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See page 8 for information

Living Things, Control Systems, and Biofeedback

T.J. La Vaque, Ph.D.

From a scientific perspective, the problem with living things is ... well... that they are living. Living things don't remain static, like a stone or a molecule. Living things are constantly changing. That being the case, the constant change must be closely regulated in some consistent manner, following self-regulatory rules that are consistent over time. The fact that living things are scientific moving targets presents a problem for those branches of science that study living organisms, most particularly for disciplines that study behavior such as human psychology, psychophysiology and cognitive neuroscience. These



study the hugely complex "behavior" of the human system *in toto*. Living things are inherently self-regulatory, self-stabilizing, homeostatic entities composed of an exquisitely balanced and complex array of constantly active control systems.

At the simplest level of analysis a control system may be seen as an uncomplicated negative feedback loop that continuously senses whether "Condition X" is within a criterion value. If the value is not within criterion, a corrective action is initiated to reacquire the criterion value, and the corrective action is terminated when the criterion value is established. The pancreatic Islets of Langerhans release insulin to increase glucose absorption and decrease blood sugar concentration, thus preventing hyperglycemia,

but "turn off" insulin at the criterion value to prevent creating an equally disastrous hypoglycemic state. Cells in the hypothalamus time the pituitary release of follicle stimulating hormone (FSH) via the hypothalamic releasing factor (FSHRF) to initiate ovulation, and the same cells must sense increased concentrations of ovarian luteinizing hormone (LH) and progesterone in order to stop FSH release and thus prevent a state of "super fertility." These are examples of just two of thousands of negative feedback loops. When any one of them fails, the living thing is ill.

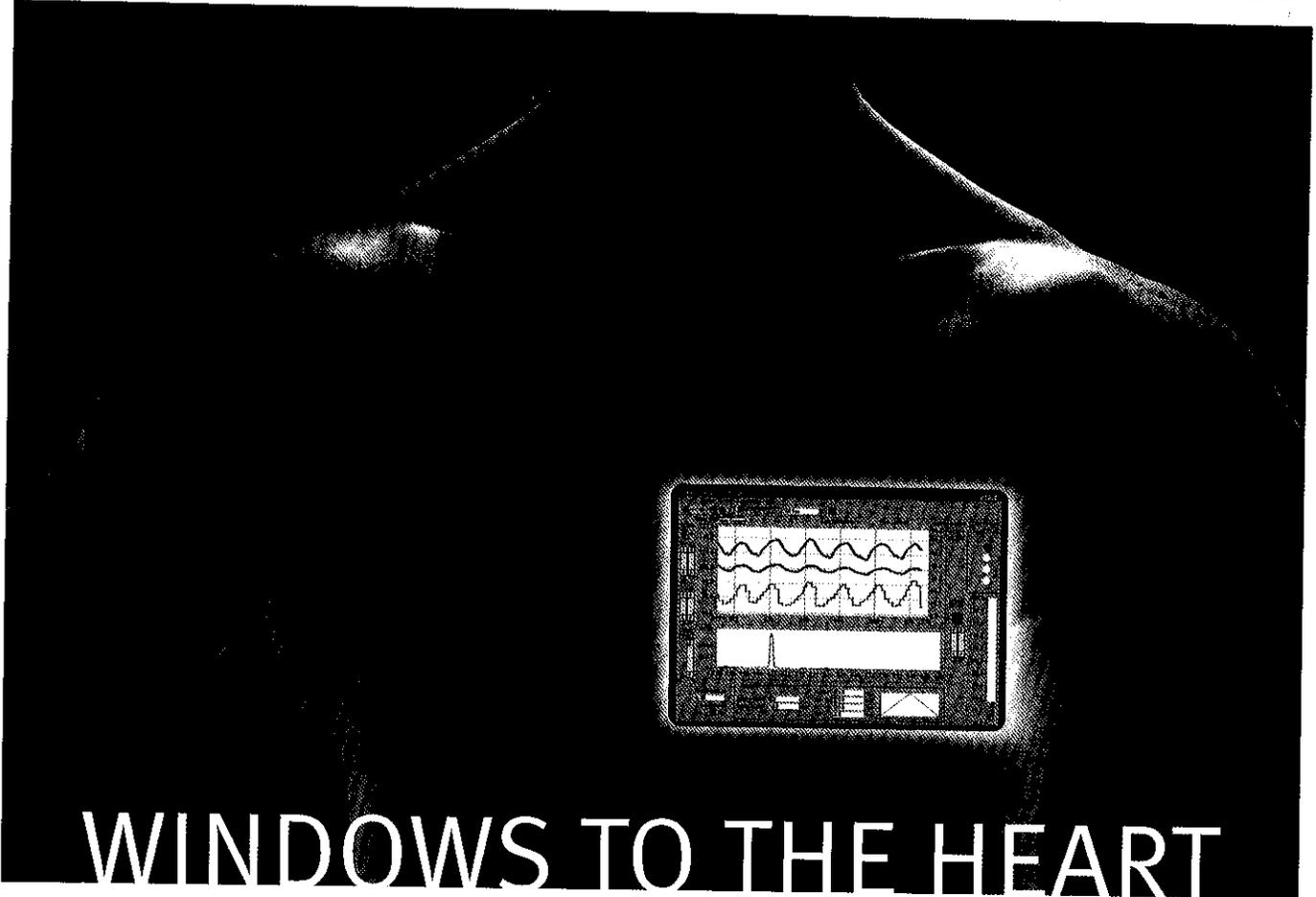
Less frequently discussed is the concept of behavior in the feedback loop. Psychologists are well aware of the primitive motivational states that initiate specific behaviors designed to maintain homeostasis. Decreased blood volume and increased osmotic concentration of blood sodium "turn on" hypothalamic cells creating a psychological state subjectively experienced as "thirst." To re-establish a healthy state of hydration, the living organism must be able to identify the state, identify what object in the environment is required to correct the deficit, initiate behavior to seek the object, recognize the object, acquire the

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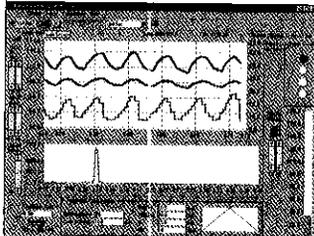
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WINDOWS TO THE HEART



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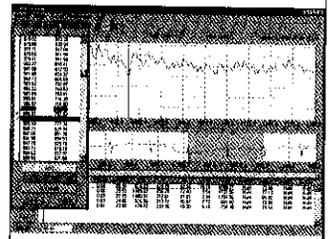
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* Statistics are calculated as recommended in the Special Report on Heart Rate Variability Standards of Measurement, Physiological Interpretation and Clinical Use. Published by the Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology (European Heart Journal (1996) 17, 354-381).

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FROM THE EDITOR**On-Task Consulting****Douglas W. Matheson Ph.D.**

This is my first try at editing a newsletter and I must confess, I am a novice. Previous editor Dr. Jeff Cram has done his best to steer me in the right direction, so any problems that we encounter are due to my inexperience and or incompetence.

My thanks go to Sarah Labarbera who single-handedly pulled together the advertising for this issue which contains a variety of topics beginning with an imaginative venture into Living Things by Dr. Ted LaVaque. Ted is a prominent psychologist from Green Bay, Wisconsin. Dr. Julian Isaacs provides us with some very interesting therapy and training techniques gleaned from his years of experience both with neurofeedback and QEEG. Dr. Hershel Toomim has two articles in the current issue, the first introducing early data from his revolutionary HEG (hemoencephalography) work and secondly, a tip on how to construct EEG electrodes for pennies on the dollar. Our frequent contributor Dr. John Perry focuses on the MyoTrac 3 and its use in incontinence assessment and practice protocols. Finally, I will review the recent online survey regarding the health and welfare of the Biofeedback Society of California. We have a listserv for the BSC. To join email to bsc@psych2.uop.edu and in subject line type subscribe BSC. There you may post comments and questions to the membership. The list is an open, unmoderated forum, so please use it.

FROM THE PRESIDENT**Positive Psychology and Heart-Felt Living****Naras Bhat, M.D., FACP**

For thousands of years, philosophers, psychologists, and mystics have explored the mystery of what makes humans happy. For this reason, the world's strongest authority in the field of psychology, The American Psychological Association, devoted their flagship journal of *American Psychologist* (January 2000 issue), to the field of "positive psychology." Authors Martin Seligman and Mihaly Csikszentmihalyi were guest editors of this important publication that focused on positive psychology. Four key points made on the subjects of "happiness, excellence, and optimal human functioning" were:

1. A person's physical attractiveness, gender, income or age does not predict his or her sense of happiness. Happiness doesn't depend on "yuppie values"—meaning high income, business success, or having the newest gadgets like DVD players or cell phones. Instead, yuppie values are "strongly associated with unhappiness."
2. Physical health, social support/connectedness, marriage, extraversion and religiosity do predict a person's sense of happiness (as opposed to having power, possessions or money). Therefore, values that are based on "internal assets," in addition to "external connectedness," (including spirituality) are clearly related to a person's happiness.
3. Explanatory styles also affect a person's ability to experience happiness.

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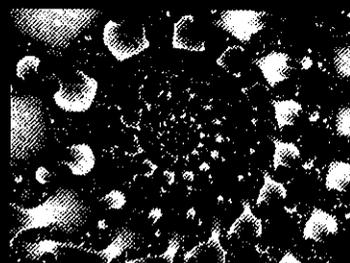
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New Horizons In Neurofeedback

Neurodiagnostic Brain Imaging Services

Julian Isaacs, Ph.D.

Neurofeedback (NF) has a unique ability to remediate many human conditions which are either impossible to permanently cure by any other means, or which are very much slower to resolve by other modalities. For example, literally no other remedial modality can stably resolve seizure disorders, ADHD, or learning disorders. But, as practitioners, our perceptions of the revolutionary implications of neurofeedback can become blunted by: 1) our daily use of it and by, 2) the ignorance of neurofeedback by the wider medical and psychological communities. In turn, skepticism is fuelled not only by the lack of a large enough corpus of controlled research, but also by our (the neurofeedback community of practitioners) failure to adequately communicate its essence and by our relative lack of political smarts. Neurofeedback is a modality that hides its real nature and it might be more readily accepted if it were made much more publicized. Superficially, it is a form of biofeedback. As such it is widely seen as just a different kind of peripheral biofeedback, which, itself, seems commonly, and wrongly, dismissed as a harmless but essentially marginal and rather “new-age,” low key modality.

But the startling reality is that neurofeedback provides a deep neurological intervention. The **means** may be biofeedback, but the **effect** is to profoundly change neurological activity, and with this, physiological, cognitive and affective functioning. Furthermore, neurofeedback fits easily into the paradigm of biological psychiatry. Instead of using medications to alter neurological function by biasing neurotransmitter levels, neurofeedback training up-regulates or down-regulates neurotransmitter systems and neural pathways by targeted exercise, creating permanent and profound change. Someone could (should) research the changes in neu-



rotransmitter receptor site density created by neurofeedback because this is “physical” enough to engage the medical community, who seem not to take psychological measures seriously.

Given this perspective, it seems that NF techniques could be developed which would permit intervention into

some varieties of depression, anxiety, PTSD and addiction, but other tools, more obviously founded on biologic principles have been developed fairly recently. Research has established that the two amygdalae are centrally involved in primary emotional responses. Research has also indicated that the right sub-orbital prefrontal cortex has a primary role in modulating affective responses. Dealing with the amygdalae would mean developing protocols which would calm their function, and improving affective modulation would imply developing methods of re-regulating right orbitofrontal function.

In this context the “stabilization” protocols (T3 and T4 with Fp1) originated by the EEG Spectrum group, consisting of uptraining frequencies in the alpha or SMR ranges at T3/T4 and Fp1 would be appropriate. Sebern

... it seems that NF techniques could be developed which would permit intervention into the neurological bases of severe psychiatric disorders. . .

the neurological bases of severe psychiatric disorders, maybe even the personality disorders, particularly those which appear to be sequels to chronic early childhood dramatization. Good examples would be dissociative and PTSD disorders, or borderline personality disorder, which seem to be intractable, or very slow to respond to conventional psychotherapeutic approaches. The research literature has established that chronic early childhood trauma gets “wired into” the developing brain, making non-neurological interventions of limited efficacy. The research and clinical outcome data shows that alpha-theta training has fulfilled this hope relative to

Fisher [sebern.fisher@verizon.net] developed the “Fpo2” protocol for children with reactive attachment disorder. This involves putting an electrode under the right eyebrow, near the nose, again uptraining frequencies in the alpha range. Since affectively potent sites are trained in these two protocols, correct choice of uptrained frequency is crucial, too high a frequency producing agitation and exacerbation of symptoms.

In my own practice I have combined these two protocols into what I term the “bliss” protocol, placing

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Living Things, Control Systems, and Biofeedback

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object, consume the object, and terminate the behavior when just enough has been consumed to reestablish the criterion state (corrected blood volume and sodium concentration). The thirsty organism seeks water and stops drinking long before enough water has been absorbed into the bloodstream to alter the osmotic condition or blood volume. How does the organism know when “enough is enough” without risking excessive water consumption and serious water toxicity? Behavior and learning represent critical components of the feedback loop and homeostasis. When the behavioral feedback link of the feedback loop fails, the living thing is ill. Human beings seem to have the capacity to interfere with the homeostatic feedback loops far more effectively than other organisms. Disorders such as anorexia, certain forms of obesity and addictions are examples of self-created illness.

If living organisms at the lower end of the phylogenetic scale are complicated moving targets, human beings have raised the level of complexity by a significant factor. Human beings won the evolutionary lottery by virtue of increased brainpower. We plan, anticipate, predict, and communicate verbally. We manipulate our environment symbolically, just by “thinking” about it and engaging in “what if” thinking. Philosophers, mathematicians and physicists call “what if” thinking the “*Gedankenexperiment*” (thought experiment). We are self-aware. We believe.

Belief, symbolic representation, and self-awareness represent powerful forms of abstract information processing (cortical functions) that do not operate in isolation from our more primitive psychological functions and information processing. If they did, they would probably be useless to us. At some level, even our sophisticated abstractions serve a homeostatic goal. Sounds a bit Freudian, doesn't it? The ego functioning in service of the id. The psychological functions of planning, predicting and anticipating serve survival goals (food storage, building shelter, avoiding danger, creating combat advantage),

just as more basic behaviors (seeking water, finding food) do. Those same sophisticated psychological “functions” have an impact our primitive “functions.” When God put the human cortex on our primitive brain, He put a rocket engine on an oxcart. The power of our own thoughts, memories and beliefs can overwhelm the more “established” feedback loops and distort our physiology, and we may become ill. Simply engage in a vivid *Gedankenexperiment* and see “what if” you were in an airplane plummeting straight to the ground from 30,000 ft. “What if” an intoxicated, aggressive gang broke into your house and confronted you? At some level, the primitive “fight or flight” physiology has just been engaged. “What if” your body image is distorted to the extent that you believed must starve yourself to be “safe

study. NIH now funds research for the exploration of the mechanisms of the mind-body “placebo” effect as it influences health. The mind-body axis in healthcare research is no longer regarded as an embarrassing hobo to be hidden under the kitchen stairs, but is an honored guest invited to the banquet table to participate with the rest of the healthcare industry in a dialogue of exploration. There is active interest in understanding the mechanism of the placebo response and perhaps finding ways of potentiating the “placebo effect” for clinical benefit.

The funding of mind-body research has already produced dividends, some expected, and some startling. Perhaps the most interesting report to date has come from positron emission tomography (PET) studies of the brain's response to placebo in Parkinson's

The funding of mind-body research has already produced dividends, some expected, and some startling.

and accepted” or to “be in control”? Clearly the normal control system and homeostatic process has been neutralized, over-ridden by “belief.” Imagery is a more primitive and potent form of self-communication than words. “What if” the physiology were chronically distorted because of such psychological functions? Of course the result would be psychophysiological illness, also called the nocebo response (the negative side of the placebo response).

In a similar manner, however, “sophisticated” psychological functions can be engaged in the service of health. I attended a National Institutes of Health (NIH) conference in 1999 entitled “The Science of the Placebo” (NIH, 2000). The conference resulted in a compilation of the papers published as a book (Guess, Kleinman, Kusek, & Engel, 2002). The conference was a seminal event because, for the first time, a broad array of healthcare disciplines gathered to formally consider the role and nature of “the placebo” in healthcare, and to examine ways to study the phenomenon. This represented a formal recognition of the placebo phenomenon as a legitimate area of mind-body scientific

Disease (de la Fuente-Fernández et al., 2001), in which PET studies revealed that placebo produced “substantial” endogenous release of dopamine in the damaged nigrostriatal dopamine system of Parkinson's patients. In fact, the endogenous “placebo” dopamine release was equivalent to that seen in response to standard drug therapies (levodopa and apomorphine). I would argue that this simply represents the activation of the normal control system and homeostatic mechanism by “belief” (or possibly classical conditioning), in much the same way that belief and imagery are known to override homeostatic function in the instance of stress reactions.

In my opinion, a major difficulty that biofeedback confronts is that the clinical discipline of biofeedback has developed largely as a scientific orphan. There is passing recognition of learning theory and operant conditioning, reinforcement contingencies, and so forth, but those rarely play a significant role in actual clinical protocols. There is really no coherent theoretical structure that guides the clinical process. Clinical biofeedback has grown like a cottage industry.

Some practitioners appear to confuse technology with science and resort to “technospeak” in an effort to convince others that there is sound scientific foundation for their practice. At the same time, information from the basic sciences closely related to biofeedback never seems to cross the hallway from laboratory to clinic. I am thinking most specifically here of the lack of connection between, for instance, cognitive neuroscience, physiological psychology and EEG biofeedback.

Applied psychophysiology has some interesting tools and approaches to offer the burgeoning field of mind-body research and the search for the mechanism of the placebo response. There are some tricky methodological issues to address. I am reminded of the question posed by (I think) comedian Steve Wright (or George Carlin): “If God sneezes ... what do you say to Him?” In similar fashion, since the

placebo has represented the “gold standard” control condition in human healthcare studies. What can be used as a control condition in order to study the placebo response? Modern imaging technology may provide an answer. If the placebo response is, in reality, a variation of the recognized homeostatic processes as engaged by psychological processes, how can we participate with the others already at the banquet table in order to gain access to their powerful technologies (PET, fMRI) to demonstrate the ability of biofeedback methodology to specifically access, control and potentiate the “placebo response” for clinical applications? Living things are just tough to study. They won’t sit still. Hopefully methods derived from work in applied psychophysiology will help us understand and use the psychophysiology of placebo and nocebo.

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New Horizons in Neurofeedback

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the reference at Fp02 and one active electrode at T3 and the other at T4, uptraining in the alpha band with eyes closed. This protocol seems to be extremely powerful in re-regulating affective function. Even dissociative clients with active PTSD symptoms and histories of severe chronic childhood sexual abuse respond very well. The process seems to permit sufficient anxiety reduction and ego control for previously “stuck” clients to be able to metabolize their issues, facilitating marked progress. I am using this and other protocols, such as C3/C4/Pz SMR in “alpha-theta” style sessions instead of using conventional alpha-theta placements and uptraining, with gratifying results.

In a similar manner, we have had success in developing an answer to what used to be (at least in my office) a bugaboo in neurofeedback - alpha reduction in clients with excessive frontal alpha output. This can be very difficult for clients to learn to control and I hope the following will be useful. I term this the “bootcamp” protocol and it arose in response to an information-theoretic analysis of alpha suppression training in relation to alpha’s normal physiologic function.

Clients are encouraged to approach the alpha suppression task like a ninja or martial arts master, with great concentration and great intention to succeed (hence the “bootcamp”). Suppressing alpha provides good experiential correlates for focused attention-intention versus “taking it easy” and clients are strongly encouraged to learn to discriminate low alpha states from high alpha states by the therapist quizzing them after every trial regarding what were effective or ineffective strategies. In the earliest stages, the therapist terminates each trial immediately when the client’s alpha rises above criterion. Sessions are terminated as soon as rest periods fail to restore alpha suppression ability. Training is performed eyes open for clients showing excessive eyes open frontal alpha. Clients who suppress alpha with eyes open but have excess alpha with eyes closed do the training with closed eyes, using sound feedback.

Premise 1 of this protocol is that without training, alpha is never suppressed for long periods, especially in high alpha clients, because alpha represents a “rest” state. Alpha suppression in early stage training must therefore be performed in many short bursts, of a few seconds, separated by short breaks. Premise 2 is that alpha suppression uses up cerebral glucose and oxygen faster than can be resupplied by cerebral vasculature, so that a glucose-oxygen “debt” rapidly accumulates. Premise 3 is that clients cannot sense the development of the purely physiologic glucose-oxygen debt. So (4) although they may have established some correct experiential associations between alpha output and internal states of attention-intention, the associations are negated if training trials last long enough because the glucose-oxygen debt supervenes and causes uncontrollable rises in alpha output despite maintained effort. The alpha output becomes a hostage both to the periodicity of the glucose/oxygen resupply process, and to ultradian rhythms of alpha density. Therefore if trials, or the session, are allowed to last too long, the alpha output appears to become random - i.e. independent of the client’s attention-intention. This then negates the association between clients’ internal cues and their actually suppressing alpha, preventing learning. My hypothesis is that this is why so many neurofeedback therapists have found clients unable to effectively suppress alpha.

Several years ago I bought a Lexicor NSR24C brain mapper to perform QEEG on NF clients. I am very grateful to have previously shared an office with the redoubtable Jay Gunkelman for 3 years, who unstintingly shared his knowledge with me. Since 2001, I have been performing QEEG studies for various other clinicians, including neurofeedback therapists, psychiatrists, wholistic physicians and others. In the quest to make QEEG more disclosive of the neurological basis of client’s difficulties the QEEG process has evolved to the point where the process and results are somewhat different from what seems to be common practice.

First, although this is not the place to review QEEG analytic and normed software in detail, it is worth com-

menting on software because these “lenses” used to view the data affect the conclusions reached. I use NxLink for the principal normed analysis because, although its discriminants are very insensitive (e.g. the ADD discriminant was triggered only 6 times in 200+ QEEGs of ADD children), it offers tabulated data and topograms of the normed absolute amplitude (actually - amplitude squared, or “power”) of the client’s EEG in the clinical bands. This is superior to the relative amplitude measures produced by the Thatcher software because in comparing the two measures from Nxlink for the same clients it is clear that the relative measures in many ways do not really reveal what’s going on. In most cases the relative measures confirm the general diagnostic picture given by the absolute measures, but at the expense of distorting or ignoring significant details of the topological distribution of abnormal levels of EEG output in many of the bands. In perhaps some 20% of cases the relative measures are just plain misleading. The kicker is that it is impossible to deduce the absolute distribution of power from the relative power distribution.

Lexicor’s “Neurolex” offline analysis software (“7.0e”) is used to perform a separate analysis of the eyes closed and eyes open non-normed EEG data. Although venerable (written in 1989), DOS-based, and buggy in places (it remains a beta test version), this software provides surprisingly powerful analytic features (remontageable spectra, CSAs, topograms, tables, evoked potential analysis) and superior topographic representation of the non-normed absolute EEG compared to either NxLink or SKIL. NxLink uses the same scale for mapping absolute power into colors for all bands, leading to such an absence of color detail in all other bands than alpha that it is useless in this regard. SKIL uses such a degree of smoothing of the color gradations in its topograms that it is often very difficult to visually discriminate EEG field boundaries. Paradoxically, because “primitive” Neurolex uses fewer colors for its topograms, boundaries are much clearer to see!

I use SKIL for one very specialized purpose — production of comodula-

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New Horizons in Neurofeedback

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tion topograms. If NxLink indicates significant coherence abnormalities I perform comodulation analysis with SKIL. Comodulation is a very powerful metric to use for identifying parts of the brain which have low "connectivity" to other brain areas. The normed comodulation topograms are enormously revealing and multiple comodulation analyses are performed for what I call "biological" bands. Biological bands are the EEG frequency bands as defined by separable regions of the spectra from the 19 electrode sites. Looking at the spectra from the Neurolex analysis (SKIL provides spectra which are too smoothed and lack detail), it is clear that the various peaks, plateaux etc express the outputs of physiologically separate neurologic systems. The frequency ranges of the biological bands are used to define bands for comodulation topograms. Even though SKIL has no norms for children, SKIL's comodulation analyses seem to be reasonably accurate. They appear largely to agree with NxLink's normed coherence measures on children (Nxlink's norms go down to 4 years of age) and SKIL's comodulation results relate to their symptoms. Which brings us to the "why" of comodulation analyses. Coherence and comodulation abnormalities seem present in all head injury, stroke, learning disability, dementia and memory impairment cases, and many depression cases. Correcting comodulation abnormalities using neurofeedback training based on Lexicor's "correlation" metric is an effective way to improve cognitive status.

To revert to the uniqueness theme it has been a dream of mine to be able to resolve "connectivity" disorders using neurofeedback. This particularly applies to non-verbal learning disorder (NLD), because NLD is a profound, under-diagnosed disability which, when full-blown, has severe negative cognitive and social consequences for children and does not resolve with education or age. NLD individuals have high risks for depression and suicide as adults. The theoretician of NLD, Byron Rourk of Windsor University, Ontario, has proposed that

NLD is caused by agenesis, dysgenesis or failure of white matter fibers to myelinate properly in utero or early childhood, causing "disconnection" in the right hemisphere so that its essential pattern recognition functions cannot be performed. Our data indicates however, that most NLD children have amplitude abnormalities in the right hemisphere. All of them have comodulation abnormalities in at least the right temporal sites if not more.

It seems to be a little known fact that Lexicor's software enables its QEEG systems to perform evoked potential studies, both visual ("P100" etc), auditory ("P300") and potentially, somatosensory. Evoked potentials are routinely performed in my office for head injury, stroke, learning disability, dementia, perceptual and explosive disorder cases. The results are very revealing and relate well to symptoms. For example, a head injury client complained of finding reading very hard. His P100 VEP showed visual processing failing to propagate into the left posterior temporal area normally - agreeing very well with comodulation topograms showing lowered connectivity in this area, which is involved in reading. Evoked potentials are diagnostically helpful and can identify cerebral areas needing neurofeedback. They are much easier to perform than many clinicians seem to believe, and I offer training in this area because Lexicor does not provide either training or technical support for its EP software. Future plans include attempting to develop neurofeedback protocols employing steady state evoked potentials for correcting sensory deficits.

In addition to recording periods of eyes closed and open EEG, and EPs during evaluations, 19 channels of EEG and bilateral GSR are recorded during clients' performance of the auditory TOVA. In addition to being an attention test, TOVA is a well defined stressor. During the first (boring) half, deactivations of EEG (with increases in frontal theta or alpha) and GSR are often seen. The second (demanding) half provides a stressful task which tests for disinhibition, "frontal lobe shutdown," rapid fatiguing and/or anxiety. The auditory form of TOVA is used because it precipitates fewer eye blinks coincident with button pushes (TOVAs are all performed eyes-open).

"Biolex" neurofeedback software is used to analyze longitudinal trends in the TOVA EEG data. An import function in Biolex's post session analysis software permits graphing of up to five frequency bands from a user selectable channel in EEG recordings made with Neuroex. Biolex will also do analyses of alpha dominant frequencies and correlation analyses of output from electrode pairs (useful to quantify comodulation levels).

Bilateral GSR permits the detection of differentials in contralateral hemispheric sympathetic activation. Often there are striking differences in GSR arousal between hemispheres, and they come in all combinations. This approach was suggested by the work of the Mangina's in Canada which indicates the existence of a normative range of GSR values for optimum cognitive function. Bilateral GSR recordings during the TOVA identify traits of hemispheric over and under arousal, and agree very well with both symptoms and EEG findings. Sometimes, with equivocal QEEG data, the GSR data supplies a useful extra viewpoint to guide interpretation.

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3. Prichep LS, John (1992) ER. QEEG profiles of psychiatric disorders. *Brain Topography*. 4:249-257.

Biographical Notes

Julian Isaacs has been in private practice as a neurofeedback practitioner since 1994. He has been a faculty member of a Bay Area graduate school since 1982 when he relocated from Great Britain to California. He lives in Marin County and founded Marin Biofeedback Associates in 1997, ownership of which was transferred (amicably!) to his business partner Cindy Kerson in late 2001. In January 2002 he founded his QEEG organization, Neurodiagnostic Brain Imaging Services, in response to the growth of his QEEG practice. His email address is julianisaacs@aol.com

MyoTrac 3 Automates Incontinence Assessment and Practice Protocols

John D. Perry, PhD

One of the most compelling features of the early J&J biofeedback interfaces for the Commodore and later for IBM-PC computers was the ability of the user to “program” a standard sequence of display screens and preserve that sequence as a “protocol” or “application” for future use with clients suffering from the same or similar conditions. Many individual users assembled their own favorite combinations of screen sequences and data reports, focusing on topics like Stress Reduction and Diaphragmatic Breathing. Entrepreneurial program developers invested hundreds of hours creating complicated specialized protocols which sometimes sold for as much as \$2,500, including some aimed at treating incontinence.

But these early “USE” language programs were DOS-based and lacked the bells and whistles that were beginning to appear on newer Windows-based instruments. New features such as the ability to change the amplification (range) of an EMG signal with a single mouse-click “on the fly” (i.e., without losing any data) seemed self-evidently essential. And although



MyoTrac 3 Continence Software from Thought Technology should make everyone happy. It provides the classic three basic protocols used in pelvic muscle rehabilitation: (1) evaluation, (2) practice, and (3) a free-running mode for use when no standard protocol seems to work.

Each of these basic protocols can be used in a default setting – or modified and saved in several different varieties. In the evaluation module, for instance, it is possible to include five

What is especially appealing is that the timing of each segment can be individually adjusted . . . and the newly timed sequence can be given a name, saved to the hard disk, and recalled for use with future patients.

several very impressive general-purpose biofeedback programs came on the market in the late 1990s, they all lacked the one ingredient considered essential for pelvic muscle rehabilitation – a “bi-polar” orientation. When they summarized data at the end of a session, all intervals – including both “rest” and “contract” – were averaged together; obviously not a suitable compromise.

In addition to the crucial separation of “work” and “rest” data, most clinicians soon develop their own favorite sequences of work and rest intervals. The

separate sequences – which just happen to correspond to the sequences specified in the 1984 Software Standards for Perineometry published by this author. These include baseline, quick contractions, 10-second contractions, an endurance test, and a post baseline measure.

What is especially appealing is that the timing of each segment can be individually adjusted (again, with a mouse-click) and the newly timed sequence can be given a name, saved to the hard disk, and recalled for use with future patients. Clinicians who work primarily with elderly patients will probably want to change the default work-rest ratio from 10/10 to 5/5 or even 3/6 as a starting point.

The first time the program is run, the operator must select the device type and the serial port number. Then enter basic patient demographics and

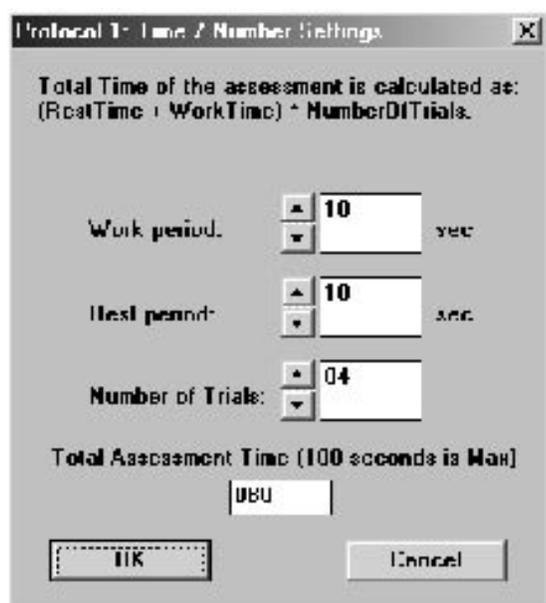


Figure 1. A typical settings window

This screen allows the clinician to set the Work and Rest periods and the number of repetitions.

Continued on page 12

MyoTrac 3 Automates Incontinence Assessment and Practice Protocols

Continued from page 11

you are ready to start.

As the program begins, a 30 second “check the connections” period ensures that there is a final test of the mechanical setup, including selection of a one or two channel and line or bargraph feedback display, and audio options. Then the several parts of the evaluation sequence are presented and simultaneously recorded in memory. When each section completes, the user has the option to “continue” or “re-

peat” that section – if, for instance, some artifact may have obscured an accurate reading. As each section is completed, a summary data box flashes on the screen with mean, standard deviation, variance, and even a zero crossing frequency. At the end of the test the therapist has the opportunity to enter “SOAP” notes, which will be saved.

The program has provisions for an extensive database of patient records, sorted by patient name into chronological order and labeled by protocol. Now here’s the exciting part: each session can be selected and “replayed” like a videotape. There’s even a “slid-

er” bar to “fast forward” to perhaps an event that was marked on the screen. One potential use of this feature would be motivational — to show a patient dramatically how much better her results were today compared with only three weeks ago, for instance.

Another nice feature is the “Confidential” button. Most computerized installations involve only one monitor, and it is quite unethical to display a list of patient names in such a manner that they can be viewed by other patients. “Confidential” converts the patient names to the first two letters of the last name and the first initial, so my name looks like “Pe***, J***”. This seems like an elegant solution to a frustrating problem. Individual Patient Records and notes can be edited, completed later, printed, and saved to hard disk or floppies.

The Continence Protocol works with three different sets of Thought Technology hardware: (1) The compact 2-EMG-channel “MyoTrac3”, (2) the “palm” size MyoTrac3G with its built-in LCD display, and (3) their top-of-the-line “Procomp+”. When used with the “standalone” 3G, patient session data is collected offline and can later be downloaded to a PC computer for analysis and preservation.

The closest thing I have to a serious criticism of the TT Continence Software is the size of the printed report – six pages of graphics plus a page of SOAP notes. When I wrote software, I prided myself on getting all the significant data onto a single-paged “report”. But paper is relatively cheap and there are good reasons to believe that reimbursement may ultimately be a function of documentation.

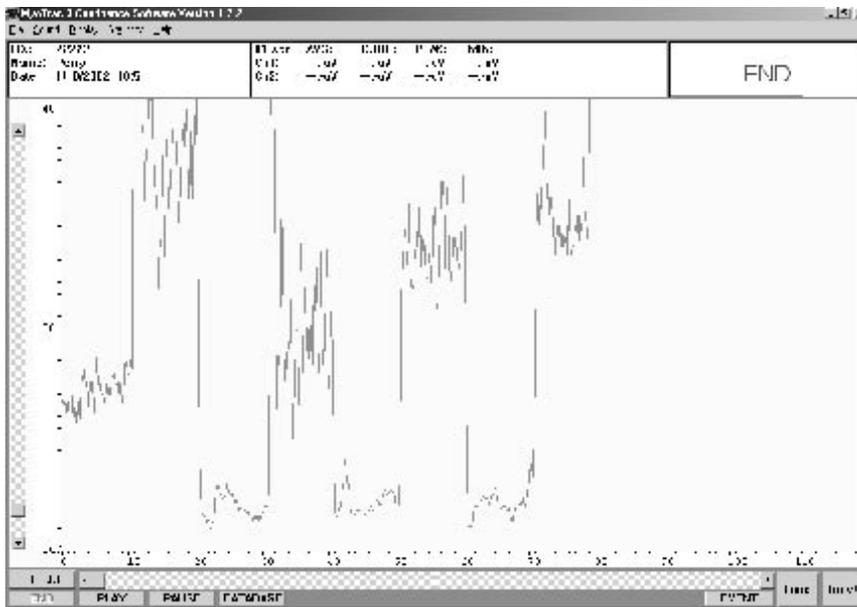


Figure 2. The basic display screen in line-graph “replay” mode. The MyoTrac 3 Screen in “replay” mode can only display line graphs, whereas during data collection filled graphs are also possible. At top center, instantaneous means and averages are shown during operation. This display shows four strong contractions following an initial agitated rest period.

From the President

Continued from page 3

- Happiness experienced from people’s work is strongly predicted when their work is congruent with the personal meaning in their lives. Competence, belonging and autonomy were also cited as part of the work-happiness equation. David McClelland’s model

of “Mother Teresa Effect” of improving immune power by deliberately watching altruistic movies, HeartMath research on heart rate variability changes during heart centered state, and our own work of teaching cardiac patients to “live with your heart in mind” — all echo the Vedic message *hrit parno* (your heart is your life). Propelled by this

heart-centered mind-set we have adapted the theme of *Art and Science of Heartfelt Living* for our annual meeting at Asilomar in November. Under the able leadership of our program chair, Jeff Cram, our society has put together an outstanding panel of speakers focusing on the needs of your heart. Our heart is yearning for yours at Asilomar.

HARDBALL with DOUG MATHESON

Douglas W. Matheson Ph.D



When I was asked to assume the editorship of the BSC Newsletter, I immediately thought about my experiences with the organization. I recalled that I was present at one of the founding meetings in San Francisco back in the 1970s, have been to several annual meetings over the years and had former students serve as officers in the BSC over the years. Still, I didn't really know about the membership. I decided to write an online survey to get information about several BSC issues as perceived by the members. The questions and the results may be downloaded PDF file at <http://psych.uop.edu/bsc/bscsurveyanal.pdf>.

Forty-two members responded to the survey. Let's review the items. The comments after each question are mine.

1. Why did you join BSC? (Please check all that apply.)

- | | |
|-------------------------------------|-----------------------------------|
| a. To Network (50%) | e. To attend functions (74%) |
| b. My company asked me to join | f. To promote biofeedback (57%) |
| c. I felt my company should belong | g. To obtain Membership Directory |
| d. Previous biofeedback affiliation | h. Other |

Apparently, the annual meetings and other seminars are very important to the members. That suggests we might want to spend more time and energy on those functions.

2. As a BSC member, which benefit is most important to you? (Please check one.)

- | | |
|---------------------------------------|---|
| a. Advocacy | c. Networking |
| b. Communication/Business Information | d. Education/keeping up on the latest information (61%) |

The members are keenly interested in keep up with the latest stuff. Communication and information are very important to the membership.

3. How effective has BSC been in achieving its mission?

- | | |
|-----------------------------|---|
| a. Very Effective (14%) | c. Not Effective (0%) |
| b. Somewhat Effective (62%) | d. I am not familiar with the mission (19%) |

Most felt the BSC was somewhat effective but nearly 20% did not know what the BSC's mission is. Perhaps we should draft a mission statement for potential new members and well as those who have paid their dues.

4. With which organization(s) would you like to see BSC form closer alliances?

- | | |
|--|-----------------------------------|
| a. Biofeedback Societies in other states (45%) | d. American Psychological Society |
| b. AAPB (67%) | e. American Medical Association |
| c. SNR (45%) | f. APA |

Members want closer relations with AAPB, SNR and other state societies. It might be helpful if the various state organization have links to our web site and vice versa. We do have reciprocal relations with AAPB and SNR for meeting announcement.

5. On which topic(s) are you most likely to seek information through BSC's programs?

- | | |
|-------------------------------------|--------------------------------|
| a. New Research (64%) | d. Political and Social Issues |
| b. See new equipment/software (57%) | e. Insurance Issues (38%) |
| c. Clinical Practices (60%) | f. Other |

It is apparent the members would like to know what's going on in the discipline. This item correlates with item #4 suggesting more information interchange. Also, the Newsletter should be a ripe venue for vendors wanting to advertise their products.

6. What topics would you like to see more of at meetings and in the Newsletter?

- | | |
|--|---|
| a. How to use equipment/software (48%) | f. RSA (36%) |
| b. Temperature training | g. Respiration training |
| c. EMG training | h. behavioral and psychotherapeutic methods (48%) |
| d. SC and skin potential | i. Neurofeedback adults (48%) |
| e. EKG | j. Neurofeedback children (29%) |

While many older biofeedback methods did not yield high marks, many current practitioners successfully use thermal, EMG, SC, respiration, and RSA in combination with neurofeedback.

7. Who would you like to hear speak at BSC programs? (Check those most important to you.)

- | | |
|--|---------------------------------|
| a. BSC Members (48%) | d. Regional Biofeedback Leaders |
| b. U.S. National Biofeedback Leaders (71%) | e. Regional Political Leaders |
| c. U.S. Political Leaders | f. Other specific speakers |

It looks like we should be inviting speakers who have national/international reputations. Somehow the society has to figure out how to fund travel etc. for this folks. Suggestions from the membership would help the board make appropriate invitations to speakers. The 2002 Winter meeting in Asilomar does feature several prominent keynoters.

8. Are there any areas currently not represented that you would like to see represented in a BSC committee?

No response here. I suspect apathy or disinterest here.

9. Attendance for the state meeting is declining. What suggestions do you have to improve attendance and make the meetings more enjoyable? – free associate!

Items here included, more reasonable accommodations, less expensive fees, greater variety of topics. And not scheduling papers opposite each other. One issue that was not expressed are the excessive fees charged to students who wish to attend. If we are going to grow with new blood, we have to make our meetings available to students, both undergraduate and graduate, and there should be a venue for them to ask questions, get help or otherwise be invited to meet with our group.

10. Have you accessed BSC's Web site?

- | | |
|----------------------------|----------------------|
| a. Yes, Regularly (10%) | c. Yes, Rarely (26%) |
| b. Yes, Occasionally (29%) | d. No, Never (36%) |

Our website is an under utilized resource. Yair Lurie has done a splendid job building and maintaining our website (<http://www.biofeedbackcalifornia.org/>). Recently Yair lost all his data when his computer's hard drive crashed and burned, but he will have things back up soon.

11. Did you find the Web site easy to navigate?

- | | |
|-----------------------------|----------------------------------|
| a. Yes, Very Easy (21%) | d. I have never been there (31%) |
| b. Yes, Somewhat Easy (31%) | c. No, Difficult (2%) |

The data speak for themselves.

12. How can BSC improve its Web site? _ (no response)

13. What additional information, if any, would you like to see included in the Membership Directory? (no response)

14. Do you read Newsletter?

- | | |
|---------------------------|----------------------------|
| a. Yes, Every Issue (57%) | c. Yes, Rarely (5%) |
| b. Yes, Most Issues (26%) | d. No, explain below (10%) |

Apparently just over half of us read the newsletter which has many implications.

15. What additional information, if any, would you like to receive in Newsletter or on the Web site?

- | | |
|--|---|
| a. Current research Articles (60%) | f. Members' Classified Ads Page (24%) |
| b. Equipment/software Articles (43%) | g. Bulletin Board/listserver online (29%) |
| c. "How to do it" Articles (67%) | h. "Meet the Members" Column (29%) |
| d. More Member-Driven Information (19%) | i. Other (5%) |
| e. More BSC board of directors- Information (7%) | |

It would appear that the board of directors is less important than they might feel. We need more input into the Newsletter from the membership. Let's hope that Hershel Toomim's how to do it (electrodes) will stimulate the rest of you to contribute. We are going to put directions for contributions to the Newsletter out on our listserver soon so you all can benefit from that information. We need new ideas, suggestions and help putting important information out to the membership.

16. BSC's annual meeting is next November at Asilomar in Pacific Grove, CA. Would you or your practice consider contributing to the an annual meeting fund in the next twelve months if the money went to support the advocacy and well-being of the society?

- | | |
|--|---|
| a. Yes, More than \$100 (2%) | d. Yes, Less than \$10.00 (5%) |
| b. Yes, Between \$50.00 and \$100.00 (10%) | e. Need More Information (17%) |
| c. Yes, Between \$10.00 and \$50.00 (17%) | f. No, my dues and convention fees are enough (33%) |

Finance is always a hot potato I hope the 29% of responders send their money in to LaWana Heald at our state office. We need the funds to continue to operate successfully. I don't think the membership would do a car wash or a cake sale, but maybe we could raffle something off.

17. Overall, how effective is BSC in addressing your needs?

- a. Very Effective (5%)
 b. Effective (26%)
 c. Somewhat Effective (52%)
 d. Not Effective-need a lot of work to improve (7%)

Looks like most of the membership that participated in the survey feel there is a lot of room for improvement. Since we had an n=42 (exact membership figures are not available at this time, but we assume it is > N=200) in the survey, many of our members either won't take the time to pitch in with input, or just don't care. That does not bode well for the society. If we don't get off our rusty dusty and do something, we might not be here next year. It is interesting that past presidents are seldom heard from once they retire. That suggests what a thankless job leadership is in our organization. It is a shame for a state that has a population of over 20 million that we are not more vigorous in our praise for the work all these men and women have done over the years.

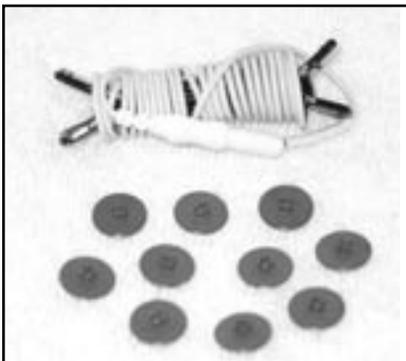
18. How can BSC address your needs more effectively?

*This item elicited the most emotion input. A typical response here was this: "Encourage mentoring for those of us at the beginning of our practice. I've heard several people who have 'quit' because it was 'too hard' to keep things going, marketing, expanding practice beyond the 'basic' training." Another responded: "like receiving listserv emails relating to bio and health issues. More information like this I think could be useful and a good service to the membership." A third person offered: "there's very little offered. Newsletter is very scant. No networking available unless you're one of the established practitioners. Biofeedback is a very difficult career to begin. It seems everyone is afraid of sharing information because they think someone else will take their few clients! The only way to receive training is by paying someone \$75 or more/hr. to mentor you. This just seems crazy! Are there other options I'm not aware of? Most of the new biofeedback students I trained with have already given up. There's no training, no jobs and the equipment is extremely expensive. Soon, there will be no new blood in this profession. Bah!" Guess what folks? We are hearing that people who are certified and in the business don't know the phrase **Pro Bono**. It appears that we are not doing enough to help new people. I was at a seminar in Seattle a few weeks ago, Lynda and Michael Thompson presented a wonderful three-day seminar on how they use their biofeedback hardware and software in their practice. Attending the meeting were two young professional women from British Columbia who were studying for the AAPB certification exam. They complained that they could not get adequate supervision even though they lived near Vancouver, B.C. Why do we have to charge for everything? I don't recall having to be paid to speak at the American Psychological Association, the Canadian Psychological Association or the Western Psychological Association. Professionals should share their knowledge freely and willingly. This "I've got mine, now try to get yours" attitude stinks. That's my opinion. I'd like to hear yours. Post your ideas on our listserv by emailing to bsc@psych2.uop.edu.*

HINTS AND TIPS

Hershel Toomim's Electrode gift to BSC

While many EEG vendors offer electrodes for sale, many are often over \$100 for simple EMG/EEG sensors. Hershel Toomim has come to the rescue. He has devised a simple system comprised of small, inexpensive plastic electrodes

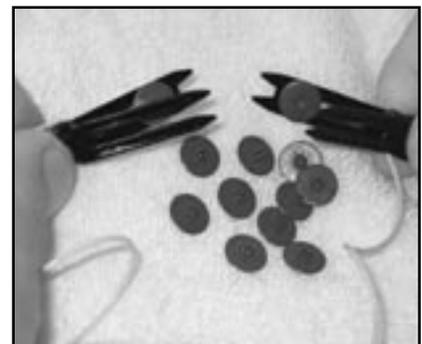


covered with conductive media, and really cheap double prong hair curl clips from any drug store or beauty supply houses. The plastic electrodes are available from Hershel in small quantities (100 for \$10.00). The photo above shows 10 plastic electrodes, each having an impression at the top where a wire lead may be inserted. The leads in the photo are wrapped around both hair clips. When the leads are unwound, the two clip electrodes are exposed, and the wire lead is inserted into the impression.

When the electrodes are covered with conductive gel, and placed on the skin, they provide a low impedance contact.

If you are doing EEG, you might take apart a hair clip resulting in

two slotted halves, pop in an electrode in the slot, feed a wire lead into the top impression, and you have a center electrode for recording on the scalp (Cz or wherever). Thanks very much to Hershel for this tip. Hershel's email address is hershel@biocomp.mpowermail.com.



When you want the very best...

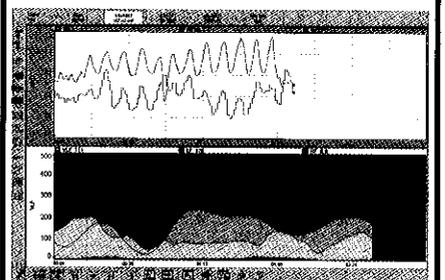
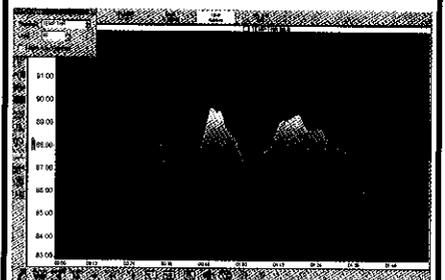
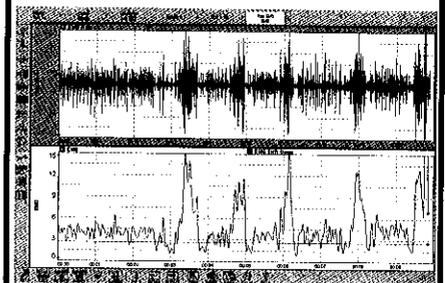
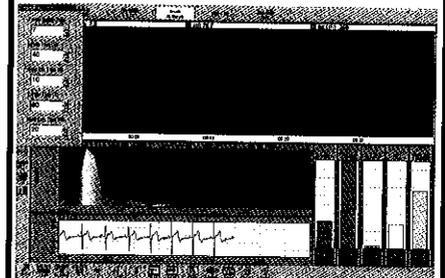
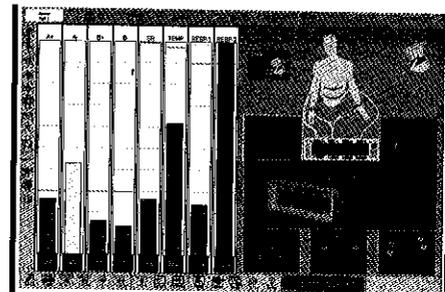
- Cutting-edge, "everything in one compact package" engineering designs with quality manufacturing for system longevity
- Automatic impedance testing on all electrodes for greater low-noise signal reliability and lower cost than remote preamps
- Fast USB connection for highest sample rates and 16-bit encoding for the highest signal resolution of any system on the market
- New Windows Physiolab Software features complete compatibility with the newest computer systems and an intuitive, easy-to-use interface
- Complete range of choices to meet your needs from low cost single-application starter systems to highly capable 24-channel systems
- Advanced Heart Rate Variability, EMG, Temperature / Skin Conductance and EEG applications, cables and electrodes included with multi-purpose systems at no extra cost
- Used by researchers at the Mayo Clinic, Harvard Medical School and NASA, and by clinicians worldwide

For system specifications, please visit <http://jjengineering.com>



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Hemoencephalography (HEG): The Study of Regional Cerebral Blood Flow rCBF & rCBO₂

Hershel Toomim Sc.D.

Editor's note: This article is also available on the Web at <http://psych.uop.edu/bsc/toomim02.htm>. Figures 3 and 4 are also available in color at that site.

Neurofeedback using HEG

Neurofeedback using HEG trains the subject to increase blood flow to a targeted area of the brain. Neurofeedback, as we have known it so far, measures the electrical activity of the brain, EEG, as a feedback signal to be controlled by the patient. Here we have substituted blood oxygenation for the same purpose. You have probably tried shining a flashlight through your hand and have seen the dark side light up. Our tissues, flesh and bone, are translucent.

It's not dark inside the skull in lighted conditions. In the sunlight, if you were in there with your brain, you could read a newspaper by that light. In HEG a light is shone on your brain through the translucent scalp and skull.

Fig. 1 A spectrophotometer device is worn on the head. Flashing red and

infrared lights are shown in the figure as one optode. The light collection amplifier is another type of optode. It responds to the returned light that is reflected and refracted by the encountered tissue. These optodes are spaced 3 centimeters apart so as to conduct most of the available light at the depth of cortical tissue.

Fig 2 Red, 660 nm, and infrared, 850 nm, lights are alternately shown on brain tissue. The graph above shows the large difference in red light attenuation between oxygen rich and oxygen starved hemoglobin whereas the infrared light is minimally changed. (Elwell & Hebden, (1999)

A computer program, receiving a measure of each light color in turn, calculates their ratio and graphs the value for the patient to see, hear and alter. During the summer of 1994 it was discovered that the author could intentionally increase cerebral regional oxygenation. Brain oxygenation increased merely by intensively willing it. The computer graph responded to thoughts. A neurofeedback system was born. The feedback signal is a vi-

sual graph and/or an audible tone.

Neurofeedback using this new technique provides a means to exercise selected brain areas. Exercise increases blood flow to the chosen brain module. Capillaries and dendrites grow with brain exercise! (Kaiser 1997, Thompson et al. 1998, Joyce and Seiver 1997, Ros-siter 1996, Kaiser 1997). An audible

tone was devised to increase in pitch to signify increased blood oxygenation. To increase oxygenation one merely attended to the highest note in each trill and willed the next higher note to sound. Application of the head-band and monitoring patient progress is simple. The treatment process is divided into ten-minute segments. Usually 3 to 4 such segments constitute a treatment session. Brain exercise in rats leads to increases in numbers of brain cell dendrites and capillary density, (Diamond, et. al 1988.)

Rosenzweig (1965) of U.C. Berkley conducted studies in the mid 1960's showing effects of enhanced or stimulating and non-stimulating environ-

Continued on page 18

Figure 1

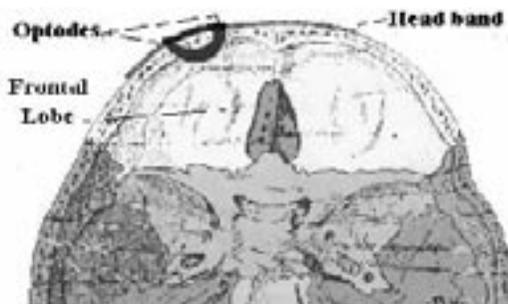
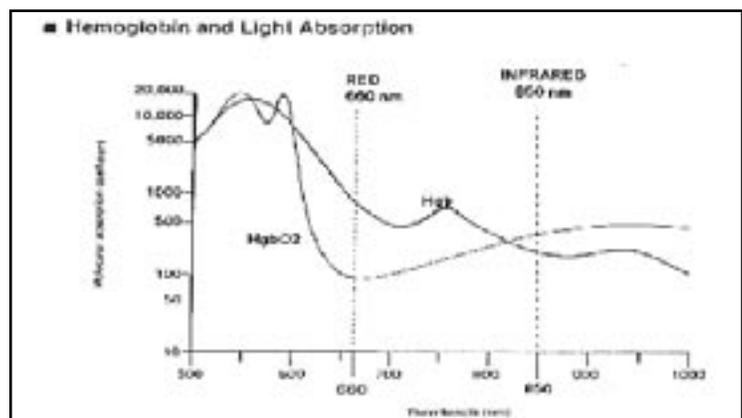


Figure 2



HEG

Continued from page 17

ments on rats. Those placed in stimulating environments had better blood supply in the brain, heavier brains and more neurotransmitters. Students show the same effect when brain exercise is used. The weaker areas become strong.

Subsequently Diamond et. al (1988) demonstrated that brain exercise increased the weight of rat brains. Dr. Diamond undertook to determine if old rats could learn new tricks. Rats live to an old age of 900 days. She selected seven hundred-day old rats for her experiment. She divided the rats into three groups: 1. One rat in a cage, 2. Two rats to a cage, and 3. Six rats to a larger cage. All the rats were fed standard laboratory chow. Cages with six rats were provided with new toys; mazes to solve, rotating drums for exercise, etc. almost every day. These rats were held and petted by the lab assistants. Rats love to be tickled. After a month the rats were sacrificed. Their brains were examined. Those of the enhanced group were found to be 8% heavier compared to the solitary group. The additional weight was supported by denser capillary beds. Microscopic examination of enhanced environment cortical slices revealed dendritic trees resembling a dense rain forest. Those of the solitary group resembled a carefully manicured landscape.

Single Photon Emission Computerized Tomography, SPECT, Demonstrates blood flow pre- and post-treatment

Our newsletter is published in black and white. To see the colored SPECT [Single Photon Emission Computerized Tomography] images of the SPECT study of manic depressed patient before treatment and after 23 treatment sessions, please go to <http://psych.uop.edu/bsc/toomim02.htm>.

SPECT studies are unique in their comparison to an age-related database. The false color blood flow levels are shown by colors ranging from black through purple, blue, yellow, orange, red, and white. The Population Mean is depicted in yellow. The left margin color scale defines standard deviations relative to the population mean.

[For an introduction to SPECT, see <http://brighamrad.harvard.edu/education/online/BrainSPECT/Introduction.html>].

Comparison to a database is a unique feature of SPECT studies by The UCLA Santa Monica Hospital Nuclear Medicine Service under the direction of Dr. Michael Uszler. These easily read studies are very helpful in determining subnormal hypoperfused brain areas. This pre-treatment study of a bipolar, manic-depressive, patient shows several seriously hypoperfused areas (Heuser et al. 1994). These include the medial frontal subgenual region, the right and left temporal lobes,

both hippocampi, Broca's and Wernicke's areas as well as the left superior frontal and parietal association areas. Not shown in this view is the blue to purple right subgenual orbital-frontal lobe. As Drevets (Drevets et al 1999), showed this area, when below normal, is common to bipolar disorder and depression (Ito et al. 1996). The right orbital-frontal area, a gateway between cortex and the limbic system, seems to provide cortical control of emotion. Such control is lacking in bipolar disorder. In this emotional vein we have yet to see a bipolar patient who has a good relationship with her mother. This study (Fig 4) was completed after 23 HEG sessions, 7/21/2000.

Until this writing this patient, a rapid cyler, has not experienced a manic episode. At the time of this SPECT study she was depressed. That this is to be expected is shown by the below normal blue area in her left frontal cortex.

At present she is coping competently with her mother's newly diagnosed metastasized breast cancer. She is a nurse and is too busy to feel depressed. This is interesting since she has never before been able to live peacefully with her mother.

Literature study examines brain areas involved in ADD/ADHD, Schizophrenia, and Autism

Fig. 5 The National Library of Medicine search turned up many imaging studies of Autism, Schizophrenia and ADD/ADHD disorders (An-

Figure 3

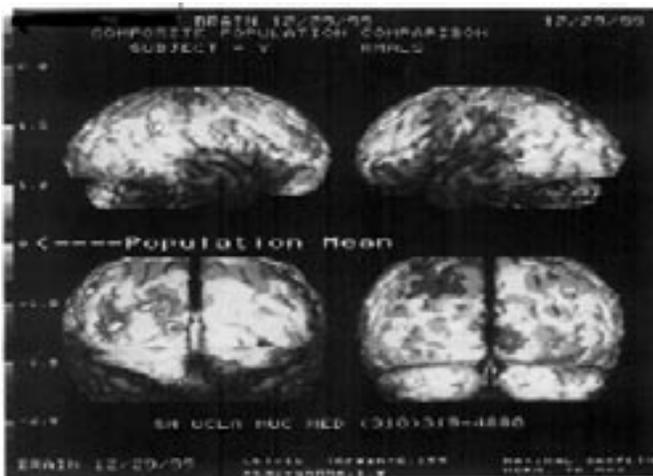
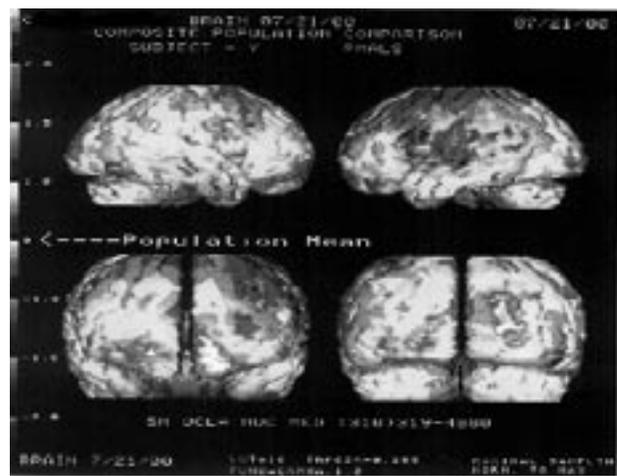


Figure 4



dreason et al.). The citation frequency for hypoperfused brain modules is illustrated here. It is clear that hypoperfused frontal cortex dominates the field. Knowledge of the distribution of hypoperfused areas is useful in determining brain areas to be treated.

The dominance and importance of frontal hypoperfusion fits our experience in dealing with Depression (Drevets et al 1999), Toxic Encephalopathy (Heuser et al. 1994), Epilepsy and Schizophrenia (Andreason et al. 1997) as well. The importance of the frontal lobes cannot be over emphasized (Ito et al. 1996). These areas are particularly easy to reach from the forehead with the spectrophotometer headband.

Disorders with Abnormal Regional Blood flow

- ADD
- Aging Memory Loss
- Alzheimer’s Disease
- Anorexia /Bulimia
- Asperger’s
- Autism
- Chronic Fatigue
- Depression
- Senile Dementia
- Dyslexia
- Epilepsy
- Lupus Erythematosus
- Migraine
- Multiple Sclerosis
- Schizophrenia
- Toxic Encephalopathy

Figure 5

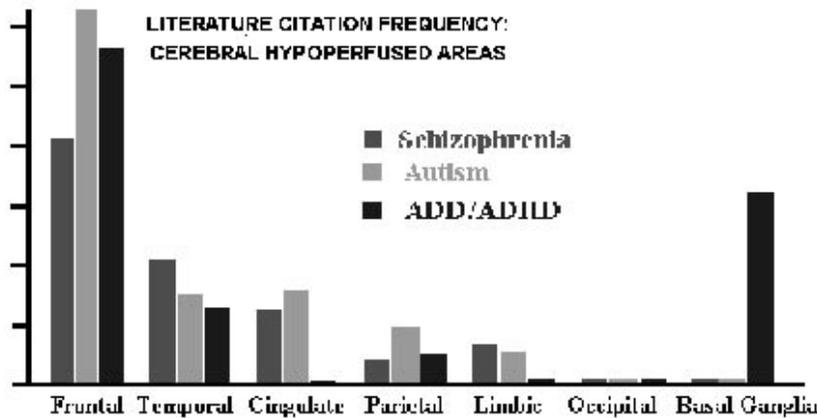
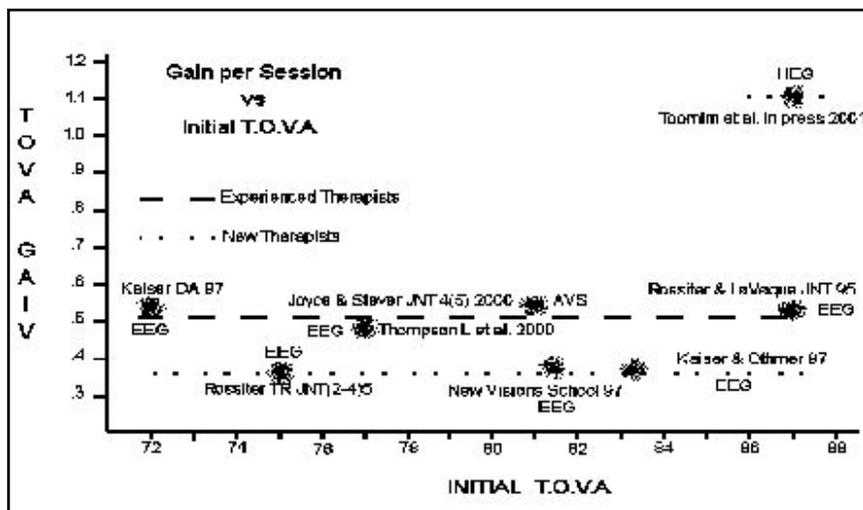


Figure 6



Test of Variables of Attention. (T.O.V.A.) A computerized test that measures response time, consistency, inattention, and impulsivity.

The TOVA is useful in tracking patient recovery. Frontal cortex, the executive part of the brain is most often compromised in any brain disorder. The TOVA indicators, speed of response and stability of the prefrontal cortex, are a useful index of improvement of brain function following HEG neurotherapy. Many brain studies have validated the proposition that healthy brains respond to problem solving and other stimuli more rapidly than compromised brains. Thus working memory problems are suitably tracked with TOVA to determine the most appropriate dose for ADD/ADHD children. Each study in the following graph used TOVA scores as a pre-post training measure. The graph shows the gains for all published studies with TOVA scores as the dependent variable

Fig. 6 Treatment TOVA gains per session vs. initial TOVA scores for various treatments reported in the Neurofeedback literature. There are EEG, Audio-Visual Stimulation (AVS), and HEG studies presented. The number of sessions ranged from 10 to 40 in these studies.

The TOVA gains per session of these published studies (Kaiser & Othmer 1997, Thompson & Thompson 1998, Joyce & Siever 1997, Rossiter & LaVaque, 1995, Rossiter, 1996, Joyce, 1997) present some very counterintuitive information. These results fall naturally into two groups. 1) Studies done by the most accomplished providers gained 0.52 TOVA points per session. 2) Studies done with home, school, or average providers cluster about 0.37 TOVA points per session. That the per session scores cluster so closely about either 0.52 or 0.37 is completely unexpected since the number of reported sessions ranged from 20 to 40 and each provider had a favorite set of parameters and procedures. It is also unexpected that the initial scores that measure the degree of dysfunction of the patients had no effect on the gains per session. One would expect gains to decrease as the number of sessions

Toomim's Cognitive Behavior Questionnaire: Directed to Specific Brain Areas

Hershel Toomim Sc.D.
Biocomp Research Institute

1. **Do you easily get lost?**
T6; Right. posterior temporal lobe, automatic direction memory here.
2. **Do you recognize people you have recently met about a week ago?**
T6; Right inferior mid temporal lobe. Face Fusiform Area
3. **Do you recognize neighbor's houses? Would you note a strange car on your block?**
T6; Superior mid temporal lobe compares shapes, objects to memory
4. **Do you like to read?**
If no, find out why.
5. **Do you recognize words on a page by shape?**
T4; Right Superior mid temporal lobe compares shapes, objects to memory
If dyslexic then inferior right temporal lobe is substituting for superior T4 2
Else T5. Transfers to left superior temporal lobe, Werneke's area
6. **Do you find reading is too much work? Is lack of understanding the problem?**
T5; Left lateral frontal lobe and left superior mid temporal lobe, Werneke's area
7. **Do you find yourself rereading paragraphs?**
Fp1, Fp2, Fp3, left inferior frontal and left lateral frontal areas; working memory deficit. Check TOVA for impulsivity.
8. **Do you find your spoken words are different from your intent?**
T3-F7. Superior left lateral frontal lobe, anterior superior temporal lobe. Broca's area controls speech production
9. **Do you keep lists of things to do?**
F3, F4, Fp1, and Fp2. Lists substitute for mid term working memory.
10. **Do you have trouble prioritizing your time?**
F7. Left anterior temporal lobe for organization.
11. **Are you often late for appointments?**
F3, F7, and T5. Logical memory retrieval and storage areas.
12. **Do you sometimes find yourself unknowingly rereading a news column or book for a while before you realize it?**
F7- T3; Memory recall
13. **Are you impulsive, like needing to beat the yellow traffic light?**
Fp1, Fp2, Fpz, and Fz. Frontal cortex, check TOVA, and anterior cingulate gyrus
14. **Do you often find yourself unable to stop a recurring thought?**
Fpz- Fz anterior cingulate gyrus
15. **Are you uncomfortable sitting still?**
Fpz, Fz. Anterior cingulate gyrus.
16. **Do you ever feel guilty or ashamed?**
Fp2 Right orbital frontal gyrus
17. **Did you bond with your mother?**
Fp2 Right orbital frontal gyrus.

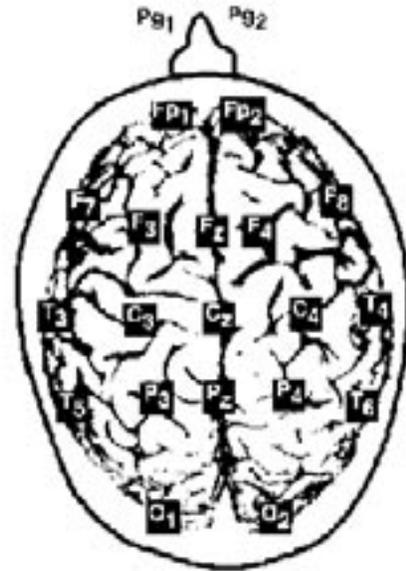


Figure 7

increased and the patients approached normal. That this didn't happen suggests 40 EEG sessions is insufficient for the average patient even with the most accomplished providers.¹ It is noteworthy that the HEG study falls into a completely new treatment efficiency category. HEG gains are more than double the gains shown for other techniques. From these studies we can see that the procedures are very tolerant of provider skills. One can hardly go wrong. The major variable is the cost to the patient. There are no known side effects for HEG treatments.

Can't remember? Can't focus? Misplace things? Slow learning? Always tired? Turned around?

These are some common physical brain problems. Healthy brains have adequate blood flow. Problem brains have insufficient blood flow to limited brain areas. Several brain areas are involved in whatever you do. Finding the affected areas is key. A non-invasive directed brain exercise is indicated.

Fig. 7 Ten/Twenty International Brain Position naming system

The questionnaire on page 20 was designed to point out the brain areas needing exercise to counter hypoperfusion.

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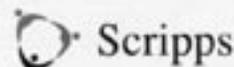
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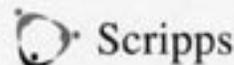
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