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Letter from ISNR President

As we move into the summer months many of us anticipate restful vacations and the chance to relax during the long, leisurely evenings the season offers. Despite such temptations, your Board is hard at work clearing the large number of projects crowding our plate. I am so appreciative of each of our Board members, the specific talents each one lends to the Society and the considerable time and effort they are willing to devote to securing the future of ISNR and to raising the visibility—and credibility—of the field of Neurofeedback. I think you will find that this will have been a very productive year for the Society, a year mostly of beginnings to be sure, but beginnings that engage the fast-moving flow of events destined to shape the future of our field. We do not intend to sit on the porch and rock while these events pass us by.

Most of you probably are clear by now that these events center to a considerable extent on the rapidly expanding volume of research in neuroscience that is pushing us to direct our own research toward (1), defining and explaining more clearly what we’re actually doing when we train a brain away from dysfunction and toward peak performance; (2), demonstrating ways Neurofeedback can help with major concerns such as autism, Alzheimer’s, dementia and PTSD, while (3), continuing to advance our training systems to take advantage of Neuroscience’s emerging understanding of the system that is the brain.

It is one thing to do research, but quite another to have it believed and accepted. In order to earn and maintain credibility for our research we as a field have to show up as a credible and mature discipline in the eyes of other disciplines and the public as well as to legislative and regulatory bodies. I believe this means we have to develop (1) internationally recognized standards of treatment, (2) internationally accepted standards of knowledge, expertise and certification for those who choose to practice Neurofeedback, wherever they are located, and (3) definitions of what we mean by Biofeedback and Neurofeedback that can stand the tests of time and change.

In connection with that latter point, I want to acknowledge and appreciate the extensive work that representatives of our combined fields—AAPB, BCIA and ISNR—have done to come up with our first-ever unified definition of Biofeedback. We are now working on a clear concise definition of Neurofeedback. Our successors may revisit these efforts in due course, but for now we will have something carefully crafted to move forward with.

As formidable as all the foregoing may sound, it’s exciting, too. I believe that we just may be, in William Tiller’s terms, at “Jump Time,” a point in time when we can take a quantum leap into a new, larger sense of who we are as a field of practice, where we spend less time backbiting and more time cooperating to secure for Neurofeedback a lasting place in the array of healthcare options. In that connection, your Board has been hard at work on a number of other projects designed to take us in the directions I’ve mentioned.

One such project involves the thrust of this year’s conference. The theme of our upcoming conference on the scenic Riverwalk in historic San Antonio, Connecting Applied Neuroscience to the World, echoes our field’s overall direction and promises excellent speakers, lots of new information and some fun events, too. Board member and Conference Chair Leslie Sherlin, Conference Coordinator Ann Marie Horvat and the Conference Committee are stopping at nothing to create real value for you this year. I urge you to make your plans now to attend, while flights and special room rates are still plentiful. You won’t be disappointed. Go to www.isnr.org for details. See you there.

Another relevant project appears to be getting underway, as well. Recently, I attended a very productive meeting with Board-level representatives of AAPB and BCIA on the subject of forming an alliance to move our collective field forward and to speak with one voice on the common issues we face. The outcome was a recommendation that this alliance initially form three task forces to address three primary issues: increasing insurance recognition and rates are still plentiful. You won’t be disappointed. Go to www.isnr.org for details. See you there.

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ISNR Mission Statement

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

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

AAPB Neurofeedback Division Mission Statement

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

• The encouragement and improvement of scientific research and clinical applications of EEG technology and neurofeedback.
• The promotion of high standards of professional practice, peer review, ethics, and education in neurofeedback.
• The promotion of neurofeedback and the dissemination of information to the public about neurofeedback.

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

Continued on page 6
Letter from ISNR Co-Editor

Welcome to the July issue of NeuroConnections.

This issue continues to provide more information regarding the Z-score training which is still in the beginning stages of usage by clinicians. Elizabeth Tegan R.N., M.S. has written up her use of Z-scores using Thought Technology’s InfiniTi. Very useful. Studies of this new type of training, hopefully, will be provided over the next few years.

Stephen Larson PhD has written a wonderful informative article about a legendary member of the Neurofeedback world... Les Fehmi, PhD. I remember meeting Dr. Fehmi when I first started in the field in 1989 with the hope of working with him. His schedule and mine conflicted and so we didn’t connect. His Open Focus work, however, did connect and if you have never used it, grab the CDs and books and use it. Open Focus and his alpha synchrony is worth your time. Do enjoy Stephen’s article on Dr. Fehmi.

John Carmichael PhD has provided us with a very thoughtful discussion of his work with police officers who have PTSD. He lays out his rationale, assessment techniques and NF work with them. PTSD is a diagnosis that is very much in the forefront due to the number of returning veterans who have been diagnosed with the disorder and is an area that we need to focus on.

Finally, Mary St. Clair, LMSW provides us with a case study using the LENS system showing the many changes that took place in this client as well as the changes that occurred in her life.

This issue also has information regarding our annual conference which is to be held in the lovely city of San Antonio, Texas. Walking on the canal, eating under the flaming torches and listening to the soft music is an experience to be savored. The conference has lined up outstanding speakers and workshops to help further your skills. I hope to see all of you there in late August!

Warmly,
Merlyn Hurd PhD
Merlyn Hurd PhD, BCIA/EEG Fellow
ISNR Editor

Letter from AAPB Co-Editor

Welcome to the summer 2008 issue of NeuroConnections. In this issue we continue to explore clinical applications and protocol design considerations to take full advantage of the z-score training software which has becoming increasingly available to end users. Neurofeedback, as with other forms of therapy, reflects a blending of science with artful application of the therapist’s clinical experience, empathic wisdom and clinical judgment. The capacity to train to real-time norm-referenced feedback has the potential to contribute to the clinical specificity and scientific basis of neurotherapy training. Yet contributors to this issue consistently note training to a normative z-score cannot substitute for a sound theoretical basis for a planned program of intervention, which derives from a solid understanding of the neuroanatomical and electrophysiological correlates of the patient’s symptoms and desired outcomes.

Although widespread interest in z-score feedback training is only emerging, scientific evidence supporting the efficacy of real-time norm referenced training protocols has been accumulating for the past decade, in the pioneering work of Kirtley Thornton, who developed task-specific norms for reading and memory tasks (“activation-guided database”) which have served as the basis for real-time norm referenced training in learning disability and traumatic brain injury populations. This work has now appeared in a series of peer reviewed publications and book chapters, documenting significantly larger effect sizes than either standard learning disability interventions or traditional neurotherapy.

I would like to take this opportunity to thank departing board members Nancy White and Joel Lubar, who recently completed their terms of service with the AAPB neurotherapy division board of directors. While their official terms of office have come to an end, we continue to look forward to their insights and incisive wisdom and expect that their personal dedication and unflagging support for the field will continue into the future. We welcome newly elected neurotherapy board members Paul Swingle PhD (representing the international scope of AAPB and the neurotherapy division) and Rex Cannon, MS (who is an outstanding example of AAPB’s future in its talented and highly productive student membership).

As we look ahead to future issues, we would like to take a moment to invite readers to contribute clinical case histories and features relevant to upcoming themes. With the fall issue, we plan to examine slow cortical potential neurotherapy as well as interventions based on transcortical DC stimulation therapy. We also plan to devote a future issue to biofeedback and neurotherapy interventions with returning combat veterans. We would welcome your contributions to these thematic issues. If you would like to discuss a possible feature article, please contact me at rriss@madonna.org.

Roger Riss, PhD
AAPB Co-Editor

Letter from ISNR Ed

Another quarter of a year has passed since the last issue. I’m pleased to have been involved with the Task Force on Nomenclature, in which the “Big Three” — AAPB, BCIA and ISNR established the official definition of Biofeedback. You can find it on the AAPB site. It would be wise to use it when in discussions with third party payers and in your marketing tools. The more the official definition is used, the more cohesive we will as a field be represented. ISNR is organizing an effort to establish the definition of neurofeedback, which will also be ratified by all associations.

ISNR is also proud to be involved with the Biofeedback Alliance. We hope that our efforts these next few years soundly contribute to cohesion that helps establish our field even further. With this effort and the new ISNR Research Foundation, we surely are going to make positive inroads to establishing credibility with those who have been our strongest adversaries.

This issue is again overloaded with wonderful articles, so I’ll keep my ramble short. My compatriots in this joint newsletter have touched on the important issues, so I invite you to read their letters.

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

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

Happy Summer,
reimbursement; broadening the number of colleges and universities teaching Biofeedback, Neurofeedback and Quantitative EEG, bringing in young practitioners; and raising public awareness of our fields and the healthcare benefits they offer. The group recognized the potential inherent in involving our European counterparts to create the beginnings of a truly global alliance.

Your Board has been busy promoting the field in other respects, as well. In response to the American Psychiatric Association (APA)/American Association of Child and Adolescent Psychiatry (AACAP) dismissal of Neurofeedback as “unproven” in their on-line ADHDD Medication Guide, your Board took the sense of the membership, explored various options and ultimately wrote the AACAP with the research references that showed their conclusion to be unjustified. In their response the AACAP agreed to take our information into consideration at their next annual review of the Guide. A small victory, perhaps, but maybe they’ll be less cavalier in future.

We issued a commentary on a white paper surveying the research on Neurofeedback’s effectiveness with addiction that came to a conclusion inconsistent with the clinical outcomes most of us have experienced. Both the paper and the commentary will be published in both the AAPB’s journal and our Journal of Neurotherapy, assuring a more balanced view of the subject.

We are still in process of upgrading the ISNR web site with the idea of presenting to the world the more expanded view of the field we espouse. This is moving forward at a slower pace than I like to see, but I think you will like the outcome once the upgrade is complete.

In a somewhat different vein, your Board has made it a point to be visible and transparent in its deliberations and decisions, open to your comments and suggestions and willing to be accountable for its actions. We have published the minutes of our meetings and attempted to keep you abreast of developments, especially where you have shown special concern. I, for one, hope this breath of fresh air keeps running through the Board Room and that this openness brings us closer together as an organization.

I feel it is important to mention again that we lost three giants of our field this year: Margaret Ayers, Bernard Brucker and Joe Horvat. In recognition of Joe Horvat’s selfless dedication to the advancement of our field your Board has established the Joe Horvat Research Fund to support the expansion of research in Neurofeedback and we encourage you to make contributions.

This has been an eventful year for ISNR. If I thought my tenure would be quiet and smooth I would have been quite mistaken. And there’s more to come as we hammer out the elements of Neurofeedback’s future. Still, I am gratified to have been at the center of things for a time and to have served with the quality of person represented by your other capable and dedicated Board members during this time of growth and change. My thanks to them all for their assistance during this time; it is clear I could not have accomplished much without them.

And special thanks to Cindy Kerson, capable and dedicated, who keeps it all together and who quietly kept me straight all year.

As I return to the Board as Past President in a couple of months I pledge the same assistance to our President-Elect. And I pledge to you, our loyal members, to continue the effort to carve out a lasting place of prominence for the field to which our predecessors dedicated themselves and from whose foundational efforts you and I are now able to create something of lasting value to ourselves and others.

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

DALE PATTERSON

Dale Patterson passed away on May 20, 2008. He was born on May 22, 1950 and grew up in Bethlehem, PA where by the time he was 18 he had won many trophies for high school tennis. In college he was on the squash team; he was also an excellent skier. Throughout his adult life he continued to play tennis. He also loved sailing and through the course of his life time had owned a few sail boats for pleasure.

He was the owner and clinical director for over 25 years of two Biofeedback and Alternative Medicine centers in New Jersey, primarily in Philadelphia. His education included Bachelor of Science, Psychology, Western Washington University; Master of Science, Personality Psychology/Neuropsychology, Kansas State University; Doctor of Clinical/Counseling Psychology. He taught coursework at Rutgers University; and his published thesis was: “Biofeedback Training and Cognitive Style: An Electrophysiological Learning Study.” He moved to Jacksonville, Florida a few years ago to semi-retire. He is survived by his only daughter, Melissa L. Patterson, 21, who has just graduated college and has been accepted to work as a journalist at the Chicago Tribune and his companion Jean M. Normandin with whom he had a nine-year relationship.

Dale was an influential mentor to many clinicians of Neurofeedback. He was always challenging all of us to push the envelope. His practice welcomed newcomers to work with him and learn the techniques of working with children in what one newbie said, “Was the fastest set up she had ever seen.” He believed in having the children be seen in short sessions with plenty of activity to stimulate their cognitive development at the same time reducing their symptoms of AD/HD. His stress management techniques were also successful with children and adults.

Dale’s humor and dedication will be missed. If you were on his e-mail list, you never knew what joke he would suddenly send you or sign you up to some odd website. Dale was a unique individual and dedicated neurotherapist.
The New Biofeedback Alliance!
Daytona Beach, Florida was a fitting setting for the AAPB 39th Annual Conference. To the delight of the attendees, the beach, the sunsets, and—yes—the education were all glorious! But, best of all was the camaraderie of all who attended the conference. Several attendees commented that they were attending the conference for the first time in several years and this meeting was a resounding reminder for them of the invaluable education and fellowship offered at AAPB.

There were many highlights, not the least of which was watching so many members out on the dance floor during the Biofeedback Bistro. Those who were able to attend had a wonderful time! What a fitting closing to the conference.

But the biggest highlight for me actually occurred behind the scenes. A special event took place to which the Presidents and Presidents-Elect from the three bodies representing biofeedback, AAPB, BCIA, and ISNR, came together to discuss the future of the profession. By coming together, we learned that we share the same goals and vision for advancing the future of biofeedback and that there is a unity of spirit among the three groups in achieving qualified growth in this profession. At the core of the discussions were three primary topics:

1. Third-party reimbursement for biofeedback services;
2. The need to attract young practitioners and scientists into our memberships and the biofeedback certification programs, and;
3. A desire for greater awareness of the health and performance benefits of biofeedback in the medical/healthcare community and the public.

The outcome of these discussions was most productive and truly exciting! Not only are these three organizations working together for the good of the profession but three very important initiatives were established to address the topics above. Task forces were established, each to be driven by one of the three organizations and with representation from each group. BCIA has taken responsibility for the Advocacy Task Force to address item #1, AAPB will head the University Outreach Task Force in tackling item #2, and ISNR will spearhead the Public Awareness Task Force in addressing item #3.

This new affiliation was dubbed the Biofeedback Alliance—that has a nice ring to it! We hope that each of you will support your respective organization’s involvement in these new initiatives and volunteer to participate where needed.

David L. Stumph, IOM, CAE
AAPB Executive Director

In the spirit of cooperation, the Biofeedback Alliance also approved a new definition of biofeedback. We encourage you to use this definition in your promotional efforts for your biofeedback services. Post it on your website, use it when addressing your local media, and share it with other professional societies with which you are associated. Here is the definition:

Biofeedback is a process that enables an individual to learn how to change physiological activity for the purposes of improving health and performance. Precise instruments measure physiological activity such as brainwaves, heart function, breathing, muscle activity, and skin temperature. These instruments rapidly and accurately “feed back” information to the user. The presentation of this information — often in conjunction with changes in thinking, emotions, and behavior — supports desired physiological changes. Over time, these changes can endure without continued use of an instrument.

Biofeedback Alliance—that has a nice ring to it! We hope that each of you will support your respective organization’s involvement in these new initiatives and volunteer to participate where needed.

David L. Stumph, IOM, CAE
AAPB Executive Director

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- Jack Johnstone, Ph.D.
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- Leslie Sherlin, Ph.D, QEEG-D
- Rob Coben, Ph.D.
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Whole-Head Normalization Using Live Z-Scores for Connectivity Training

Part 2 of a 2-Part Series
Part 1 appeared in the April, 2008 issue

Thomas F. Collura, Ph.D

This article is a second in a 2-part series that further explains the practicalities of using Z-score training with multiple sites. For an explanation of the theory this is based upon, please refer to part 1 of this series in your April issue of NeuroConnections (Ed.).

Some have worried that multivariable training with LZT is too complex for the trainee to comprehend. Quite the contrary. During the training, the subject is simply watching a DVD or animation, or playing a game, or listening to music or sounds. The complex protocol calculations still control all feedback as if there were just another training variable. The trainee experience can be whatever is conventional or familiar, relative to the “signaling” method. The brain readily seizes on information that relates to a well-targeted state, regardless of the metrics underlying the state. The fact that we can ride a bicycle demonstrates that we can readily integrate millions of bits of information into a cohesive whole, combined with the mind and body responses, and that it can become effortless. The more comprehensive the information, the more likely the brain is to understand and interpret it. And this is a brain process, not a conscious mental process.

This is not unlike the difference between simple muscle fitness training, versus a more comprehensive activity like dance or athletics. When applied in a comprehensive whole-head training approach, live Z-scores transform neurofeedback into an entirely different kind of experience for the brain’s self-regulatory mechanisms. Nonetheless, the trainee continues to watch movies, play simple games, listen to music, as before, and by allowing the training to occur, lets their brain learn a new and profound new set of activations and connections.

Currently, we encourage the majority of our users to use the comprehensive MVP method that incorporates all available Z-scores into a single metric. We have enhanced it to include selective training functions, such as training only a specific metric (absolute power, relative power, etc), or training a certain class of metrics (“all connectivity metrics”). In addition, we have included the ability to use different upper and lower limits. This was necessitated by the experience with a man who had excessive amplitudes overall, reaching the level of 2-3 standard deviations in the dynamic scores. When a window of + or – 3 standard deviations was used for training, the trainee’s EEG quickly changed to a very low amplitude EEG, and overshot the goal of zero. Therefore, we offered the ability to provide different limits, and the trainee was trained using limits of +3 and -1 standard deviations. This allowed effective feedback, while not rewarding the trainee for going too low.

Using a comprehensive approach, it also becomes possible to address the issue of normalization training versus peak-performance or mental-fitness training. Based upon our experience with various peak-performers, we have identified certain combinations of features that are unique to them. We also have subjective reporting data on individuals who undergo Z-score training, and who exhibit one or more of these characteristics. Certain characteristics are generally identifiable as “good” and which reflect optimal functioning for that individual (but not necessarily all individuals). Other characteristics may be observed, that are concordant with “complaints,” which might include issues with attention, mood, and so on (Collura et. al. 2008).

Figure 2 at left shows an example of
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a display used in this approach. Despite the complexity of the underlying computations, the display and its interpretation are relatively simple. The system derives a metric which reflects a comprehensive analysis of all of the Z-scores, or a subset thereof. The metric becomes the training variable, thus replacing the conventional amplitude or connectivity-based metric, and is significantly more comprehensive than a single Z-score.

The interpretation of the overall success rate is identical to that in any operant conditioning paradigm, and reflects the aggregate reward being experienced by the user. The variables that can be adjusted to control feedback are the target size and the performance score required for the derived metric. In the example shown, the required score is 70.0 percent, and the trainee is achieving this goal 50.4 percent of the time, on average.

One benefit of MVP-based protocols is that they can be biased for peak performance. For example, among the attributes that may be selected for enhancement are global alpha coherence, resting motor strip

**Figure 3.** NeuroGuide coherence maps of case of Jack (Smith, April issue) showing High Beta (top) and Delta (bottom) coherences before training (left), after a conventionally targeted coherence training regimen (middle), and after z-score training (right).

**Figure 4.** Pre- and Post-treatment NeuroGuide QEEG maps (eyes open) showing effects of 23 sessions of 4-channel Multivariate Proportional live Z-Score training.
we refer to the example case presented by mark smith (april issue). in this case, we have three neuroguide qeeg coherence maps obtained from a full 19-channel EEG assessment. the first map shows the trainee at an early stage in this training experience. considerable coherence abnormalities (hypocoherences) are evident. the second map shows the effects of conventional targeted coherence training, using the following plan:

1. increase coherence of beta at F4/C4 to decrease seizures. (5 sessions)
2. increase coherence of delta at P3/T5 to decrease seizures. (5 sessions)
3. increase coherence of delta at F7/F8 to decrease seizures. (5 sessions)
4. increase coherence of beta at C4/F8 to decrease seizures. (5 sessions)

The effects of the training are evident. (see figure 3 on page 12.) the targeted coherences have indeed moved toward normalization. however, many coherences that were not targeted have changed, and not for the better. furthermore, delta coherences have become significantly worse. this demonstrates the potential hazards of targeting single coherence measures along single connectivity paths. the third (right) map shows the result after several sessions of Z-score targeted coherence training. it is evident that the Z-score approach is indeed capable of targeting and normalizing coherences, leading to whole-brain normalization.

these advanced Z-score training methods are implemented in software, and are applied “on top” of the basic live Z-score software that is built into the ANI DLL. this software is itself written in the form of a library, which can become available to other system developers who wish to incorporate this new form of training.

as an example of the ability of multivariate Z-scores to resolve complex situations, figures 4 on page 12 shows pre- and post-treatment QEEGs, which were taken from a case that required only 23 sessions to produce the changes shown by lambos and stark (Collura et. al. 2008). the trainee was a 12 year-old boy with problems related to impulsivity, behavior, discipline, and hyperactivity. in amplitudes, he had abnormally high slow frontal activity, abnormally low fast frontal activity, and occipital abnormalities in delta and alpha. these also manifested as many significantly abnormal asymmetries. in addition, there was hypercoherence in essentially all frequency bands, and particularly at the very low and very high frequencies.

by using an MVP protocol, the clinicians were able to remediate essentially all of these abnormalities in 23 sessions, as shown on the QEEG. interestingly, one small emerging abnormality appears in the form of left frontal beta and high beta. if anything, this slightly excessive activation of the left frontal lobe might reflect a benefit, which would be a brightening effect on the trainee’s mood. these results are taken from the eyes-open condition, which was the training condition. a different set of changes, also related to normalization of the EEG, was observed in the eyes-closed condition, indicating that the brain was learning self-regulation for both conditions, despite being trained with eyes-open only.

in summary, the use of Z-scores in itself is an important addition to neurofeedback, but it does not provide an “automatic” solution in and of itself.

acknowledgement:
the author wishes to thank michael l. smith for helpful comments and input on this article.

disclaimer:
the author has a financial interest in BrainMaster Technologies, Inc. the advanced multivariate targeting method described herein is patent pending in the US, Canada, and Europe.

in memory of dale patterson
A respectful goodbye to an individual who was devoted to the biofeedback field is offered here. Dale’s enthusiasm for the field was unmatched by all. Despite personal physical and personal setbacks, he remained forever focused on his desire to bring this treatment to all who could benefit from it. I will forever appreciate his passion and devotion. It is unfortunate that he was unable to bring his dream to those in need.

Perhaps, however, his energy, optimism and drive will be felt and appreciated by others as they continue to move the field into its proper place in society. He would greatly appreciate the continued efforts of others.

kirtley thornton, PhD
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An (Open) Focus on Les Fehmi’s 2007 ISNR Lifetime Achievement Award

Stephen Larsen, Ph.D.

It is an awesome thing to know personally some of the “pioneers” in biofeedback, and neurofeedback. Though the field is only around fifty years old, and still largely unrecognized, I believe that neurofeedback has enormous implications for the healing disciplines of the future, from medical/neurological to psychiatric concerns. While biofeedback has showed demonstrable efficacy with muscle relaxation (Basmajian, Cram, etc.), vascular regulation (Green, Walters et al), GSR (See Brown) for many people, even in the field, neurofeedback, or the connection between brain and behavior still remained a kind of no-man’s land of myth and quasi-informed speculation. What affects what? Is consciousness the outcome of brainwave activity, or can conscious awareness or intent in turn influence it (Kamiya, Kasematsu and Hirai, etc.)? These problems are still being worked out in neurofeedback communities; of which the EEG branch of the AAPB and the ISNR have taken leadership roles as constituencies of scientific peers.

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Neurofeedback was brought to a larger public with Jim Robbins’ book A Symphony in the Brain, with over 15,000 copies in print. Jim did due diligence when writing it. He interviewed Stermian, Budzunski, Kamiya, the Others, and Thatch er among many others. He did more than write about neurofeedback—he also got “hooked up” and did sessions, which gave his book additional life and authenticity. In this experiential zone, a high point, he tells us, was his encounter with the work of Lester Fehmi. “The results,” he writes, “were dramatic and among the most profound I experienced during the course of research for this book” [Robbins p. 188]. This is not insignificant praise from a respected science journalist who began writing his book knowing little about the field.

I had a chance to spend a couple of hours with Jim at the Sept ’07 ISNR conference in San Diego. I asked him about Les Fehmi, who had not been able to come to the conference. Jim told me the ISNR had awarded Fehmi a Lifetime Achievement Award, and he was scheduled to accept it on Les’s behalf at the conference awards banquet at the San Diego Zoo that evening, but a pressing family matter would not let him attend. Would I, as a good friend of Les’s, stand in for him? Both humbled and honored, I agreed.

Thus it was to the trumpeting of elephants and the musky waft of eau du orangutan that some of the world’s finest neurotherapists and researchers heard me accept Dr. Les Fehmi’s lifetime achievement award on his behalf.

“Dr. Fehmi,” I said in the ceremony, “was unique in the field of neurofeedback. He was there since the very beginning. While completing his Ph.D in physiological psychology, he was struck by a little anomaly that emerged out of how monkey brains processed visual information. It seemed that whole realms of information were carried simultaneously on mere neurological wisps of information—small time slices of brainwaves. Out of this came his lifelong interest in whole brain synchrony. As a young professor at SUNY Stony Brook, Fehmi began doing alpha trainings on himself. After many failures, and almost giving up, he had a breakthrough experience of his own, out of which he developed the consciousness-altering technology that is present in the Open Focus™ technique. Open Focus is one of the most outstandingly effective experiential processes that can be taught or used with or without EEG biofeedback. It is useful to psychotherapists as well as lay-people, and is solidly backed up by both theory and experimental evidence. In this way, Dr. Fehmi’s work is a tribute both to science and to the art of healing and well-being.”

Several weeks later, following the Eastern Regional Biofeedback meeting held on the Rutgers campus, Tom and Terri Collura, and Robin and I had the pleasure of presenting the award in person, at a quiet little Italian restaurant in New Brunswick. Despite all our high spirits and waggish behavior, (with Les and me using sleight of hand magic effects on the maître’d and waiters) it was a solemn occasion. Giving a lifetime achievement award to someone means that sooner or later they will “achieve mortality in this lifetime. The award is now nestled among literally dozens of awards for achievement and professional accomplishment, that line the hallways of the couple’s gracious Princeton office.

Surely, however, a Lifetime Achievement Award requires a little more elaboration. This article allows me more space than a ceremonious speech would, to explain the creative and professional effort that leads up to such an award.

Lester Fehmi was still a psychology undergraduate at San Jose State College, around 1959, when he heard Joe Kamiya talking about how his studies showed that people could discern whether they were in an alpha state. Full of his newly acquired understanding of the scientific method, Fehmi thought the whole idea seemed a little woolly and not scientifically verifiable; but when he heard Kamiya again, a few years later, his ears pricked up. He graduated from San Jose State in 1961 with honors, with a major in psychology and mi-

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Dr. Jonathan E. Walker, M.D.

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Les Fehmi Award
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tors in mathematics, physics, and electrical engineering. He had worked for Lockheed Corporation since 1958, first as a solderer, then as a research laboratory analyst, and finally as an engineering psychologist. He went on to MA (1965) and then PhD (1966) in Physiological Psychology (minor in Neurophysiology and Biophysics) at UCLA.

What Fehmi was discovering in his neurophysiological research was truly astonishing. He was studying evoked potentials and information processing in monkeys. Milliseconds after the monkeys were flashed information tachistoscopically, a blanking flash could be introduced that masked the image. The research question became, what was the length of time allowable after the information was presented to the monkey that would allow the information to be registered. To Fehmi’s astonishment (and everyone else who looked closely at the data) no information was lost even down to 30 msc. Information began being lost somewhere between 30 and 20 msc, and all information was lost below 18 msc. The findings were counterintuitive, especially for theorists who thought a temporal code was responsible for the information transmission. Fehmi concluded it was a spatial, not a temporal code that carried the information. This meant the information was carried almost instantaneously on wavefronts of synchronous action potentials.


During his Post-Doctoral Fellowship at UCLA Brain Research Institute, Fehmi’s seven-year marriage began falling apart, and he became overwhelmed with deep psychological pain and suffering. He wondered if biofeedback had any answers for this raw, immediate reality of emotional pain. There was a general consensus that the slow rhythms of delta and theta went with depression, and beta and hi-beta with anxiety. Kamiya had originally alerted him to alpha, and now it seemed that alpha must hold the key to something; neither sluggish nor over revved, alpha rested in a more neutral, sustainable range. Still, it would take some perspiration to change Fehmi’s inspiration into a clinical reality, or something that could really help someone—er, like himself.

From 1967-73 Fehmi was Assistant Professor of Psychology at the State University of New York at Stony Brook. He spent his first year building new equipment to monitor the EEG. When he had a workable prototype, Fehmi decided (like any good behavioral scientist interested in the functioning of humans) to use himself as the guinea pig. But the more Fehmi tried, the more he failed. By the thirteenth two-hour session, he was ready to give up on the whole thing. While hooked up and feel-

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ing he was accomplishing nothing, a wave of futility washed over him, and he had the psychological experience of “giving up.” Suddenly the alpha became abundant.

Fehmi was able to reconcile his phenomenological state of being with the feedback he received. This provided the entree to a new type of neurofeedback training probably never done before. Repeated sessions with abundant and synchronized alpha was “a profound experience” he said simply, “Things got better. My arthritis went away. I had been too fixedly ‘objective.’ I now became warmer, and guess what, other people responded in kind.” This was 1968.

Fehmi also noticed that there was a rush of creative insight, and that things seemed to come more easily; he found himself more appreciative, and more flowing and graceful. But there had to be more to it than simply “giving up” to produce alpha. What kinds of subjective experiences, what physical stimuli (or lack thereof) or intentional visualizations would encourage alpha? He explored smells, colors, art, music—the visualization of panoramic sunsets. These produced mild, but not always predictable improvements. Relaxation protocols weren’t very effective either. He experimented with more esoteric notions and suddenly alpha flooded the brain.

According to Jim Robbins, the first meeting of Biofeedback professionals took place in Aspen Colorado, in 1968. It was a breakaway mini conference, part of a larger one called Brain and Behavior. The legendary Barbara Brown, and Joe Kamiya were there, along with Thomas Mulholland, Thomas Budzynski and Johann Stoyva. The young university professor Lester Fehmi chaired the paper session. The following year, in Santa Monica, the meetings were joined by Barry Sterman and Elmer Green. [Symphony p. 65]

In the late 1960s Fehmi also began to attend the Council Grove conferences near Topeka Kansas, as a regular participant. The conferences, founded by biofeedback pioneers Elmer and Alyce Green (then at Menninger), brought biofeedback, spiritual disciplines and consciousness studies together. The conferences were attended by biofeedback pioneers Steve Fahrion, Pat Norris, Dale Walters, veteran LSD researcher Stanislav Grof, and mythologist Joseph Campbell.

Suddenly Fehmi found that, unlike in dry academia, the word “consciousness” was not a dirty word. Astonishing! People could think about both consciousness and the brain together. It was at Council Grove that Fehmi began to try his brain synchrony techniques for psychological exploration, and teach people Open Focus. In around 1973, a friend, Jerry Wesch, who also attended Council Grove, took Fehmi to a recording studio near his home in Indianapolis, where he recorded the professional-quality tapes that are still used in Open Focus workshops.

Also in the 1970s Fehmi began publishing in biofeedback journals and on topics related to biofeedback, and also presenting on topics related to biofeedback at the American Psychological Association national conferences in 1971, and 1973. Les had gone to Princeton in 1973 to set up a private practice with a psychiatrist named...
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Brain Synchrony and Open Focus attention training. Sometimes they teach separately, sometimes together. As a practicing clinician, I see a nice complementarity between them; Les tending toward the neurofeedback and experiential Open Focus techniques, and Susan providing the skills of a consummate psychodynamic therapist. I believe a variety of therapeutic needs are met by this accomplished duo.

In the lectures at his trainings, however, Les Fehmi is very much the university professor. Science is where he feels most comfortable, and he wants trainees to understand the science behind his method. He is very precise as he explains what the brain is doing neuroanatomically when it achieves synchrony in all its quadrants, and what is likely to happen on the afferent and efferent levels.

Remember that Jim Robbins said his experimental encounter with Fehmi’s work was “among the most profound I experienced… muscles…started letting go… a lighter feeling.” There were unexpected sensory enhancements that are reported in the neurofeedback literature. “I could pick up the smell of lilacs blooming half a block away. The sun seemed more golden, richer somehow, the way I remembered it glowing from childhood.” [p.188 Robbins] As the nervous system is balanced and synchronized in a positive way, the innate energy and creativity of the personality come forth.

As a long term Zen meditator, Les Fehmi knows what can happen when you de-afferent (still) the mind. The “Buddha nature” indeed shines forth; people become “more themselves.” This is something that modern psychiatry and neurology have overlooked. To be fully human is not just to be free of anxiety and neurosis, it is to flourish and celebrate the abundance of life while making social contribution. This form of neurofeedback fits in well to the “performance optimization” types of biofeedback, which have reported considerable success in sports, music and the performing arts.

Just recently Les helped a golfer cure a fifteen year case of “the yips” (an involuntary tremor or spasm in the arms which occurs on the downswing).

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and take one of the famous Fehmi trainings. My wife Robin took the training with me, and we both trained separately for about an hour. After the day’s activities we retired to our comfortable hotel and slept soundly. We each awakened, reporting a very vivid dream in the early morning. We told each other our dreams, and were astonished at the point-by-point comparison. We had had virtually the same dream, with thirteen points of agreement in setting, characters and action including incidental details. From many years of clinical dream work (both of us lead a regular bi-weekly dream group for the last thirteen years) this was an absolute first. I had seen the LENS form of neurofeedback stimulate dreaming, but not this kind of event that almost went beyond “synchrony” into synchronicity, or an encounter with parapsychology. We were astonished.

Later that same day, we did the “couples” protocol with two machines linked together and the reinforcement contingent only if we both were in synchrony. At lunch at an outdoor café in Princeton, I noticed the palpable orange-golden quality of the sunlight, and the exquisite musicality of a birdsong. These sensory immersions were followed by a sweet and exceptional closeness where we seemed to be thinking each other’s thoughts. We laughed frequently and warmly. The “honeymoon effect” lasted a few weeks and was noticed by us and other people. A couple of months later, at another visit to Princeton Biofeedback, we tried it again, and had the inverse, where we were irritable and visibly out of harmony with each other. Les and Susan confessed to us they had experienced both the harmonious and disharmonious potential of the method. A third visit, a couple of months later, seemed to emphasize the harmony pattern again. What was obvious to Robin and me, old trouper’s on the consciousness/meditation/biofeedback circuit, was that something unmistakable was happening. For me the training became far more believable if it could provoke disharmony as well as promote harmony.

After a recent session (individual again), I had an extraordinary lucid dream where I not only felt awake inside the fabric of the dream, but had a glimpse of the dream architect—the hidden creative mind deep in the self that was in fact making up the dream.

I believe this to be what enlightenment is, becoming one with the mind that’s making up the dream that is our everyday life as in La Vida es Sueno, written by Calderon.

To date, and this implies this lifetime is far from over, Fehmi lists 50 publications and papers read at professional conferences. The papers range far beyond the scope of biofeedback/neurofeedback publications, and include Experimental Brain Research, and the International Journal of Psychosomatics. His articles have also appeared in many professional anthologies and textbooks.

Jim Robbins interest in and inspiration from Fehmi’s work has already been mentioned, and has proven durable and productive. Recently as joint authors they wrote The Open-Focus Brain, published by Shambhala. In just a few months the book crossed over ten thousand in sales, and is being reprinted. The publishers have other projects including a related workbook planned. The book is being translated into other languages, and published abroad. These results have anticipatory implications, not only for the success of his method and its practitioners, but for the widening of the playing field for the whole discipline of neurofeedback. They introduce people genuinely interested in self-transformation to a method that really works, and has good science solidly behind it.

In fact my conversation with Fehmi has become intense enough, that we are currently in the planning stages on a joint book emphasizing the neuroscience aspects of what he does, as well as its underpinnings. The title is: Whole Brain Synchrony: The Wisdom and the Neuroscience Behind Open Focus.

As the lifetime achievement award says, Fehmi did something that people who wish to create something never seen before, he “thought outside the box.” But it is important to note that he “came from within the box,” that is to say, that only under the rigors of the controlled experimental situation, did he notice the anomaly that started him on the quest for his creative discoveries. What is unmistakable is that synchrony training and Open Focus are of immeasurable benefit to us all.
“So far as love or affection is concerned, psychologists have failed.”—Harry Harlow, 1958.

Sadie Hawkins Day, February 29, 1972, what Sponge Bob might call Opposite Day. It was a day when women propose and men accept or pay unbelievable consequences, a day when girls chase and boys are the focus of attention. Opposite Day. My 2nd grade teacher Miss Katherine explained how February had a 29th day rarely, every four years, and everything was reversed on Leap Day. Then she walked over to Peter, knelt down, and asked him to marry her. I’ve had issues with Peter ever since, but that’s another story. Recess came and we ran outside to play and I found myself being chased by Tammy, my girlfriend since who knows when, and we ran over and around huge piles of snow and she was about to catch me and kiss me but something inside of me called time-out. I didn’t know what possessed me and realized the mistake instantly and called time-in, but I didn’t count on Olivia. She appeared out of nowhere and I was not going to let Olivia kiss me. I dashed across the parking lot and she fell on a spot of ice and cut her head and that was the end of our game, forever. Second recess was cancelled.

A Google search of the term “mating disorder” reveals nothing, or nearly so (two porn sites). Neither the Diagnostic and Statistical Manual (DSM) nor the International Classification of Diseases (ICD) list Mating Disorders on an axis. How can we exclude mating from our roll of dysfunction? What, do we believe everyone is successful and all attempts are effortless and without conflict? Given its importance I suspect it is done properly and trauma-free once every four years, if so often, and some of us probably attain clinical failure and need help, need assistance, need therapy. The first step in

Sexual selection is why we are here.
Life requires consumption but continuance requires selection.

resources spent on chase and fending off rivals and too little thought and response given to predators and an ever-changing environment. The environment is like Tammy, always there, but minus any time outs.

DSM-IV and ICD-10 list end points of rare mating disorders—sexual dysfunction and paraphilias—but both manuals fail to incorporate the range of behaviors and cognitions involved in mating or dissimulating, to make up a term. The most important decision a child makes in his or her short life is to what degree to invest in our self. The most important decision after childhood is who will be our partner and to what degree

will we invest in their lives, and mating underlies both decisions.

Popular culture and mating disorders are synonymous. From celebrities to politicians we witness full circle a cacophony of disorders, from short-term mating, serial monogamy, partner swapping, polygamy, extravagant lifestyles, jealousy crime, martyrdom and homicide, as well as histrionics dressed up in power and waste.

Childhood mating disorders include early maturation, early exposure, late maturation, late exposure. Let’s add insufficient interaction with both sexes, competent approaches to intersexual and intrasexual competition, and most importantly, adaptive responses to failure on either front. It is well known that late maturing boys and early maturing girls undergo attempts at social isolation and most mating disorders emerge from social deprivation. Let me use a common example, a woman who everyone knows is the prettiest, floating through junior and senior high school, or so it would seem. But she is without intrasexual confidence, unable to respond to girls who isolate her. Lack of acceptance by the same sex compelled her to seek acceptance from the opposite sex, unwavering acceptance. Is

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there any question how her life progressed from there?

Does she have a personality disorder? No. Sexual dysfunction, no. An emotional disturbance, not exactly. She developed a mating disorder, stemming from low intrasexual confidence and subsequent gender isolation and this led directly to behaviors inappropriate to her stage of maturation. In high school she was ill-used by a series of boyfriends as she bonded out of the family group prematurely and trusted adolescents unprepared for couplehood. Again and again.

David Buss, professor of Psychology at UT Austin, is well known for human mating research. He outlines the considerable sexual adaptations during human evolution, as with any species, and for every adaptation there is an opportunity for advance and retreat. Here is his list of obstacles that must be overcome by any life forms in the process of successful reproduction (Buss, 2002):

- Select a fertile mate
- Outcompete intrasexual rivals for initial attention of this mate
- Fend off mate poachers
- Prevent mate defection
- Engage in appropriate sexual and social behaviors to ensure conception

With each goal consider how it may go wrong. Applied too often, too severely, too rarely, too resourcefully. Based on Buss’ work and others I would characterize the following general categories of mating disorders:

- Selection disorder: Unable to find appropriate mates in terms of age, interests, commitment, relationship status. A subcategory can be added for hyper- and hypo-responsiveness to rejection.
- Intrasexual competition disorder: Too little time spent developing desirability, or too much time to the exclusion of our domains of function such as tooling oneself for a career.
- Intersexual competition disorder, or gender disorder: Extreme involvement in gender-cultural stereotypic behaviors to exclusion of intersexual abilities, or too little.
- Pathological mating disorders such as harassment, stalking, mate substitutes.
- Bonding disorder: Maladaptation at any stage of relationship development, with a focus on blending and nesting (McWhirter & Mattison, 1984). Primary bonding disorder is premature/postponed or ineffectual blending or nesting. Blending is when two individuals become a couple, a single unit, spending free time together; and nesting is when couples strengthen their commitment through acceptance and a realistic understanding of relationship (McWhirter & Mattison, 1984).

Instability disorder: Trying to resolve THE relational conflict of childhood in a person less invested in us than the person with whom we had the original conflict.

Finally, there are five mate-forms: parent, sibling, self, child, stranger. We can marry someone who re-creates a parent-child bond on either end, a sibling bond, an auto-erotic bond, or go out and create our own disorder by rejecting all we’ve ever known.
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This article was created because we (Cynthia, Jay, and Tom) found ourselves in dialog at AAPB regarding the appropriate use of the many forms of Neurofeedback currently available to clinicians. I suggested Jay and Tom answer a few questions regarding their specific approaches to help those of us in “the trenches” decide how each modality/philosophy can be applied for a given client/population. Jay Gunkelman has developed the model of phenotypes and Tom Collura, along with Robert Thatcher has developed the Z-score training methodology. Please find below three questions that the author presented to Jay and Tom and their respective responses. I hope this helps you to decide on water color, oil, or gouache.

**What do you find to be the distinguishing features of the Z-score and phenotype neurofeedback training methods?**

**TOM:** All QEEG-based training including Z-score training needs to follow the guidelines:

- There needs to be a clinical complaint. *(Jay adds: we discussed a less clinical orientation for this section)*
- There needs to be an EEG abnormality that is consistent with the complaint.
- There needs to be reason to expect that reducing the EEG abnormality will alleviate the complaint.

Then you proceed with training relative to the EEG abnormalities. This rule applies to ALL QEEG-based treatment, not just z-scores. I have seen QEEG-based protocols that do not follow these guidelines that have adverse (or mediocre [ED]) results. For example, if right frontal beta is “low” then training it up is definitely not a good idea. As another example, someone with chronic anxiety who exhibits a diffuse alpha excess as a coping mechanism, does not want that trained down.

With live z-scores, you can also see cases where the live “training to the norm” is not indicated. For example, excess C4 SMR may be a “peak performance” signature that should not be trained down. Similarly, left hemispheric hypocoherence may reflect superior language ability (I have seen it in public speakers, professors, etc). You don’t want to train that either.

However, when you see a clear sign of an abnormality related to a complaint QEEG-based protocols, including live z-score training, are indicated.

Finally, it is also clear that using a phenotype-based approach and basing protocols on the phenotypes offers an additional, highly robust way to get around the above considerations, when the QEEG does not yield to a simple “you need to fix this” type of analysis.

Live Z-score training is particularly valuable for connectivity training in which it is difficult to establish appropriate targets. It has the capability of targeting multiple connectivity metrics simultaneously toward normal, allowing the brain to normalize in an extensive and comprehensive fashion, with an observed minimum of sessions. If used in a simple “train to the norm” manner, it can be extremely effective in many cases. Dick Stark, MD, a clinician in Florida, has been using Z-score extensively in his practice. When I asked him about this, he responded, “The z-scores we use are dynamic, and provide information unavailable when using a static Q.” He is learning to watch the dynamics of the brain in action, which is unique to live z-scores. However, there may be observed EEG deviations that, for certain reasons, are not desirable to normalize. These include some “peak performance” characteristics, as well as various compensation or coping mechanisms, whose normalization does not comprise the most optimal therapeutic path. One of its strengths it that it addresses the EEG deviations directly, without having to resort to categorization. Another is that it can lead to new insights gained by the direct observation of a system of real-time metrics revealing underlying dynamics and organization. The orientation of live z-scores is neutral, in that once the normative criteria have been establish, it endeavors to reveal the EEG parameters and their underlying dynamics, without predisposition or bias with regard to what can be discovered.

The Phenotype approach has the benefit of using physiological and clinical insight to categorize observed EEG characteristics in a functional way. It can lead to effective protocols that would not be suggested by merely observing QEEG deviations and seeking to normalize them. It produces protocol recommendations that tend to be standardized, and attempt to address an underlying condition, by providing an appropriate functional challenge in the particular recommended training. In this regard, it has more of an “Eastern,” yet entirely scientific, orientation. It has a weakness when confronted with complex QEEG circumstances that can be more effectively targeted automatically using live z-scores. It is also limited to the fixed number of preconceived phenotypes, and is thus more restrictive in its application. *(Jay adds: these statements need to be substantiated.)* It should be considered as an essential component of any evaluation, as a means of understanding the “sanity” of the overall assessment, and to guide the choice...
of training protocol, which could be any of a wide range of types.

The two methods differ in their level of granularity. Whereas phenotypes must fall into a finite number of categories, which are comprehensible to the human interpreter, Live Z-scores display an unrestricted range, as patterns emerge from the myriads of “red and blue numbers” that can form structured patterns on the screen. Dick Stark has learned to read these patterns. This granularity can translate into training power, particularly in the case of many varied connectivity deviations. Even in the face of a daunting “spaghetti head” configuration, live z-score training can effectively train away essentially all of the deviations in a relatively small number of sessions (less than 25 in the examples cited elsewhere in this and the last issue). Whereas a phenotype might classify a broad range of such situations as “epileptiform,” live z-scores are capable of teasing out multiple connections and deviations, to provide a very precise targeting strategy.

I agree strongly with Jay’s comments (below) regarding the importance of a multivariate analysis. Indeed, live z-scores can provide a foundation for further development of targeted protocols that exploit physiological insight and clinical guidance, as both z-scores and phenotypes become more fully developed, and more fully complimentary.

**JAY:** The Z-score training’s orientation to the mean of the EEG metrics is a different orientation than we use with the phenotype approach. There are a limited number of phenotypes, and they cut across the DSM categories, but unlike the DSM, the phenotypes predict effective therapy approaches, both with medication, as well as with NF.

I conceived the classification system for EEG in the late 1990s, and it was written up in 2005 based on retrospective experience with EEG analysis. This system has since been tested for medication prediction in ADHD. In ADHD only one phenotype has a positive response to stimulant medication (the frontal slow phenotype). The phenotype approach has also been used for addiction with great success, and those outcomes (N=30) will be presented this fall at ISNR, with the phenotypes suggesting the bulk of addiction being driven by two different physiological systems (over- arousal, and cingulate drive).

In phenotypes the client’s EEG findings are matched with the phenotypical patterns that comprise the preponderance of the variance in the EEG. The phenotype(s) identified will be a cluster of data points that are not at the mean, but rather data points that are divergent from the mean. In the phenotype approach, each phenotype divergence has known generators and distribution pathways. These are all well-characterized in the IFCN’s (International Federation of Clinical Neurophysiology) position paper on EEG rhythm generators, and has prescribed interventions that will move the divergence back to it’s phenotypical mode… which is not at the group mean, but characterizes the stable (though divergent) base-state for that phenotype.

To become clinically normal, an individual does not need to have “normal” (oriented to the mean) EEG values, but rather simply needs to regress to the mode of the phenotype, since the phenotypes are also present in the normal population. “Normative” databases account for the divergence of these groups or clusters from the mean by increasing the variance of the data set, rather than creating cluster based modal subsets of the clinically normal individuals.

I will be showing the incidence of the phenotypes in the ADHD and also in the “normal” population at the ISNR meeting in August as well. The data suggests that “normal” is not a difference in kind from the clinical population, but merely a matter of dimensional divergence distance. Normal health brain function does not reside at the statistical mean, and exceptional states are definitely not a function of having EEG values residing at the group average.

I would propose that for pathological divergence, regression to the mean would be an improvement… but for peak performance applications, average or mean oriented results simply do not make sense.

In our work, we have shown that returning people to their phenotypical modes, and reducing their divergence creates clinical improvements, but we also are showing phenomenal gains in neuropsych function, which look like peak performance training, not just removing their specific complaint.

We treat all people who present to us, whether for peak performance or for a clinical complaint with the same overall approach, which is a customized assessment for phenotypes, and the individualized though standardized set of NF or medication approaches. The diagnosis or behavioral complaint does not direct therapy, though it is taken into account when prioritizing phenotype approaches when there are more than one (which is common).

The inter-rater reliability of the phenotype evaluation is quite acceptable with lambda values of 0.90 and better without specific training of the raters in identifying the patterns. The classification is simple and reliable.

Though we have tried to objectify our approach through publication of the phenotypes and their predicted interventions, and are actively doing prospective replication of the outcomes, I will not be satisfied until we can get the classifications performed by a computer algorithm, and our group and others are actively working on or discussing this automation.

I am happy to see new approaches developed, such as Z-score training, which does hold great promise for some applications, though as an emerging new tool, it remains for the clinical community to use the tool and identify the strengths and weaknesses of this emerging application. I understand the excitement of a new tool, but I also know that we should attempt much and claim little, until the published outcomes support the experimental application.

In an anxious individual, various EEG findings can correlate with the anxiety, from frontal hypoperfusion (seen as alpha and/or theta), a frontal lobe asymmetry (more hypoperfusion on the right), as well as some other specific findings like cingulate involvement (over-focus on those things that make one anxious, such as seen in GAD), and even over-arousal, seen as faster alpha. If one were to normalize all these findings, not only might the anxiety be removed, but if the alpha were slowed, it may also degrade the semantic memory and IQ performance… so not everything associated with anxiety is restricted to being associated with the complaint alone… and some may be associated with optimal states due to a pattern of divergence associate with both the complaint and the peak state.

Thus, regression to the mean values does not always yield better function, and “normalizing” to a Z-score mean is not always the best course of action for all values… it can’t be done blindly… and the field needs to identify and fully flesh out the emerging new application’s strengths, as well as these potential weaknesses, so that our clients can be served with the most effective approaches possible.

In epilepsy, where we have effective NF applications (both SCP and SMR) proven in blinded placebo controlled studies, applying the new Z-score training instead of known clinical approaches requires informed consent from the client indicating

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**Phenotype and Z-Score Modalities**

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that they choose not to do a proven training and instead choose to do an experimental application using this new tool.

It should be remembered that the brain is a multivariate system, and multivariate divergence can be highly statistically significant, even when the individual Z-score values that make up the multivariate are not themselves divergent significantly... so not everything that is truly significant can even seen when viewed with the lens of univariate measures that populate most databases. The phenotypical divergence within the normative population (even when pulled from a well constructed database's normative grouping) shows this effect very well.

**What diagnostic tools would a clinician use to determine the phenotype pattern or EEG deviations from the norm when?**

**CHOOSING TO USE EITHER MODALITY FOR TRAINING?**

**JAY:** The pattern identification and classification into phenotypes does not require any EEG/qEEG database, as it is best drawn from the raw EEG. The EEG shows the patterns easily, as witnessed by the inter-rater reliability lambda statistic of 0.90 and better for most patterns reported in our recent study, conducted with Martijn Arns, Rein Breteler and Desirée Spronk (all from Nijmegen, The Netherlands).

Basic training in EEG interpretation is needed to establish competence in visual identification of these patterns, as well as any other patterns seen in the EEG morphology. The classification is not difficult, but there are some people who have difficulty seeing spatial patterns that may find this approach to be best left in the hands of those who have already established competence in reviewing the EEG visually.

This emerging approach to the EEG interpretation was published initially in 2005, so there are few trained locations in existence at this time, though those with EEG experience will have no trouble with this classification system, even without specific training (as seen in the published study, where the two raters operated independently, and did not receive any pre-experimental training to make the ratings more reliable.

The determination of phenotype classification merely requires a trained observer and the EEG, and no additional software or device expenditure.

**TOM:** I would say that in any case, whether training using manually targeted variables, or live z-scores, it is important to interpret the EEG in the context of what is normally expected. Even a visual examination of a neurological EEG requires an in-depth understanding of what is expected, so that deviations, whether in the time-domain data, or in derived variables, can be identified. The phenotype approach uses a combination of functionally relevant indicators, to sort EEGs into the set of categories currently used. On the other hand, the inspection of a QEEG by observing the z-scores in and

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of themselves, may suggest certain conditions, but does not require the categorization of the findings. For example, an individual may have “excessive” frontal slowing among their z-score deviations, which are in fact, phenotype #1. So this type of observation is commonly recognized, based upon experience and clinical relevance, independent of whether or not one is using a particular categorization scheme.

When the phenotype reduces to “epileptiform,” the detailed coherence, phase, and asymmetry z-scores can provide invaluable new information regarding the precise connectivity issues at hand. Z-scores also provide a precise mechanism for targeting connectivity. This is not inconsistent with phenotypes; it provides an additional level of guidance. Where the recommendation might be to “normalize coherences,” live z-scores provide a significant means [can we use “vehicle” or another word so we’re not using “mean” in a different context?] to do precisely that.

Applying z-score training does not require training “to the norm.” Rather, targets are placed in the context of the normative database, and targeting starts off with that data on hand. Live z-scores can be used in combination with conventional targets such as “increasing alpha” or “reducing fast activity”, and do not conflict with them. It is also possible to “delete” certain considerations from automatically targeted training, so that z-score training can be done “while leaving absolute amplitudes alone”, or “while not putting a specific limit on SMR amplitude.”

Again referring to the examples shown in my article in this issue, it can be seen that the use of live targets is a particularly useful way to sort out multiple deviations and target them individually or in combination, but with a physiological and clinical rationale to support it.

What do you recommend researchers interested in phenotype and Z-score training to do to facilitate further understanding and confidence of clinicians so they use either of the modalities appropriately and properly?

**TOM:** My first recommendation is that researchers as well as clinicians make every effort to get training and education on these, as well as other emerging methods.

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Phenotype and Z-Score Modalities
Continued from page 27

Nothing takes the place of direct contact with other professionals. We have had numerous experiences where attendance at a workshop or seminar, reading of a published paper, or even an ad hoc conversation, has led to fruitful work and growth for the field.

I think it is critical to avoid factionism or pedantry in forming opinions about what does or does not work, or what directions one might pursue. Often, perceived differences are actually an opportunity to learn from contrasting approaches. For example, both standard QEEG’s, but particularly live Z-score technology, are important ways to bring out and quantify characteristics relevant to phenotypic classification, among other things. At the same time, even when using live Z-scores, it is beneficial to continually view the raw EEG tracings, in order to understand what is happening beneath the sea of numbers. There is only a need to make a dichotomous decision if one decides beforehand that a conflict must exist. To the seasoned, experienced practitioner, every technique brings its strengths and weaknesses to the field, and each one must be evaluated with an informed point of view.

I recommend that those who are interested contact those who are using the new techniques, and try to get a detailed, first-hand understanding of what works, when, and how. I do not recommend that we pay much attention to uninformed, negative opinions that are based upon categorical objections or hearsay.

Overall, my strongest recommendation is drawn from Buddhist wisdom, and that is to “withhold judgment,” and to allow ideas to mature before taking a strong position.

I have heard categorical statements that lie somewhere between outrageous and meaningless, to the effect that “person X’s approach is no good because (substitute second-hand gibberish here).” Such attitudes fail to do justice to either person X or to the speaker. It is sometimes entertaining, sometimes not, to ask the speaker exactly what they are talking about, or where they got the information. It is only when the information is first-hand, or the opinion is a considered one, that there is a chance to make mutual progress and move forward.

For my own work, I have been looking in detail at live z-scores and their use, and have also been using the phenotype approach as a way to further inform and enlighten what is seen. If both techniques are valid, as I am sure they are, then they cannot but be mutually supportive, and mutually beneficial. Again, if a live Z-score pattern suggests a known set of abnormalities such as a phenotype, and if a normalization protocol is consistent with a plan of remediation, then training to the norm is probably a good idea. In cases where the phenotype is “epileptic”, then live z-scores can provide the method of choice for normalizing connectivities. In other cases, it will be more desirable to bias the training in a direction other than to the norm, or to combine the normalization with a biased component such as global power reduction, alpha enhancement, or whatever else makes sense.

JAY: The correct approach to any new tool is open minded skepticism. The phenotype approach was developed retrospectively, looking at too many years of experience and making systematic records of divergent patterns and what worked with them. This obviously has required prospective replication of the observations, and that is exactly what has been done and will continue to be done.

A study of 100 subjects and controls is just being published in the Journal of Integrative Neuroscience showing the predictive outcomes for treating ADHD with stimulants, and there is really only one of the 11 phenotypes that respond to stimulants, as predicted. Other clinical outcome predictions with phenotypes for treatment with neurotherapy for addiction (N=30) is also now being presented this Fall at the Biofeedback Society of California and at ISNR’s meeting in San Antonio. Studies on Depression and phenotype prediction of medication responses are planned.

Researchers and clinicians should feel free to test the phenotype model. This is why I published the model instead of patenting the approach. I welcome tests of the model for further independent validation, as well as to help refine the predictions from the model.

I prefer the peer review and publication approach to establishing efficacy claims over promotional marketing to promote an approach, though I’m sure both approaches have their place in moving the field forward.

TOM: One thing is for sure, and that is that the EEG still contains a lot of information we have not yet begun to comprehend. It is by working on new approaches including live Z-scores, as well as phenotypic classification, that we can learn to interpret those marvelous squiggly lines, and actually use them to help people improve. Techniques that are based upon science, that use observational data, and that have a meaningful connection to neuronal dynamics, hold the most promise in my estimation.
This case involves a previously very high functioning nurse who suffered a traumatic brain injury and was reduced to a life with brain fog, emotional outbursts and an inability to cook a simple meal for herself. After LENS treatment, she is functioning very well and is ready to return to the workforce as a nurse.

In 2003, my client had complications from an Arterial Venous Malformation. She had two aneurysms and resulting surgery that left her with right side hemi-paresis. She had several months of Physical, Occupational and Speech Therapy. By the time she sought me out three years later, she was walking and driving.

Her main complaints were brain fog, very poor short term memory, very hot temper, difficulty handling any organization (especially her papers), and complete inability to multitask. This client had been a very energetic nurse and avid golfer, and had worked in home care until her disability.

In June of 2006 we did a few sessions of traditional neurofeedback, and the client obtained a QEEG from Ray Daly, PhD in Windsor, Ontario. Most significant QEEG findings were Z score FFT Relative Power of 8hz in the 2-3SD range globally. Z scored FFT Coherence in Delta and Theta were 3+ SD.

In July 2006 I purchased the LENS system, got trained, and introduced my clients to LENS. I mapped this client using the “No Feedback” setting of the LENS software. Her LENS map very closely resembled her QEEG with very high amplitude (20-23uV) of 8-12hz on the right side, especially at C4 and P4. I started treating the LENS Site Sort with the LENS Feedback protocol with a 20 offset. (I did not do an Offset Evaluation right away, stemming from my caution as a beginner LENS provider.) See map one to the left.

We had sessions 1-2 times per week. By her fifth session, one month into using LENS, she was noticing the papers on her husband’s desk. These used to be a blur. She noticed that her husband of four years had been using the checks that came with her VISA statement as cash advances…without her knowledge or permission. She also noticed that he hadn’t paid the mortgage and that they were going into foreclosure. This new knowledge was clarification that he was taking advantage of her disability, and that her previous suspicions of his dishonesty were true. She immediately filed for divorce! This is a great example of the clarity that Len Ochs says will come with LENS treatment, with the caveat, “Things will get clearer, but beware, you may not like what you see!”

This client’s symptoms improved at the same time as the high amplitudes reduced on her maps. This doesn’t always happen, that the maps look as good as the client feels, but it’s satisfying when it does! We tracked the following symptoms with the resulting scores:
We continued with sessions while she rode the divorce roller coaster. Her symptoms continued to hold and improve. Eventually, we started tracking reading comprehension and math, those being the hardest skills for her to re-gain. We probably could have stopped the LENS sessions, but she was coming to sessions for the support while she went through the divorce and foreclosure, so we kept up the LENS as well.

For her 54th session in May 2007, we started using Nick Dogris’s special LENS protocol, Rocking the Spectrum. This change brought renewed improvements in her symptoms. Finally for her 69th session in October 2007 (see map nine, to the right), we changed the protocol to Rocking the Spectrum 2 and added pRoshi glasses for a few minutes per session. I made this change because I was concerned that her coherence measures were not normalizing, as shown on a TLC (The Learning Curve) assessment. The coherence did clear up, and I think it was because of the addition of the pRoshi.

We concluded treatment with another QEEG with Ray Daly, PhD, and that showed that the coherence had normalized.

I saw her for a total of 77 sessions. By that time, she was divorced, moved out to her own apartment, and the house finally sold at auction. Her comments during our last session, “I could have never accomplished what I have over the past year and a half without your help with the neurofeed-back!” and “I wonder how much my decision to marry that jerk in the first place was because of the personality changes I was going through that I didn’t recognize were from the growing AVM problem in my brain?” and “You saved my life!”

She emailed me recently that her symptoms have continued to improve and she’s ready to re-enter the work force as a nurse.

Mary St. Clair, MSW, BCIA-EEG Associate Fellow, has a private practice specializing in Neurofeedback in West Bloomfield, Michigan.
QEEG / TOPOGRAPHIC BRAIN MAPS:
Generalized Anxiety Disorder Subtypes

HIGH ALPHA SUBTYPE: Anxiety, Depression, ADD

HIGH BETA SUBTYPE: Anxiety, Insomnia, Alcohol / Drug Abuse

LOW ALPHA SUBTYPE: Anxiety, Insomnia, Alcohol / Drug Abuse

CLINGULATE DYSFUNCTION: Anxiety, Rumination, Obsessive Compulsive Disorder

HIGH FREQUENCY BETA: Anxiety, Alcoholism, Insomnia

HIGH FREQUENCY ALPHA: Anxiety, Insomnia

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The recent 4.0 update to Thought Technologies Infiniti afforded the opportunity to use Z-score training with my clients. This is a case review of how Z-score training enhanced a particular client’s treatment and to show some examples of how Z-score training is currently implemented in the Infiniti platform. The client, a 45 year old married mother of two has a history of severe mood instabilities with depression, anxiety, specific phobias, binge eating disorder, migraine headaches and racing thoughts centering around intense self judgment. Her background includes childhood physical and emotional abuse as well as significant attachment issues and a family history of mood disorders.

I used a variety of psychotherapy methods as well as several neurofeedback strategies (2 channel squash, windowed squash and bipolar training with an optimized reward frequency) to work with her. Through monopolar assessment strategies and trial and error it seemed that left side training worked best for her. Her mood problems are accompanied by racing intractable negative thoughts which seem to overwhelm her ability to moderate her mental state. Left side training and prefrontal training helped to slow down the thoughts, allowing her to self soothe more easily. Her moods have become gradually more stable with regard to degree and frequency of depressive episodes. She is not on any psychotropic medications because of her sensitivity to side effects and works with a homeopathic psychiatrist which seems to be helpful. She attributes her improvement to the neurofeedback training because of a relapse she experienced when she missed several weeks of training.

Her neurofeedback sessions have been very challenging because she has become hyperaroused very easily and if she relaxed, she would become sleepy, “dull” and unable to focus. She had a very small window of optimal arousal and if the training was for more than 10 minutes, fatigue would set in. Z-score training revealed a profound difference – she was able to train for 30 minutes or more and remained alert, euthymic, able to focus, with no negative symptoms. Her improvement between sessions also seemed more robust and lasting. I have used Z-score training...
training for 6 sessions at left side and prefrontal sites. Figure 1 is an example of how I used Z-scores to work with this client and how I structure most of my Z-score training. Up to five screens are available during a training session in Infiniti and one can switch between them easily on the fly, which facilitates the way I like to work.

Figure 1 shows the screen I use at the beginning of each session. It gives me a good overview of what is happening and identifies which of the specific categories are most out of range. As shown, absolute power has the lowest score and so I would go to a screen which focuses specifically on that aspect. This is a one-monitor screen but there are also two monitor screens for this training. The video file moves and a tone or music plays when all items are within the dual thresholds. This client liked to look at the “Percent Success All” and focus on increasing that number. I usually come back to this screen after training a specific category of Z-scores for around 5 minutes, to see what is happening with all of these parameters and spend some time here training more comprehensively.

The basis on which I choose the screens to work with is through a one-minute assessment script I developed to plan what screens to have available – I usually do one minute eyes closed and one minute eyes open recordings.

Figure 2 shows a dual monitor screen which is focusing on absolute power which I use with this client. There are also screens which bring peripheral biofeedback modalities in – such as respiration, EMG and temperature. The client screen has the video file which moves with success and plays a song or midi tone as well as the “% success” number which they can use to increase their performance. On the clinician screen, there is the raw wave, dual threshold bar graphs which turn red when out of range (thresholds can be set manually if desired), a trend graph for epoch means of the z-scores (20 second epochs) and the numeric, showing the epoch mean, in order to gauge progress over time.

Figure 3 shows a screen is a dual monitor screen which is training phase difference z-scores. The client screen shows the ongoing % success, as above, but also has a requirement to hold the green light on (success condition) for a period of time in order to achieve a point. A puzzle piece is added for each point along with a “ding” sound for audio feedback. The time requirement can be changed on the fly, depending on the client’s ability to succeed. Each unit on this screen (user defined) is for .25 seconds and the time duration can be increased or decreased by that amount for each unit. I use each of the screens as indicated by the client’s response and with what they enjoy working. Coherence is something this client really worked well with and she noticed how quickly her z-scores approached the norm with only a few sessions.

When I am training to evoke a particular state of consciousness, I do not usually use z scores for feedback. However, I really like having the z scores available on the training screen to track what is happening in real time and also having the option to review the session using the z-score report screens (see below). I have recently begun to do 4 channel alpha coherence training with this client, in order to enhance her ability to open her focus and increase her ability to become the witness rather than to be so identified with her negative thoughts. So far, this seems to be helping to normalize an extreme imbalance of alpha at O1 and O2 (her alpha amplitude at O1 is twice what it is at O2) and she is reporting more restful sleep and improved mood and anxiety.

Figure 4 shows a reporting screen which I use to assess the trend of z-scores through a session. This particular screen is reporting on two channels of a four-channel alpha coherence session for this client. There are two channels of z scores available in Infiniti now, but there will be four channels in the next release. You can see the imbalance in absolute power alpha z-scores at the beginning of the session at O1 (upper left) and O2 (upper right) and moving toward the norm as the session progresses. Relative power for the same channels is shown at the bottom. The trend graphs are based on 20 second epoch means and the means for the whole session are reported in the numerics above the graphs. There are similar reporting screens for all of the other specific categories. The z scores are expected to be about ½ of what you would see in Neuroguide QEEG data since the scores are based on intrasubject variability as well as intersubject variability so smaller z scores can be quite significant.

In summary, I am really enjoying having z-scores available for assessment, training and monitoring progress. I feel that it has added substantially to my ability to use neurofeedback effectively. In the interest of full disclosure, I teach online classes focusing on creating and editing protocols and screens in the Infiniti platform for Thought Technology and the Biofeedback Foundation of Europe.

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Since 1985 I have provided assessment and treatment services to operational and retired police officers who presented with work-related post-traumatic stress disorder (PTSD) as defined most recently by DSM-IV (American Psychiatric Association, 1994).

Studies have shown that from 12% to 35% of police officers will qualify for the diagnosis of PTSD at some time in their career. Moreover, generally their PTSD results not from a single traumatic episode but, more akin to military personnel, rather from what I have termed Duty-Related Accumulated Trauma (DART).

Assessments of police officers I have seen revealed their exposure to hundreds of traumatic events in a twenty (20) year career. Each officer had experienced multiple instances of real threat of “death or grievous bodily harm” at the hands of suspects who shot at them, tried to knife them, rammed their police cars or tried to run them down, physically assault them (especially when suspects were under the influence of drugs that simultaneously increase physical strength and decrease pain sensitivity), threatened them and/or their families, stalked them, and exposed officers to their own life-threatening illnesses including HIV/AIDS and Hep C. In addition, each officer had attended multiple horrific scenes (such as severely injured, dead, charred, mutilated, and decapitated persons), had direct contact with young children (who had been battered by physical abuse, or murdered, or physically injured from sexual assault), and some had been forced to shoot a suspect who later died of his wounds with the typical attention to officer safety.

When I see these police clients, I complete a careful psychological assessment which at minimum includes the following: trauma history and CAPS interview (Blake et al.,1997); a structured clinical interview; administration of standardized psychological tests (the Trauma Stress Inventory (TSI: Briere, 1995) and the Personality Assessment Inventory (PAI: Morey, 1991); sleep information obtained from bed partners’ observations; and a psycho-physiological stress test of both Autonomic Nervous System (ANS) variables and muscle tension levels obtained during baseline, trauma recall, and recovery conditions.

In working with police clients for over two decades, gradually I have developed better and better treatment approach. First, I provide assessment information and treatment recommendations to VA Canada and to the client’s physician. VA Canada is the agency responsible for disability payments for both police officers and military personnel injured physically or psychologically on the job.

Second, clients are provided with psycho-education about their condition detailing results of the assessment, the role that medical conditions might play (such as obstructive sleep apnea) and with recommendations to consult their physician about these, the psycho-physiological and neuroscience processes involved in PTSD, the resulting sequenced plan, the prognosis, and attention to other key matters such as officer safety.

My clinical conclusion is that adding BFT-E for PTSD among this population is supported even after other approaches have not proven optimal.

Third, research-based details about medication options for PTSD and their consequences are presented. Following our discussion, clients choose to see their physician about a prescription or, more often than not, choose to continue psychological treatment without medication.

Fourth, each client receives a series of psychological interventions including multiple strategies for stabilization, common elements of cognitive behavioural therapy (CBT) excluding both reprocessing and exposure therapy, recommendations on how best to manage cognitive impairment, biofeedback training (including RSA) for both improving demonstrated ANS de-regulation and decreasing muscle tension (both of which can be viewed as Stress Inoculation Training, an element of CBT), and various approaches for normalizing sleep. In-session biofeedback training and related home practice continues until variables are within normal limits; thereafter, clients are encouraged to maintain their home practice on a daily basis as well as implementing the training at the first sign of an increase in physiological reactivity.

Finally, at least the TSI is re-administered as one way to evaluate progress. The TSI has three validity scales, an overall score for PTSD severity, and scores for the PTSD components of intrusive re-experiencing (criterion B), defensive avoidance (criterion C), dissociation (criterion C), and anxious arousal (criterion D). DSM-IV criterion C is a combination of avoidance and numbing/dissociation symptoms. Clinical significance is defined as a score at or above 63.

Late in 2007 I undertook a retrospective file analysis on the most recent twenty-eight (28) consecutive referrals of police officers with PTSD due to DART who had completed the above assessment and treatment sequence. Results revealed that twenty (20) of them (71.4%) had achieved remission of their PTSD. Generally, between three (3) and six (6) months was required to complete treatment and many officers were on stress leave during this time. Interestingly, a similar file analysis of Canadian military veterans referred to me who had been deployed to combat missions (for example, WWII, Korea, and Kuwait) or to peace-keeping/peace-support duties (Gaza, Cyprus, Bosnia, and Kuwait) indicated that all of them achieved remission of PTSD following the treatment sequence noted above. They required only periodic follow-up to maintain gains.

Based on a sound rationale from research in applied neuroscience, the only published outcome study about the use of EEG biofeedback (BFT-E) with PTSD (Penniston and Kulkosy, 1999), and discussions with colleagues at ISNR conferences, I initiated BFT-E with the 28.6% of police clients who still met the PTSD criteria at the conclusion of my initial treatment sequence above.

Continued on page 36
Using the Truscan-32 by Deymed Diagnostics (sample rate 128 per second, sensitivity of 70 microvolts, and filters set between 0.5 Hz and 70 Hz), with sensory placement according to the 10-20 system, and using linked ears, a qEEG was completed under both eyes open and eyes closed conditions with these eight (8) clients. The resulting qEEG was webmailed to Dr. Joseph Horvat or Dr. Robert Thatcher for analysis who used both NeuroGuide and LORETA. The consequent brain maps and suggestions were web-mailed back to me from which BFT-E protocols were developed accordingly.

Based on the qEEG analyses, the most common finding was absolute amplitude insufficiencies frontally and sometimes also centrally in the 3 Hz to 8 Hz frequency. The second most common finding was excessive absolute cortical amplitude in the high beta frequency at central and/or posterior regions. Approximately 37% of clients had both frontal theta insufficiencies and central and/or posterior beta excesses. Other anomalies emerged with low frequency usually with an n of 1 or 2.

An average of 23.6 BFT-E sessions followed (range 15 to 38) to alter demonstrated cortical de-regulation. Sessions were held about once a week. Sessions began with time to monitor maintenance of previous interventions and to discuss issues that had arisen between sessions. There followed one ten-minute training period for each of the three (3) protocols developed for each officer. We took a short break between protocols. Sometime after session five (5), most clients voluntarily initiated discussion of traumatic experiences often with their own conclusions about cognitive distortions and with appropriate action plans when attempts to raise such issues humanely during the first intervention sequence had not been successful. When asked why the difference clients gave responses such as “the light came on upstairs: or “the mind fog has lifted”. Thus, sessions tended to require between 75 and 90 minutes. A second qEEG was completed following the final BFT-E session.

The eight (8) police clients who agreed to BFT-E (none had declined) were all male. Their mean age was 48 (one was 26, one was 62, and the remaining 6 were between 46 and 52 years of age). The 26 year-old had completed six (6) years of operational policing and the other seven (7) all had a minimum of 20 years of front-line policing. Three (3) were retired, three (3) were on stress leave, one (1) was assigned to non-operational duties because of PTSD symptoms, and one (1) worked full-time on the detective squad. Five (5) had a co-occurring diagnosis of major depressive episode and four (4) were taking psychotropic medication.

After BFT-E, seven (7) of the eight (8) or 87.5% achieved remission of their PTSD according to the combination of client verbal report, clinical impression, and results of standardized psychological tests. Visual inspection of the NeuroGuide and Loretta output post-treatment with BFT-E indicated that amplitude changes were in the desired direction. The client who continued to meet the DSM-IV criteria for PTSD was a retired officer on medication who was going through the sixth consecutive year of very stressful legal aspects in relation to his more recent traumatic experience; he discontinued treatment following the 38th BFT-E session due to scheduling difficulties.

From assessment immediately before and after BFT-E and including all eight (8) clients, the PTSD summary and three (3) of the component scales of the TSI had decreased to at least the p.<.05 level of statistical significance. The mean summary PTSD score decreased from 73.1 to 61.8 (t=2.45); the mean intrusive re-experiencing score decreased from 79.2 to 63.0 (t=3.08); the mean defensive avoidance score decreased from 72.5 to 63.0 (t=2.28); and the mean anxious arousal score decreased from 74.5 to 59.4 (t=3.55). The mean dissociation score decreased from 68.9 to 56.9 but did not reach the standard for statistical significance. TSI validity measures for all clients were well within normal limits.

Of the four (4) who had been on psychotropic medications, one (1) had terminated all medications, one (1) had decreased dosage by 67% in the graduated plan to eliminate all medications, and two (2) remained on medication; none of the remaining four (4) initiated medication during BFT. Also, the one officer (retired) who was abusing alcohol (> one quart of whiskey a day) was able to achieve sobriety.

Of the five (5) not retired before BFT-E, one (1) took a medical discharge for a variety of reasons, one (1) continued non-operational duties, one (1) was still on stress leave for matters related to police administration, and two (2) had returned to full front-line duties.

Of the three (3) seen again at six-month follow-up, all remained in remission and in fact their TSI scores continued to decrease. For example, the average PTSD summary score for them decreased from 58.0 at the end of BFT-E to 50.0 at follow-up. Two (2) at follow-up continued to be fully operational and one (1) had retired.

Although details are not reported here, standardized psychological re-assessment indicated that the co-occurring major depression was in remission for four (4) of the five (5) after BFT-E. This 80% remission rate is interesting given that the protocol for many of them was to increase frontal theta.

The above is a clinical case series. Thus, in terms of the best research criteria, it is limited in a number of ways including no control group, completed by the author, done at one site only, and without parceling out the effects of additional treatment during BFT-E.

Still, the 87.5% remission rate following BFT-E is noteworthy given that a range of reasonable previous interventions had not been successful with these clients but had been effective for 71.4% of their colleagues.

My clinical conclusion is that adding BFT-E for PTSD among this population is supported even after other approaches have not proven optimal.

Dr. Carmichael maintains a private practice in clinical, police, and military psychology with primary focus on PTSD and can be contacted by e-mail: drjohn@telus.net. Additionally, a CD containing his current 60 page rationale for and details of intervention, the 27 aspects of stabilization, the structured clinical interview, and other pertinent information will be available for sale beginning at the 2008 ISNR Conference. All proceeds will go to the ISNR Research Fund in memory of Dr. Joseph Horvat, mentor and friend.

References
The Case Against Drug Treatment—and for Neurofeedback

The Superior Alternative for Depression

Jonathan Walker, MD

The history of antidepressant drug therapy begins with experiments by Nathan Kline in the early 1950s using reserpine to control disruptive behavior in psychotic patients. Michael Shepherd did the first double-blind placebo-controlled trial of reserpine demonstrating its efficacy. Soon thereafter, physicians working in TB wards noted antidepressant effects of iproniazid and isoniazid (M.A.O. inhibitor) and other M.A.O. inhibitors were developed by the pharmaceutical companies. About the same time, imipramine, a modified antihistamine was found to have energizing effects in depressed patients. This was the first tricyclic anti-depressant. In 1965, Schildkraut proposed the catecholamine theory of depression, proposing that depression was caused by low levels of norepinephrine in the brain. Carlson investigated the effects of drugs which would more specifically affect the serotonin system, which led to the development of selective serotonin uptake inhibitors (SSRIs). These and other serotonin-affecting agents have become the dominant treatments for psychiatrists treating major depression, obsessive-compulsive disorder, social anxiety, general anxiety, panic attacks, post-traumatic stress, and many other disorders. Initially they were touted as being selective, safe, and well-tolerated. Experience over two decades has found these assertions to fail. SSRIs have been found to interact with a complex variety of receptor subtypes. The claims to greater safety have been discredited by reports of drug-induced violence among SSRI patients at rates which greatly exceed older drugs and placebos. Many patients tolerate SSRIs poorly as a result of decreased libido, akathisia, motor abnormalities, withdrawal symptoms (sometimes protracted), insomnia, apathy, and mania. Recent SPECT studies in vivo in healthy humans given SSRIs found that SSRIs decrease binding of a radiolabelled-ligand for the serotonin reuptake transporter (SERT). The same effects were found in depressed subjects. This suggests that SSRI exposure changes the sensitivity or number of serotonin reuptake transporters, rather than altering the underlying brain disorder. Long-term use of antidepressants has been linked to a variety of adaptations which may be chronically pathogenic, including changes in gene expression, changes in cell structure and function, and changes in the homeostatic capacities of the neuroendocrine system. Antidepressants may reduce the long-term capacity of the brain to self-regulate neurotransmitter systems. Depletion of monoamines in newly remitted, currently medicated patients led to a relapse. The available evidence suggests that long-term use of antidepressants may increase a patient’s vulnerability to recurrent depression beyond that which would occur naturally.

Another important issue is the demonstrated lack of efficacy in treating severe depression and atypical depression and their questionable superiority to placebos in treating...

...SSRI exposure changes the sensitivity or number of serotonin reuptake transporters, rather than altering the underlying brain disorder.
mild to moderate depression. Long-term studies have been few and far-between. Those that have been done argue against their use, in favor of safer alternatives. In a meta-analysis of data from the 6 most recently approved drugs for depression, the investigators found that 80-90% of the antidepressant response was consistently duplicated by placebo. A 10-20% difference in response rates was fairly consistent, an amount small enough to have risen from methodological artifact. Two-thirds of the trials conducted among hospitalized patients revealed a placebo response equal to drug treatment. The abysmal performance of antidepressants has occurred with such regularity that mindful observers have come to refer to it as “psychiatrists’ dirty little secret.”

A growing body of evidence supports the hypothesis that antidepressants worsen the chronicity, if not the severity, of depressive features in many subjects. A British team found that when the patients in their study received no treatment, 50% of them recovered. Of the patients who received antidepressants, only 30% recovered. In Iceland, antidepressant sales between 1989 and 2000 increased by 387%. Despite the exponential rise in sales, suicide rate have remained static (11/100,000/yr.) and the proportion of subjects claiming disability from depression did not change (13% of all disability pensions). In adult patients whose SSRI trial data has been corrected for methodological irregularities, the risk of suicide (attempted or completed) is two to four times higher than placebo. In children, the risk is three times higher.

Many patients on SSRIs develop an amotivational syndrome, including apathy, flat affect, low motivation, and disinhibited actions. Other side effects are common. In a group of SSRI-treated children and adolescents at Harvard, 35% developed a sleep disturbance, 15% developed irritability, 10% developed anxiety, 10% developed a psychosis, and 6% developed mania. Endocrine effects of antidepressant medications include hyperprolactinemia, growth hormone disturbances, and hypogonadism. Occasionally, patients on SSRIs develop the serotonin syndrome, which may be fatal.

Withdrawal syndromes commonly occur after antidepressant stoppage (20-80% in most reported studies). The symptoms are usually short-lived (less than 14-30 days), but they may persist for months to years in some patients.

Alternative psychological treatments (interpersonal therapy and cognitive behavioral therapy) have been shown to be equivalent to an antidepressant (imipramine) over 16 weeks of treatment. When rates of remission and relapse were compared at 18 months, there was a clear advantage for psychotherapy. Other research groups report similar findings.

Increasingly, the superiority of neurofeedback over drugs for management of depression is being recognized. The first approach to successfully remediate depression was left frontal or central beta training (decrease 4-7 Hz, increase 15-18 Hz). Rosenfeld then developed a protocol for normalizing frontal alpha asymmetry, with reversal of depression in the majority of patients so treated. Baehr et al found that the changes in depression were enduring and frontal alpha asymmetry continued to be reversed on long-term follow-up. Several studies with antidepressant drugs have shown that the frontal alpha asymmetry persists after remission of depression, suggesting that the drug-treated patients remain vulnerable to future depression (as noted in the first section of this paper). Hammond described a protocol inhibiting alpha and theta and rewarding 15-18 Hz at F1 and F3 for 20-22 minutes, followed by decreasing the reward frequency to 12-15 Hz for the final 8-10 minutes of each session. Eight patients received an average of 10.4 hours of training, and 7 of them experienced mild to moderate improvement in their depression.

At 1 year, all 7 still had significant improvement of their depression. In our clinic, we have treated 30 depressed patients with a protocol to decrease 2-7 Hz and increase 15-18 Hz at FP02 (this is a site just medial to the right eyebrow) for seven 20 minute sessions. All but two have noted significant improvement in their depression. We are following them to see if the improvement is maintained. So far (a few weeks to a few months) the improvement seems to be maintained.

We think that QEEG guidance may aid in the treatment of depression. We reported one case of bipolar depression where QEEG seemed to help. The QEEG showed an increase of 7-9 Hz over frontal and central regions and increase in 8-9 Hz occipitally, with an excess of 22-30 Hz activity in the left frontal and temporal regions. Ten sessions to decrease 19-30 Hz at FP1 resulted in marked improvement, with less anxiety, irritability, anger and depression. Four sessions were done to decrease elevated 7-9 Hz at F3 and 5 sessions were done to decrease elevated 8-9 Hz at 02. Follow-up QEEG revealed resolution of the slow abnormalities and of the high frequency beta excess in the left frontal and temporal area, though excess 17-30 Hz activity remained in the parietal, central, and mid-frontal regions. He continued to have some anger control issues, but had no further depression or mania for over 3 years now. Paquette and Beauregard used sLORETA to devise a protocol (decrease 21-30 Hz at F4 and T4 for 20 sessions) which reduced depressive symptoms, negative automatic thoughts, dysfunctional attitudes, and behavioral inhibition. The treatment was associated with a reduction of 21-30 Hz activity in the anterior cingulate, the anterior temporal pole, the parahippocampal gyrus and the ventrolateral prefrontal cortex (VLPFC). Positive correlations with less depression were found in the subgenual prefrontal cortex, the parahippocampal gyrus, and the VLPFC. It may well be that the FP02 beta (15-18 Hz) protocol is relieving depression by training the brain to decrease high frequency beta in the right amygdala. Controlled studies with long-term follow-up need to be done to establish the validity of this approach.

Whichever neurofeedback approach is used, there are clear advantages over antidepressant drug therapy. There are no significant side effects or complications, no drug dependence, and no withdrawal problems. Neurofeedback has not been associated with suicidal attempts or deaths. Relapses appear to be rare once training is accomplished. It clearly represents a superior alternative to antidepressant drug therapy.
References
2. Ibid.

Conferences and Calls for Papers


Association for Applied Psychophysiology and Biofeedback. 40th Annual Conference, Albuquerque, New Mexico, April 1-4, 2009 Call for Papers Open. www.aapb.org

Crossword Puzzle Answer

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