEGs was determined to be a way to monitor progress for both client and clinician. Also, the group spent some time discussing the role of placebo in different disorders.

**Marketing a NF Practice** resulted in discussion of a wide-range of sub-topics such as the principles of marketing (frequency, content, and specifying precisely the client target), the efficacy of advertising, identifying the payee (insurance versus private), and the pros, cons, and costs of different kinds of media. The NF fee charged was seen as one important factor in attract-

ing clients. Additionally, some participants have concluded that use of the internet is a very effective source of referrals. Establishing and maintaining area groups of NF providers was viewed as useful for developing cost-effective joint marketing plans as well as for purposes of support and training. Providing education and information to potential users of NF services as well as to other community groups was considered to be helpful also.

The clinical corner on **Managing Confounds to NF Training** identified a range of factors that can affect outcome. Among those discussed were medications (both prescribed and other), protocols that turn out to not be effective, the training not holding over time, nutrition, time of day, and critical factors unknown about clients. Various solutions were proposed and the value of both peer review as well as clinical


corners at conferences was noted.

Many technical aspects were considered in the corner on **NF Session Design and Options** and many more questions arose. Generally, the group favored placement of the reference electrode on the side opposite to the training site. Also, protocol development based on a QEEG was supported and especially in complicated presentations such as following traumatic brain injury. Implementing forms of peripheral biofeedback prior to NF training was considered to be important for a variety of reasons such as experiencing muscle relaxation and increasing client compliance. Discussions occurred in respect to a number of pre-set NF protocols for conditions including depression, muscle relaxation, and emotional lability.

One group considered the relative merits of using **Power, Coherence, or Both in NF Training**. The relationship between power and coherence was discussed with many reporting that training power exerted a positive influence on coherence and vice versa; from this point of view if only one could be chosen due to factors such as hardware/software limitations, then positive results could still be obtained. On the other hand, some advantages were pro-

posed by alternating between power training and coherence training from one NF session to another including better results in a shorter period of time. One conclusion was that the sequence of coherence training should be based on dealing with the highest z scores first; however, consensus was that one should not increase delta coherence. Providing multiple forms of feedback during NF training (for example, peripheral biofeedback and the raw EEG signal) was seen as helpful to clients.


In summary, lively and useful discussions were the norm during the clinical corners. Moreover, participants were very much in favor of continuing this feature for the 2008 Conference. Topics suggested for 2008 included how to choose hardware/software for NF training, gains and losses of using QEEG, how best to generalize training from the office to real life environments, matters relating to fee setting and billing, goal setting and measurement during NF training, the nature and application of LORETA and sLORETA, and theoretical and practical aspects of using DVDs etc during training.

As the conference committee is already well into preparations, this is the time to suggest topics for Clinical Corners 2008. You can e-mail suggestions to either John Carmichael ([dr.john@telus.net](mailto:dr.john@telus.net)) or Ann Marie Horvat ([annmarie@isnr.org](mailto:annmarie@isnr.org)). 

## MINDFULL CONTINUED FROM PAGE 16

ate weather, and be prepared to protect our coastal cities from water when we fail.

That we live in an age of catastrophic weather is nothing new. That our kind recognizes it is. Climate change was the engine behind brain growth. We leapt from bipedal primates (australopithecus) to brainy bipeds (Homo habilis) to brainy toolmakers (Homo sapiens) in large part because we couldn't stand the heat of the African sun. We won a neural "arms race" lasting tens of millions of years against cats and our own kind and all the while it was played out against a backdrop of habitat loss.

The Earth hosted three human species as recently as 25,000 years ago, Erectus, Neanderthals, and us. We emerged victorious in our two-front encounter, Europe and Asia, perhaps because we lived up to our subspecies' name, Homo sapiens sapiens, which means "man, twice as wise." The question is, are we up to the task again? 



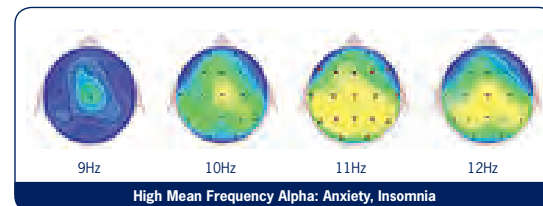
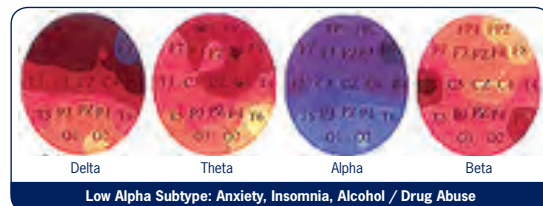
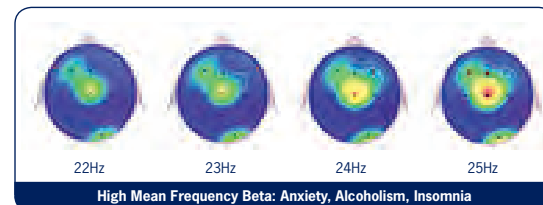
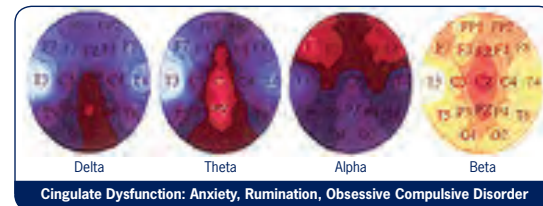
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4. Nova Tech EEG - Loreta/QEEG analysis system and adult normative database eyes closed	\$60.00
5. Thatcher TBI and LD discriminant analysis and severity index	\$60.00
6. Clinical correlations and neurotherapy recommendations by Robert Gurnee	\$100.00
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**ROBERT L. GURNEE**

MSW, BCIA:EEG, QEEG Diplomate, Director

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## ISNR 2008 CONFERENCE COMMITTEE UPDATE

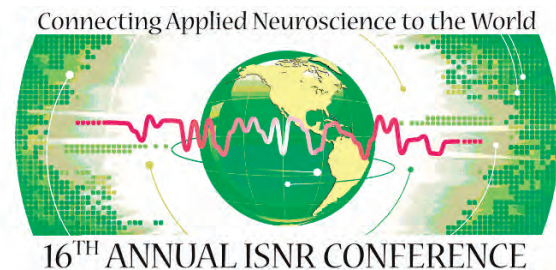
I hope that everyone had a wonderful holiday season. This year's conference planning is moving along very nicely. Because of the dedicated work of the committee members and staff we are not only ahead of schedule for planning our 2008 conference but already setting up preliminary plans for the 2009 and 2010 conferences. I want to very publicly and loudly say thank you to the committee members and ISNR staff for their efforts.

I want to take this opportunity to briefly inform you of some of the most important updates regarding the conference. This year's ISNR conference is going to hold some very exciting changes and an atmosphere that everyone will find very rewarding and professionally stimulating. Our conference schedule is already in place and it allows the attendee to have a very rich experience with plenty of time for educational opportunities, shopping with vendors, collegial interactions, and restorative connections.

This meeting is going to be the perfect opportunity for you to connect with Applied Neuroscience as you never have before. The meeting is being held at the Crown Plaza River Walk in San Antonio, TX. We are hosting presentations from clinical practitioners, academicians, researchers, trainers, coaches, physicians, and other professions who wish to make presentations about applied neuroscience applications oriented to the field of neurofeedback.

### THE MOST IMPORTANT UPDATES AT A GLANCE:

1. Call for workshops, oral paper presentations, student paper presentations, posters and short courses opened on January 7, 2008. If you haven't submitted already please go ahead and take this time to do so. The submission site is scheduled to close on April 1, 2008. Guidelines and information regarding format can be found at <http://www.isnr.org/2008submissions.cfm>.
2. We are very happy this year to add a new format to the conference workshop program. This year presenters will be allowed to submit workshops under the category of "Commercially Oriented Short Course." These workshops may have content that is relevant to a particular hardware, software, technique or other concept that is provided by a commercial entity. These workshops are still scientific and NOT infomercials. They will adhere to the same strict standards as our other workshops; however will provide the attendee with a unique opportunity to gain additional professionally relevant knowledge as it is applied to their specific needs.
3. To promote leisurely opportunities for the attendee to continue to learn about current research and clinical work



the poster sessions have been expanded. There will be 3 different poster session opportunities for the presenter to disseminate their work in a relaxed yet formal manner. We are raising the standards for our poster presentation sessions and hope to make this a unique opportunity for the attendee to interact with the presenter at a collegial level. If public speaking isn't your idea of fun, the poster session gives you a great opportunity to share information from your research or clinical practice. Guidelines can be found online at <http://www.isnr.org/2008submissions.cfm>.

4. The conference schedule is already developed and online. As presentations are accepted and topics for clinical corners are confirmed these will be updated online. The preliminary schedule can be found at <http://www.isnr.org/2008ConferenceSchedule.cfm> and be sure to check regularly as updates are added.
5. Opening night reception & special panel. I am very excited to have an opening night reception and special panel. The title of the panel is Neurofeedback: the Past, Present and Future and the speakers will include the distinguished Thomas Budzynski, PhD, Joel Lubar, PhD and M. Barry Serman, PhD. It will be an honor and an inspiring panel where these gentlemen give their perspective on our growing field.
6. I've mentioned it before but will do so again. We have a great line up of Keynote and Invited speakers. With the most recent additions we have confirmed Keynote Speakers Adam Clarke, PhD, E. Roy John, PhD, Roberto Pascual-Marqui, PhD and Fernando Lopez da Silva, MD, PhD. Invited Speakers include Mario Beauregard, PhD; Dirk DeRidder, MD, PhD; Jean-Philippe Lachaux, PhD; Leslie Prichep, PhD and Guillermo van Wielink, MD.

I hope you mark your calendars early and plan to be in attendance at this year's conference. There are many more exciting enhancements to this year's conference that are designed to maximize your educational experience and comfort. Look for more exciting news as it is confirmed in the Conference Committee updates in the newsletter or the conference online website, <http://www.isnr.org/2008Conference.cfm>.

I wish you a happy and prosperous New Year and look forward to seeing you all on August 27 at the opening reception.

Best regards,

*Leslie Sherlin, PhD, Conference Committee Chair*



## RESEARCH NOTES BY DAVID L TRUDEAU, MD, RESEARCH COMMITTEE CHAIR

### *Institutional Review Board (IRB) Review*

In a previous column I promised a discussion of informed consent and institutional review board (IRB) approval. Beginning in 2006 all proposals for ISNR research funding must include an informed consent and approval by an IRB. While the research committee carefully reviews and discusses the scientific merits and performance and financial aspects of each proposal that comes before it, there is another review required that has to do with ethics and subject safety. This is the realm of an IRB. Increasingly funded and published research is required to have IRB oversight and approval, and all academic institutions require all research to be overseen by an IRB.

Many of the comments in this column on IRB function are based on a two day course "2007 Current Issues in Clinical Research" co-sponsored by the University of Minnesota and the Mayo Clinic, September 18-19, Minneapolis, Minnesota which I attended.

#### **SOME BASICS OF RESEARCH SUBJECT PROTECTION AND ETHICS**

Federal regulations mandate that all federally funded research involving human subjects be reviewed by an independent IRB. The role of the IRB is to protect human subjects and to ensure compliance with regulatory obligations.

The IRB requires an independent review for scientific merit prior to consideration. The research committee of ISNR is the review panel for determining scientific merit of proposals submitted for research funding. Each proposal that is approved for funding must also have an IRB approval, and this IRB approval is focussed on subject protection and ethical issues. It is the responsibility of the investigators of each approved proposal to get IRB approval. Many health care institutions and all academic institutions that are involved in research have established IRB's. If there is additional cost for IRB approval and monitoring for ISNR research proposals that may be included in the budget and awarded on the basis of funds available.

The IRB review process insures that

the rudiments of the Helsinki Declaration (<http://www.wma.net/e/policy/b3.htm>) are met. The IRB requires an informed consent for the research procedures be understood and signed by all human subjects. The IRB also reviews the research protocols and judges the protocol and informed consent as adequate when certain guiding principles are met. The following are principles that are followed. The protocol and consent must reflect respect for persons, do no harm and maximize benefit and ensure fairness in participation and distribution of benefits from the research. The well being of human subjects should take precedence over the interests of science and society. Research investigators need to be aware of ethical, legal and regulatory requirements. Proto-

#### **FEDERAL REGULATIONS MANDATE THAT ALL FEDERALLY FUNDED RESEARCH INVOLVING HUMAN SUBJECTS BE REVIEWED BY AN INDEPENDENT IRB**

cols should be submitted for consideration, comment and guidance to a specially appointed ethical review committee. It is the duty of the practitioner in medical research to protect the life, health, privacy and dignity of the human subject.

An area of increasing ethical concern is conflict of interest (COI.) According to NIH, a potential COI exists when an investigator has significant financial interests which could lead an independent observer to reasonably question whether the design, conduct or reporting of research might be influenced by the possibility of personal gain (either individual or immediate family.) COI is not of itself a manifestation of impropriety, may be unavoidable in certain situations (such as commercially sponsored research) and may be more a matter of perception and judgement by others. The important thing is that all research applications include full disclosure of any potential COI. The research committee of ISNR needs to be scrupulous in crafting and enforcing conflict of interest policies. This applies to proprietary treatment protocols and equipment.

According to Tim Mulcahey, Vice President for Research at the University of

Minnesota, IRB's are often perceived to be impediments to clinical research because they may be seen as slow, bureaucratic, picky, non-responsive or intrusive. This basically amounts to a disincentive to investigators, notes Dr. Mulcahey. Ideally the IRB will also encourage clinical research and advance medical progress, and will be focussed on reducing redundancy, and expediting the review process. IRB's may seek accreditation from the Association for the Accreditation of Human Research Protection Programs (AAHRPP.) ([www.aahrpp.org](http://www.aahrpp.org)) AAHRPP works to protect the rights and welfare of research participants by fostering and advancing the ethical and professional conduct of persons and organizations that engage in research with human participants.

#### **UNANTICIPATED PROBLEMS INVOLVING RISK TO SUBJECTS**

Marian Olson, of the Mayo Clinic IRB discussed the issue of unanticipated problems involving risk to human subjects. Naturally a well-crafted informed consent would clearly include all anticipated and known risks. Unanticipated events are unforeseeable outcomes that occur at either an increased frequency or an increased severity than expected. They may be possibly, probably or definitely a result of participation in the research study. The investigator must report possible unanticipated problems involving risk to all sponsoring and reviewing entities as soon as possible. The IRB is responsible to conduct continuing review of research at intervals appropriate to the degree of risk, and at least once a year. An IRB has the authority to suspend or terminate approval of research that is not being conducted in accordance with IRB requirements or has been associated with unexpected serious harm to subjects. Serious problems include death, life threatening adverse experience, and persistent disability or in-

*Continued on page 34*

## RESEARCH NOTES CONTINUED FROM PAGE 33

capacity. They also include events or problems that in the opinion of the investigator may have adversely affected the rights, safety or welfare of the subjects or others or substantially compromised the research data.


It is difficult to see how procedures involving brain wave biofeedback research could result in unanticipated serious problems involving risk to human subjects, but the point is that investigators, research protocol reviewing committees and IRB's must have policies and mechanisms in place to deal with these unanticipated events.

## INCIDENTAL FINDINGS

Where unanticipated outcomes may require suspension or modification of a research protocol, incidental findings in the course of evaluation of subjects according to protocol also need to be addressed. Susan Wolf of the University of Minnesota Law school discussed this issue. An important incidental finding in a research subject is one that is one that has potential health or reproductive importance and is discovered in the course of a study but is beyond the aims of the study. An example pertinent to brain wave biofeedback research might be unusual findings on EEG that suggest a seizure disorder or a mass lesion. This finding may require further testing, disclosure to the subject and appropriate referral to a neurologist.

Protocols and informed consents probably should spell out how incidental findings will be handled. It should be spelled out that the investigators will look for incidental findings—within the realm of their evaluations—and if found, disclose to subjects and recommend further consultation or action. The consent may address the risk of incidental findings (anxiety, need for follow up, expense of follow up) and benefits (life saving or disease prevention or treatment effects.) The protocol should attempt to minimize the risks of overlooking significant findings as well as triggering unnecessary follow up.

## ARCHIVED DATA

While not discussed directly at this course in Current Issues in Clinical Research, there is the issue of mining archived data for research purposes. A practice may contain a wealth of outcome data that can be compared to no treat conditions in observational study designs. This type of study may suggest further research, and may give valuable guidance to current clinical practice guidelines. However many neurofeedback practitioners do not as a matter of routine use an informed consent that includes a patient's acknowledgement and permission that their evaluation, treatment and outcome data may be used anonymously for reporting purposes in a published study. While at the Veteran's Affairs Medical Center in Minneapolis I had the luxury of a readily available IRB and had IRB approved consent forms for all my neurofeedback patients. These were reviewed on a regular basis, at least annually. I maintained informed consents by treatment type, having one for substance use disorder, one for attention deficits, one for mild traumatic brain injury, and one for chronic fatigue syndrome. Each consent form gave me permission to use the patient's data anonymously in compiling reportable results of treatment. I also had the added advantage of applying oversight (via the IRB) of the ethical principles of human subjects research vis a vis the Declaration of Helsinki by the World Health Organization. I must say I now appreciate that but at the time saw it as a huge inconvenience to be born like all the other bureaucratic necessities of life in a large health care institution. 

## ISNR THANKS THE FOLLOWING CONTRIBUTORS TO THE RESEARCH AND STUDENT FUNDS FROM SEPTEMBER 15 THROUGH DECEMBER 31:

## 2008 RESEARCH FUND:

## DELTA CONTRIBUTORS (UP TO \$25.00)

Morry Edwards, Mary Lee Esty, Gail Sanders Durgin, Carolyn Grierson, Pavel Krivulka, Kirk Little, Lilian Marcus, Stuart Morton, Teresa Powers, Aharon Shulimson, Michael A. Sitar, and Deborah Stokes.

## THETA CONTRIBUTORS (\$26.00 TO \$50.00)

Robert Gurnee, Edith Schneider, and Larry Thomas

## BETA 2 CONTRIBUTORS (\$150.00 &amp; HIGHER)

Robert Coben, Cynthia Kerson, Robert Lawson, Michael Murias and Karen Trudeau.

Special thanks go to Karen Trudeau for donating her fee for working at the conference registration booth, to Robert Coben and Robert Lawson for donating the incomes from their workshops at the 2007 conference, to Robert Lawson for contributing his workshop income, and also to Michael Murias for contributing his 2007 conference honorarium.

And, let's not forget those of you who purchased raffle tickets at the conference, totaling an income of over \$10,000.

THIS AND THE ABOVE AFTER-CONFERENCE  
DONATIONS TALLY \$13,380!

## 2008 STUDENT FUND:

In addition to the initial contributions from Hank Weeks and Richard E. Davis of \$500.00 each at the conference to inaugurate the Student Fund, the following contributions have been made:

## DELTA CONTRIBUTORS (UP TO \$25.00)

Richard Dombrowski, Deborah Stokes and Nancy Wigden

## THETA CONTRIBUTORS (\$26.00 TO \$50.00)

Edith Schneider and Hans Volke

## SMR (\$76.00 TO \$100.00)

Leslie Sherlin contributed his workshop income back to the fund

## BETA 2 (\$150.00 &amp; HIGHER)

Richard E. Davis contributed his travel expense as a board member back to the fund

THIS TOTALS \$1,490 IN THE STUDENT  
FUND COFFER!





## BCIA UPDATE

The Biofeedback Certification Institute of America (BCIA) has carefully listened to our certificants and educators, and has completed three initiatives to increase the relevance and ease of the certification process while maintaining professional standards. These initiatives include an overhaul of the General Biofeedback and EEG exams, the addition of an independent study option to fulfill the Anatomy and Physiology requirement, and the creation of a Certification by Prior Experience (CPE) for experienced professionals.

### NEW GENERAL BIOFEEDBACK AND EEG BIOFEEDBACK EXAMS

BCIA is excited to report our successful revision and validation of the General Biofeedback and EEG Biofeedback certification exams. In response to candid and informative feedback from our certificants, we have extensively improved the blueprint of knowledge, reading list, and exam items for each test.

We've simplified both blueprints and updated their content and terminology. The new blueprints emphasize current practical knowledge and focus on the learning objectives that our certificants and educators consider important for professional practice. The blueprint, in turn, helped us select the core reading list that teaches its content.

We have completely overhauled the recommended reading lists and reduced each to a core list of 10 sources. We chose references that are widely available, affordable, and relevant to clinical biofeedback and neurofeedback. The amount of reading involved is now the equivalent of a 3-hour advanced college course.

New certificants will see the most dramatic change in the exam items. We reviewed all previous items and solicited hundreds of new items from educators who teach the BCIA blueprint. We selected questions that test current "entry-level knowledge" and are easily answered by one of our 10 sources. Then, we assessed these questions through a psychometric validation process to ensure that they are fair and reward the careful preparation of our applicants.

These are comments from recent certificants about the General Biofeedback

and EEG Biofeedback exams:

"I thought it was a fair exam, with plenty of time to work through it and finish it without stress."

"The EEG exam was a good overview of general concepts involved in Neurotherapy..."

### INDEPENDENT STUDY IN ANATOMY AND PHYSIOLOGY

The BCIA board believes that Anatomy and Physiology (A & P) knowledge is an important foundation for training in biofeedback and neurofeedback. We also recognize that this requirement can be difficult for professionals to complete because of cost, time investment, and class availability.

BCIA has developed an independent study option to increase our applicants' options. Professionals who choose this option will purchase a widely used, BCIA-approved, A & P textbook, read specific chapters, and complete a multiple-choice exam over learning objectives relevant to biofeedback and neurofeedback.

A & P exams will be offered on the same dates and locations as the certification exams. If one chooses, both exams can be completed on the same day. To collect psychometric data to build a fair and representative test, we will provide the exam on a no-fail basis for the first 30 people who take it and we will honor their completion of the A & P requirement for certification.

BCIA will continue to support traditional university-based and distance learning courses. Please access [www.bcia.org](http://www.bcia.org) for further information on all of the options for the A & P requirement for certification.

### CERTIFICATION BY PRIOR EXPERIENCE (CPE) FOR GENERAL AND EEG BIOFEEDBACK

When many of you achieved your certification, biofeedback and neurofeedback were emerging fields. The profession has grown and this is largely due to your pioneering spirit. You helped to set the entry-level requirements and worked hard for the recognition of professional standards.

The BCIA Certification program is the "gold standard" of excellence in training and education for the delivery of clinical biofeedback and neurofeedback services and has been certifying entry-level clini-

cians for 25 years. But what about those experienced professionals who have already gone far beyond entry-level training. Is there a certification option for them?

BCIA is pleased to announce the launch of Certification by Prior Experience (CPE). This opportunity is reserved for a select group of professionals who can demonstrate extensive training and experience and have been leaders through their various contributions to the field. We recognize that these professionals have earned the right to a streamlined certification process.

Only those professionals who can demonstrate the following may apply:

- a current license/credential, issued by the state in which you practice, in a BCIA-approved clinical health care field;
- a minimum of 60 hours of accredited post-professional education in one or more BCIA blueprint areas; and
- 3,000 patient hours over at least 5-years' relevant experience using clinical biofeedback modalities or neurofeedback

Applications will be considered by the Certification Review Committee and recommended to the BCIA Board of Directors for final approval.

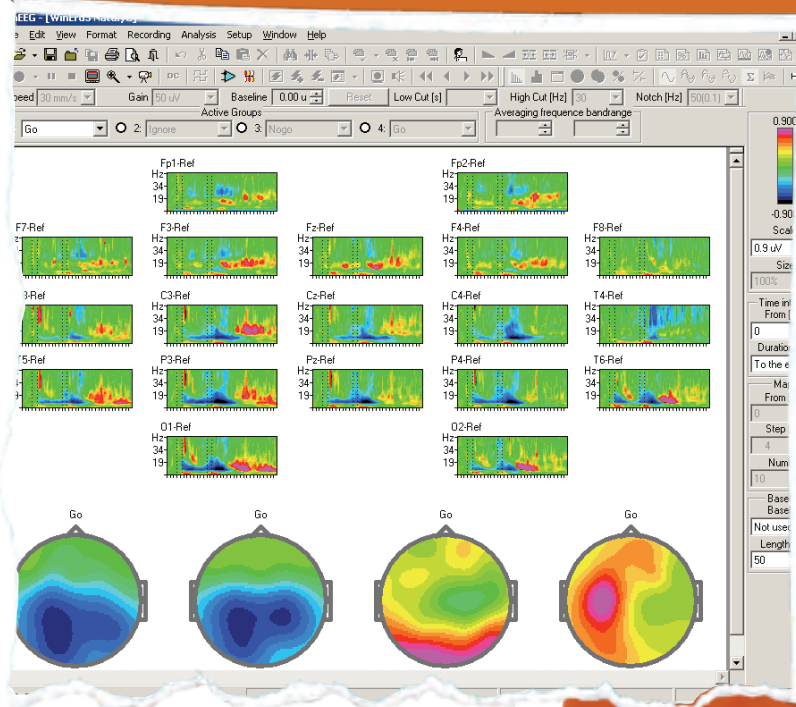
### CONCLUSION

The overhaul of the General Biofeedback and EEG exams, independent study option for the A & P requirement, and the CPE program are three of BCIA's most visible initiatives. Behind the scenes, we have also engaged in advocacy on behalf of certificants and the field, simplified all of our application forms, and added several new exam sites so that there were 10 options for the last five months of 2007. In addition, we have enhanced the BCIA website to include a zip code search for practitioners and a global search function to assist visitor navigation.

Please contact the office at (303) 420-2902 or [bcia@resourcenter.com](mailto:bcia@resourcenter.com) for more information about these new BCIA initiatives or to provide input and suggestions to us. Service to our stakeholders is our highest priority. We want you to be proud of your membership in an elite group of biofeedback professionals who are "More than qualified—BCIA Certified!"

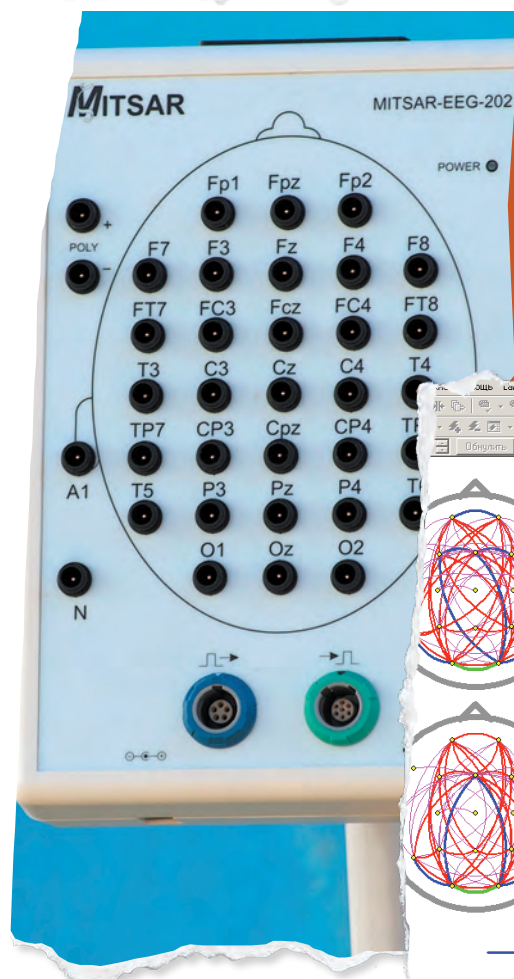
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