



## Tentative Scientific Program Schedule

April 14, 2010 - Evening program		
17:00-17:30	Welcome party with snacks and drinks	
17:30-18:00	Official opening Welcome by Erik Peper (President BFE) & Monika Fuhs (Executive Director BFE) Welcome by Prof dr. Giuseppe Sacco	
18:00-20:00	Invited lectures Ute Strehl: "long term effects of neurofeedback in ADHD and epilepsy" Sue Wilson: " Biofeedback at the 2010 Vancouver Olympics"	
April 15, 2010 – Day program		
9:00 – 11:00	Invited lectures Jay Gunkelman (title to be announced) Robert Whitehouse: "Heart Rate Variability and Capnometry, the importance of using both in self-regulation, & what's special about the heart's Resonant Frequency"	
11:00 – 11:30	Break & Poster presentations	
11:30 – 13:00	Neurofeedback symposium Oral presentations	EMG symposium Oral presentations
13:00 – 14:30	Lunch Break & Poster presentations	
14:30 – 16:00	Neurofeedback symposium (continued) Oral presentations	Symposium Integrative health Oral presentations
16:00 – 16:30	Break & Poster presentations	
16:30 – 18:00	Heart Rate Variability symposium Oral presentations	Symposium Related topics Oral presentations

See next page for titles and abstracts of all presentations

Abstracts and titles of invited lectures will be announced a.s.a.p.

## List of oral presentations (click on the title to view the abstract)

Phillipens, Ingrid	<a href="#">Neurofeedback training in non-human Primates</a>
Mattulich, Liana	<a href="#">Synergistic High Gamma for Exceptional Performance: Data makes visible our invisible innate patterns</a>
Fleischmann, Matthew	<a href="#">Evidence-based and Practice-based Evidence in Neurotherapy</a>
Collura, Tom	<a href="#">Integration of EEG / Live Z-scores, DC/SCP, and Peripheral Measures in Biofeedback</a>
Surmeli, Tanju	<a href="#">Obsessive Compulsive Disorder and the Efficacy of QEEG-Guided Neurofeedback Treatment: Case Series</a>
Breteler, Rien	<a href="#">How do you feel? Progress monitoring in Neurofeedback training with a standardized questionnaire</a>
Warnke, Ralph	<a href="#">Low-level functions as a key indicator of attention and language competence</a>
Hageman, Joan	<a href="#">Dimensions of Attention Questionnaire (DAQ): A Potential Pre-Screening Tool to Suggest Initial Use of Biofeedback or Hypnosis for Clients</a>
Kappes, Bruno	<a href="#">Learning Models and Methods for Effective Biofeedback Training</a>
Mauri, Maurizio	<a href="#">Psychophysiological reactions and Pupil Dilation during stress and relaxation</a>
Cipresso, Pietro	<a href="#">Synchronizing physiological signals acquired from biofeedback equipment and eye-tracker systems</a>
Booiman, Annette	<a href="#">How to use SEMG at the practice of a PT</a>
Fazekas, Christian	<a href="#">Regulation of trapezius activity and IQ: Is there Psychosomatic Intelligence?</a>
Peper, Erik	<a href="#">Reduce dysponesis and improve physical performance with surface electromyography</a>
Lampropoulou, Anastasia	<a href="#">Respiratory Disorders Treated Through Biofeedback Techniques</a>
Moss, Don	<a href="#">Integrative Health Care: The Role of Biofeedback and Mind-Body Therapies</a>
Friedrich, Petra	<a href="#">The Importance of Music in personalized Therapies and Biofeedback</a>
Visweswaraiah, Naveen	<a href="#">Role of yoga in facilitating biofeedback training</a>
Zivoder, Ivana	<a href="#">Stress level in health professionals: Comparison of self-evaluation and physiological measurements</a>
Blase, Kees	<a href="#">Slim with your heart rhythm</a>
Auditya Purwandini Sutarto	<a href="#">HRV biofeedback training improves cognital performance in industrial operators</a>
Bonaventura, Nunzio	<a href="#">The Trichromatic Theory of Equilibrium of the Vegetative Nervous System</a>

## List of poster presentations (click on the title to view the abstract)

Grant, Jonathan	<a href="#">The Effects Of Kargyraa Throat-Singing And Singing A Fundamental Note On Heart Rate Variability</a>
Figueroa López, Carlos	<a href="#">Psychophysiological Stress Profile In Patients With Heart Failure</a>
Sakoman, Andrea	<a href="#">Psychophysiological response to emotional words in patients suffering from Combat related posttraumatic stress disorder</a>
Kirlum, Hans-Joachim	<a href="#">Electromyographic Response In Patients With Hemiparesis – There Is No Influence On The Effect Of Brucker-biofeedback-therapy By Latency To Incident Or Age</a>
Rausa, Marialuisa	<a href="#">Biofeedback Assisted Control Of Emotional Fainting: Preliminary Results</a>
Sato, Toshihiko	<a href="#">Effects Of Neurofeedback Training For An Increase In Upper Alpha Power On Cognitive Performance In A Choice Reaction Time Task: A Preliminary Study</a>



Wednesday April 14, 2010

## Scientific Program Opening - Abstracts invited lectures

### Long Term Effects of Neurofeedback In ADHD and Epilepsy

Ute Strehl (co-authors: C Gani, S Birkle), Institute of Medical Psychology and Behavioral Neurobiology, University of Tübingen, Germany

**Abstract:** For 30 years it has been reported that neurofeedback reduces symptoms in ADHD and Epilepsy. Recently, a meta-analysis has shown that neurofeedback can indeed be considered as an evidence-based treatment for ADHD. The results confirm that neurofeedback treatment has large and clinically significant effects on Impulsivity and Inattention with a modest improvement in Hyperactivity. A meta-analysis of EEG biofeedback in Epilepsy demonstrated its clinical efficacy. While these analyses are based on pre-post comparisons there is still a lack of long term follow-up studies. Here we present data for the first time concerning the long term efficacy of neurofeedback on ADHD and epilepsy. **Methods:** Follow-up evaluation for ADHD was carried out 6 months and more than 2 years after the last training session. Out of 52 children, 23 participated in the follow-up which included three EEG training sessions. Parents rated behavioral symptoms as well as the frequency and impact of problems. Attention was measured with the Testbatterie zur Aufmerksamkeitsprüfung (TAP). For epilepsy, the evaluation of 14 patients was conducted 10 years (mean) after the end of treatment. The original patient group consisted of 40 participants. **Results:** In the ADHD study all improvements in behavior and attention that had been previously observed through assessments were found to be stable in the long term. Furthermore, an even greater significant reduction for a number of problems and a significant improvement in attention were observed. EEG-self regulation skills were preserved. The epilepsy patients still reported significantly fewer seizures compared to the baseline measured 10 years prior and EEG-self regulation skills were still observable. **Conclusion:** This is the first time long term effects of Neurofeedback are reported. The stability of neurofeedback-induced changes in symptoms and the preserved ability to self regulate EEG parameters support the conclusion that Neurofeedback helps to normalize brain functions. Possible limitations of these findings are the low number of participants and the impact of time since the end of treatment. Their relevance should be further discussed.

### Biofeedback at the 2010 Vancouver Olympics

Sue Wilson, Canada

**Abstract:** Biofeedback and neurofeedback were integrated into several sport psychology programs in Canada for the Vancouver Olympics. These programmes were part of the 'Own the Podium', Government funded, top secret work that led to the largest awarding of gold medals to the home country in the history of the Winter Olympics. This presentation will report as much feedback as possible from the clinicians as to how well the training was received, utilized and beneficial (the government report may not be available by then). A video of the programme of the gold medalist who stated that the bf/nf programme helped him lessen stress and stay focused at the start gate will be shown.

Thursday April 15, 2010

## Oral presentations

### Integration of EEG / Live Z-scores, DC/SCP, and Peripheral Measures in Biofeedback

Thomas F. Collura, BrainMaster Technologies, USA, Email: [Tomc1@brainm.com](mailto:Tomc1@brainm.com)

**Abstract:** This lecture will describe methods for combining EEG biofeedback with DC/SCP feedback, and peripheral biofeedback measures. Recording of DC/SCP potentials will be demonstrated, as well as methods for training DC/SCP simultaneously with conventional EEG recording. Peripheral measures including pulse oximetry, heart-rate variability, skin conductance, temperature, and EMG will also be described.

### HRV Biofeedback Training Improves Cognitive Performance Among Industrial Operators

Auditya Purwandini Sutarto, University of Malaysia Pahang, Malaysia, Email: [auditya\\_ps@yahoo.com](mailto:auditya_ps@yahoo.com)

**Abstract:** In shop floor, most operators perform their cognitive functions below their peak performance due to many reasons such as fatigue, boredom, and stress. The aim of this study was to examine whether heart rate variability (HRV) biofeedback training could improve cognitive performance among operators in electronic manufacturing industry. Ten operators received five sessions of weekly HRV biofeedback training of 30-50 minutes each, whereas ten subjects received no intervention. Physiological stress profiles, cognitive performance, and self-reports questionnaire (Depression, Anxiety, and Stress Scale) were assessed at pre and post intervention. There were significant group x time interaction effects for cognitive performance as measured by Stroop Color-Word (interference score) and Sternberg test (response times). No significant interaction effect was present on D2 Attention test (concentration performance). Within group analysis using paired *t*-tests revealed that, as opposed to the control group, the intervention group improved significantly on all cognitive performance. Partial support was found for the reduction of the DASS score at post intervention. The control participants showed no improvements. These findings were supported with a significant increase in the percent of total low frequency (LF) power in the heart rate spectrum across sessions and stressor period of physiological assessment at post intervention in the biofeedback group while the control group remained constant. In summary, this study provides potential application of HRV biofeedback for operator's performance enhancement, associated with increases in HRV.

### Slim With Your Heart Rhythm

Kees Blase Ph.D., HeartFocus, The Netherlands, Email: [k.blase@hetnet.nl](mailto:k.blase@hetnet.nl)

**Abstract:** Nutritionist dr David O Hare and medical physicist Kees Blase wrote a book based on the 0,1 resonance frequency of HRV for clients with overweight. The method is based on 9 steps in 9 weeks in 3 phases. The first period clients learn step by step how to reach the 0,1 frequency in effortless breathing. In the second phase emotion regulation is the aim. How can you decrease the charge in emotions with negative valence? In the third phase clients learn to manage eating emotions like hunger, appetite and saturation, and also to handle frustration, loneliness and other eating emotions. The method is effective for selfhealing of one of the 3 epidemics in the world.

### The Future Of Peripheral Biofeedback: The Trichromatic Theory Of Equilibrium Of The Vegetative Nervous System

Dr. Nunzio Bonaventura, Italy, Email: [nunzio.bonaventura@libero.it](mailto:nunzio.bonaventura@libero.it)

**Abstract:** In this talk the author introduces the Trichromatic Theory of Equilibrium of the Vegetative Nervous System (T.T.E. of VNS). The T.T.E. of VNS is a particular application of the Trichromatic Theory of Equilibrium

of Systems (T.T.E.S.). The T.T.E. of VNS is a new theory and an innovative method derived from computerized processing of biofeedback data which establishes a real innovation in this field. This theory states that it's possible to observe, to analyze, to check, and to modify, in real time, the dynamic status of the balance between the sympathetic and the parasympathetic section of the vegetative nervous system. Essential condition for the application of the T.T.E. of VNS is the identification of three specific representative physiological indexes of the general equilibrium of the vegetative nervous system. The three specific representative physiological indexes are: 1) Skin Conductance Response (SCR) ; 2) Heart Rate (HR); 3) Skin Temperature (THE). With the real time values of these three specific representative physiological indexes an innovative psychophysiological profile can be compiled. Conclusions obtained by the application of these theory and method indicate that they can be used either in scientific research or for diagnostic and psychotherapeutic purposes. Just as an example, in this talk some psychophysiological animated profiles will be presented.

## How To Use sEMG At The Practice Of A Physical Therapist

Annette Booiman, The Netherlands, Email: [acbooiman@zonnet.nl](mailto:acbooiman@zonnet.nl)

**Abstract:** Muscle biofeedback is a useful evidence based teaching and treatment approach for physical/remedial therapists. It can show unnecessary covert muscles co-contractions and the muscles staying tense after performing a task and not relaxing. The physiological monitoring can identify low level muscle activity which is not recognized by neither the client nor the therapist. SEMG allows the invisible muscle tension to become visible and is illustrated through a case study of a client who sought treatment because of neck/shoulder pain. Her pain started when she became employed in a vegetable store and continued to increase to the point that she was afraid that she would have to stop working. During the assessment sessions the trapezius and deltoid SEMG were recorded while she role played her job task which consisted of picking up apples from a crate, putting them in a paper bag, turning around and placing them in a paper bag on the scale. The SEMG showed increased shoulder tension, which did not return to baseline and there was an absence of regenerative SEMG gaps. She was then trained to change her posture and position of the arms. After the repetition of the movements several times in the new way, she repeated the role play. The SEMG showed significant decrease and relaxation in between the different tasks. After actually working in this posture with reduced dysponesis, she reported a significant decrease in headache and less exhaustion after a day's work. At the one year follow up, she reported a significant decrease in her neck/shoulder complaints and was able to continue her job without neck and shoulder problems. In summary, SEMG augments the behavioural interventions because the SEMG allows the invisible muscle tension to become visible and helps develop internal awareness. The SEMG provided immediate feedback which enhanced motivation and allowed her to talk to her supervisor to request ergonomic changes that allowed her to work more efficiently.

## How do you feel? Progress monitoring in neurofeedback training with a standardized questionnaire.

Dr. Marinus Breteler and drs. Martin van Beek, EEG Resource Institute, The Netherlands  
Email: [r.breteler@eegbiofeedback.nl](mailto:r.breteler@eegbiofeedback.nl)

**Abstract:** Recent investigations have emphasized the effectiveness of standardized feedback in the process of therapy progress. In the field of neurofeedback, several questionnaires have been used that were developed as a general questionnaire for a particular problem area, such as the Connors in ADHD and the Autism Questionnaire in autism. Apart from these diagnostically important measures, treatment progress may also be measured in terms of daily symptoms, such as feeling tired, angry, or distracted. The quick assessment (QA), originally developed by JD Elder turned out to be an interesting instrument to use in a clinical setting with repeated measures.

In this presentation we will present data of the factor structure of the QA, and associate these with the SCL-90; a well-validated symptom checklist. Second, we will show its use in progress monitoring of neurofeedback trainings. Lastly we will discuss cases in which the QA proved useful in directing further treatment.

## Synchronizing Physiological Signals Acquired From Biofeedback Equipment And Eye-tracker systems

Pietro Cipresso, Ph.D. Candidate, IULM University Milano, Italy, Email: [pietro.cipresso@iulm.it](mailto:pietro.cipresso@iulm.it)

**Abstract:** Eye-tracker systems allow the addition of a series of signals from the eyes, such as pupil dilation, the distance between the pupils, and the eyes blink, to standard neurophysiology signals, allowing the assessment of the degree of relaxation or stress felt by the subjects. It is essential to establish the time between the

presented stimulus and when the physiological response occurs above all if we acquire signals also from a biofeedback equipment so that the exact time of a presented stimulus can be determined. Many psychophysiology scientists have begun to use eye-tracking methodologies in conjunction with standard biofeedback systems. This approach has proven to be useful for analyzing visual stimuli and the physiological reactions they produce. We developed some algorithms to synchronize eye-tracker systems with a biofeedback "Procomp Infiniti" (Thought Technology) using the TT-AV Sync sensor, which was configured through a physical channel on the biofeedback. In a previous work we conducted 500 synchronizations with the device in order to establish its precision, which we determined to be  $\pm 0.1$  second. The developed algorithms allow researchers to simultaneously analyze physiological signals acquired from different devices.

## Regulation of trapezius activity and IQ: Is there Psychosomatic Intelligence?

PD Dr. Christian Fazekas, Medizinische Universität Graz, Austria, Email: [christian.fazekas@meduni-graz.at](mailto:christian.fazekas@meduni-graz.at)

**Abstract:** Background: The intelligence quotient (IQ) may influence exteroceptive (e. g. visual, auditory) and interoceptive (e.g. autonomic nervous system, posture) perception, processing and regulation of somatic information. Based on these findings the Psychosomatic Intelligence (PI) hypothesis has been proposed as an additional conceptual framework within intelligence research. Objective: The aim of this study was to probe for an association between conscious, differentiated regulation of trapezius activity and IQ. Methods: Participants in this study were asked to regulate as quickly as possible the tension of the trapezius according to standardized tasks with increasing levels of difficulties. The tasks were shown on the biofeedback monitor in combination with surface electromyographical (EMG) signals which were recorded bilaterally from the upper trapezius. In addition hemoencephalography (HEG) signals were used as a measure of concentration during performance. Results: Data concerning an association between learning curve of regulating trapezius activity, concentration according to HEG signals and dimensions of IQ will be presented at the conference. Conclusion: This contribution is intended to stimulate the discussion about further research in this field.

## Evidence-Based And Practice-Based Evidence In Neurotherapy

Matthew J. Fleischman, PhD, Center for Attention & Learning, Eugene, OR, USA Email: [matthew@attentionlearning.com](mailto:matthew@attentionlearning.com)

**Abstract:** As neurotherapy/neurofeedback seeks recognition as an "evidence-based" therapy with claims for wide-spread adoption, its practitioners need to be aware of both the strengths and limitations of "evidence-based" claims and how such therapies often fail when implemented beyond more controlled settings. An emerging alternative, "practice-based evidence" suggests that a treatment model based on constant measurement and feedback can accelerate the successful implementation of our work. This presentation will review problems with evidence-based claims in behavioral health, psychiatry and medicine and their parallels to neurotherapy. The presenter will review how "evidence-based practice" can work in behavioral medicine and how it offers many advantages include accelerating technical improvements in the treatment model, rapidly validating treatment claims and assuring that innovations can be effected in the real-world. The presenter will then offer a model for promoting "practice-based evidence" to the field of neurotherapy. The presenter has developed software that fosters the collection of practice-based evidence in neurotherapy and he will discuss the decision points that went into designing the program. Paper copies of all materials discussed will be provided to attendees or are freely obtainable and within the public domain.

## The Importance of Music in personalized Therapies and Biofeedback

Petra Friedrich, Heinz Nixdorf-Lehrstuhl für Medizinische Elektronik, Technische Universität München, Germany, Email: [friedrich@tum.de](mailto:friedrich@tum.de)

**Abstract:** Acoustic signals can modulate the human metabolic and central-nervous functions and evoke physiological effects. Especially the anti-hypertensive effect of certain iterative sound-patterns as possible intervention for essential hypertension is examined in many recent studies as well as our own research work. For a therapy, however, it is necessary to identify the musical active ingredients of the sounds. This contribution discusses the systematic analysis of the musical features that are responsible for the anti-hypertensive effect. More than 400 features were extracted and investigated in terms of their relevance concerning a blood pressure lowering effect. The 17 most significant characteristics were used to develop a classifier that decides whether a sound pattern is sedative or stimulating. With this tool it is possible to filter from a large selection of music sequences the most



suitable therapeutical sound patterns. We now have the starting basis to provide individualized and personalized therapies while respecting personal preferences of users. The results of a pilot research project with the BFE to investigate the correlation between music and real-time biofeedback parameters will be presented. The study illustrates several ways in which electrophysiological sensors and biofeedback software can be used to analyse and evaluate the effect of music in humans. It also provides a view into the internal musical structures correlated with temperature, respiration rate, skin conductance, and heart rate, and suggests guidelines for how music can be used as:

- a new therapeutic element in biofeedback applications, e.g. supporting stress relaxation by using a patient's favourite songs
- a pacer in BF-sessions with much more character and charm compared with today's existing simple electronic sounds and songs that can be annoying and repetitive.

A presentation of some results of BF-measurements from cases with some acoustic demonstrations will be given.

## Dimensions Of Attention Questionnaire (Daq): A Potential Pre-Screening Tool To Suggest Initial Use Of Biofeedback Or Hypnosis For Clients

Joan H. Hageman, PSYmore Research Institute, Inc. Tampa Florida, USA, Email: [jhhageman.psymore@verizon.net](mailto:jhhageman.psymore@verizon.net)

Abstract: Building upon previous research by Quall and Sheehan and mind-body research, Joan H. Hageman, Ph.D. utilized a repeated measures design to explore the relationship of absorption and dissociation in attentional focus, measured by twelve dimensions of the Dimensions of Attention Questionnaire (DAQ), with 59 practitioners from a spiritual/meditative practice. Four visualizations were used in with one unstructured (eyes open, mind blank) and one structured (eyes closed, think about the retreat) for both before and after training. Results with ANOVAs and correlation statistics supported the hypotheses that absorption, measured by the Tellegen Absorption Scale (TAS), and dissociation, measured by the Dissociative Experiences Scale (DES), played significant roles in attentional focus for some DAQ dimensions. TAS was significant on the pre-test unstructured visualization for dimensions Flexibility, Perspicacity, Absorption, and Simultaneity, accounting for 22%, 33%, 24%, and 26% of variance respectively. TAS was also significant on the post-test unstructured and structured visualizations for Perspicacity, each accounting for 28% of the variance. DES was significant on dimensions Flexibility, Perspicacity, Locus, and Absorption in the pre-test unstructured visualization, accounting for 61%, 52%, 61% and 55% of variance respectively. DES was significant for Perspicacity in the post-test unstructured visualization accounting for over 50% of the variance. Findings are in line with previous research on the role of absorption and dissociation and suggest that absorption capabilities with meditative practices may enhance/inhibit attentional focus involving mystical experiences, flexibility of focus, absorption in tasks, and expansion/narrowing of awareness of sensations, thoughts, or feelings. Dissociative capabilities may also enhance/lessen perceived consciousness as localized within/external to the body. Findings raise the provocative consideration to use the DAQ as a screening tool to explore attentional focus, and thereby clarify the choice for the initial use of biofeedback or hypnosis dependent upon the client's skill in attentional focus and history of meditative practice.

## Learning Models And Methods For Effective Biofeedback Training

Bruno Kappes, University of Alaska, Anchorage, Alaska, USA, Email: [afbm@uaa.alaska.edu](mailto:afbm@uaa.alaska.edu)

Abstract: Biofeedback training constitutes the systematic use of electronic sensing instruments to reveal and amplify specific physiological responses in real time. One of the primary goals of biofeedback training is to teach patients to consciously recognize, influence and essentially learn self-regulation of normally unconscious psychophysiological processes. Understanding multiple training models and procedures promotes successful interventions. Implementing fundamental learning methods influences biopsychosocial health by facilitating a patient's progress from unconscious incompetence through conscious incompetence, conscious competence and finally toward unconscious competence. Each learning phase in self-regulatory skill development provides goal directives, identifiable developmental tasks and an underlying theoretical rationale. Establishing a training rationale facilitates Education, Acquisition, Discrimination, and Self-Efficacy. This presentation identifies and proposes specific training models as well as respective learning stages during the biofeedback training process.

## Respiratory Disorders Treated Through Biofeedback Techniques

Anastasia Lampropoulou, MD, Therapeutic Conception, Greece, Email: [anastasialampropoulou@gmail.com](mailto:anastasialampropoulou@gmail.com)

**Abstract:** 650 subjects, suffered from lower respiratory manifestations of various nosologic entities, were treated with biofeedback. All biofeedback techniques were used, GSR, EMG, HRV as well as new protocols sprung from combination of a respiration patterns variety. The aim of this study was to assess the possible effectiveness of biofeedback strategies applied for treatment of chronic lower respiratory disorders. Treatment outcome was measured and was evaluated as statistical significant. The conclusion is that biofeedback can help significantly in palliating, relieving and treating of chronic lower respiratory disorders.

## Synergistic High Gamma For Exceptional Performance: Data Makes Visible Our Invisible Innate Patterns

Liana Mattulich, BCIA Fellow; CEEG Fellow MD, Inner Key International, USA, Email: [lianamattulich@yahoo.com](mailto:lianamattulich@yahoo.com)

**Abstract:** A lifetime of experiences modifies our essence and generates emotional baggage that encumbers our "original" self. That invisible, innate psycho-physiological aware-potential can be re-engaged by specific integrative techniques, which empower average to high-functioning individuals to sustain exceptional life performance in self-regulated mind-body physiology. The system uses a synergistic amalgamation of Eastern medical procedures and time proven ancient practices, applied along with EMG, EDR, HRV, bi-lateral thermals, plus high gamma EEG training using Deymed, Nexus and autonomic F-1000. EEG sequences consolidate changes in relatively few sessions. Neurofeedback over 40 Hz helps disclose psycho-physiological variables required for enhanced mental pliability and personal potential. Data were recorded in the high frequency spectra of creative and high-functioning subjects. Each participant exhibited a dominant frequency with unique, mathematically significant patterns in gamma showing amplitude enhancements. Many normal individuals' training frequencies have been found to be above the range of most neurofeedback instrumentation. Our research suggests: when subjects participated in home practices that ground plasticity, they accomplished faster and sustained personal progress in areas of functions important for their personal goals; dynamic EEG patterns demonstrated Phi Ratio relationships. We propose that the training of exceptional and sustainable human potentials could be facilitated by databases of very high gamma brainwaves. Attendees will be able to

- 1) Define "high gamma brainwaves" and identify electrode locations for training
- 2) Understand theory and a synergistic training sequence for Exceptional Performance Training (EPT) for health-maintaining physiology.
- 3) Learn new research findings and clinical protocols to produce results beyond peak performance and practices to preserve the training results.
- 4) Discuss the applications of states of enhanced perceptions and high creativity.

## Psychophysiological reactions and Pupil Dilation during stress and relaxation

Maurizio Mauri, PhD, Institute of Human, Language and Environmental Sciences / IULM University, Milano, Italy, Email: [maurizio.mauri@iulm.it](mailto:maurizio.mauri@iulm.it)

**Abstract:** In this study we analyse the correlation between biological signals, pupil dilation and certain affective states. This goal has been accomplished combining the two following factors: 1) quantitative indexes extracted from non-invasive recordings of 5 physiological signals: namely skin conductance, blood volume pulse, electrocardiogram, electroencephalogram, respiration; 2) quantitative indexes extracted from eye-tracking recordings; 3) quantitative indexes extracted from a self-questionnaire. Wearable, non-invasive sensors, communicating with a PC, were applied to 53 students and data were collected during exposure to 2 different computer-mediated content stimuli designed to evoke specific emotional states: stress (strooptask and mathematical task) and relaxation (panoramas slide show). In this paper we describe both the general emotion evaluation algorithm, and present a preliminary results suggesting that some of the quantitative indexes may be successful in characterizing and distinguishing between the 2 different emotional states.

## Integrative Health Care: The Role Of Biofeedback And Mind-Body Therapies

Donald Moss, Ph.D., USA, Email: [dross@saybrook.edu](mailto:dross@saybrook.edu)

**Abstract:** Integrative Health Care represents the synthesis of complementary and alternative therapies with mainstream health care. There is a growing emphasis within health care on making a few of the most accepted alternative therapies available in patient care, especially the mind-body therapies (and acupuncture). Efficacy research is best developed for this cluster of mind-body therapies, which includes biofeedback, neurofeedback, and hypnosis. Patients, however, spontaneously have developed patterns of use for a variety of "sexy" and interesting complementary and alternative therapies, for many of which evidence-based research is lacking or negative. In addition, much patient use of alternative therapies is not well-integrated into mainstream care. The



result is a waste of health care resources, and a dangerous fragmentation of care. The presenter will highlight challenges to integrative care, but will also point to examples of exemplary programs which integrate biofeedback, hypnosis, and other self-regulation therapies into mainstream medical care.

## Role of yoga in facilitating biofeedback training

Dr. Naveen Visweswaraiah, Swami Vivekananda Yoga Research Foundation, India, Email: [faiths.research@gmail.com](mailto:faiths.research@gmail.com)

**Abstract:** Biofeedback training is a systematic learning exercise which has definite outcome in recognizing and using the biological signals in suitably modifying the biological processes which are otherwise considered to be involuntary. Yoga is an ancient Indian science and a way of life. Yoga includes practicing moral code of conduct [yama & niyama], cleansing techniques [kriyas], physical postures [asanas], voluntarily regulated breathing [pranayama], relaxation techniques and meditation [dhyana]. Yoga is known to increase self awareness and thereby leading to exercising better control over one's own biological processes. Two studies explored the voluntary pulse reduction in yoga practitioner's and compared them with respective controls. The first study used physical cues to reduce pulse rate while the second study did not use any external cues to reduce pulse rate. In the first study volunteers who practiced yoga reduced pulse rate as compared to those who did not practice yoga. In the second study a different group of subjects who practiced yoga for 30 days showed more pronounced reduction of heart rate on day 30 compared to day 1 i.e., 10.7 beats per minute. The control group did not show any changes both as baseline and on day 30. These two studies demonstrate that practicing yoga can lead to more pronounced reduction in pulse rate and heart rate. The implication of these two studies is that yoga can be used as an add-on value based solution in biofeedback training. This voluntary ability to control heart/pulse rate has wide range of therapeutic implications.

## Reduce Dysponesis And Improve Physical Performance With Surface Electromyography

Erik Peper, San Francisco State University, San Francisco, USA, Email: [epeper@sfsu.edu](mailto:epeper@sfsu.edu)

**Abstract:** Motor performance is often impaired through dysponesis which consists of covert muscle tension not needed for task performance. The surface electromyography (SEMG) for analysis of dysponesis and training to reduce dysponesis is illustrated through a case example of a 51 year old woman who worked out in the gym on the elliptical machine. Through SEMG training her dysponetic SEMG recorded from her upper trapezius and forearm flexors was reduced by a factor of 10. After learning how to work out on the elliptical machine without the upper trapezius and forearm muscle dysponesis, she reported being much less exhausted and she significantly increased her exercise intensity. In addition, she generalized the concept of dysponesis awareness and reduction into other areas of her life such as driving. She became aware that gripping the steering wheel made her feel much more stressed then when she relaxed her shoulders and arms and felt much calmer and able to handle difficult driving situations. She reported that her awareness of dysponesis has helped her to take control and make the necessary changes to reduce the physical stress that she encountered every day. The components that contribute to successful dysponesis reduction include:

- The assumption that thoughts, memories, and emotions affect the physiology.
- The identification and reduction of dysponesis during simulated or actual task performance.
- Positive motivation provided by the SEMG feedback because it monitors the dysfunctional patterns and offers immediate feedback.
- Clinical success is enhanced when the client generalizes the skill into daily life activities.

In summary, we recommend that children and adults as they acquire a new motor skill learn dysponesis awareness and reduction to enhance performance.

## Neurofeedback Training In Non-Human Primates

Ingrid Philippens, PhD, Biomedical Primate Research Centre (BPRC), The Netherlands, Email: [philippens@bprc.nl](mailto:philippens@bprc.nl)

**Abstract:** Neurofeedback is used to improve peak performance or to replace pharmaceutical intervention in several disorders. This is not to say that these are mature, well-tested treatments. Most of the present mechanistic knowledge is based on comparison between neurophysiology and fMRI. To learn more about the mechanistic background and the underlying processes, invasive research is needed. A translational approach in a non-human primate model, close related to human, is recommended to bridge the wide gap between non-validated empirical human research and standardized controlled research. We were able to train marmoset monkeys on sensorimotor rhythm (SMR, spectral peak around 12-14Hz) on guidance of positive reinforcement in

only a few daily 30-minute training sessions. SMR appears to reduce muscle tone by affecting the thalamo-cortical circuits. This may also be the explanation that SMR training is effective in Attention Deficit Hyperactive Disorder (Fox et al., 2005, Appl. Psychophysiol. Biofeedback. 30(4):365-73). Interestingly, the thalamo-cortical circuits are also affected in Parkinson's disease (PD). Therefore, SMR training may presumably improve the motor functions in PD patients or decrease the L-dopa induced dyskinesia. On the other hand, SMR training also increases the metabolic activity in the striatum. It is known that a decline in metabolic activity activate microglia involved in the maintenance of the neurodegenerative process. Indeed, a relation between alpha-EEG, metabolic activity and microglia activation was described in a model for septic encephalopathy in rats (Semmler et al., 2008, J Neuroinflammation5:38). Neurofeedback technology may therefore benefit a broad range of neurodegenerative disorders such as PD.

Increased knowledge about the underlying mechanistic aspects may increase the possibilities for applications of neurofeedback in order to better exploit its full potential. The first evidence of non-human primates having a voluntary operant control over the sensorimotor rhythm is an initial step in providing a much-needed scientific basis to neurofeedback.

## Obsessive Compulsive Disorder And The Efficacy Of Qeeg-Guided Neurofeedback Treatment: Case Series

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**Abstract:** Introduction : While Neurofeedback has been extensively studied in the treatment of many disorders, there have been only two published reports by Hammond, D.C (2003, 2005) on its clinical effects in the treatment of obsessive compulsive disorder. The efficacy of qEEG-Guided Neurofeedback (NF) for subjects with obsessive compulsive disorder was studied as case series. Method : Drug resistant 36 subjects were assigned to 80-160 sessions of qEEG- guided neurofeedback treatment. Each session was 30 minutes duration, with 1-2 sessions per day. The approach is to examine the clinical course of these problems and with this case series, to help show the impact of the qEEG guided neurofeedback training on these client's clinical outcomes. Results : Twenty-eight out of 36 subjects who received NF training showed clinical improvement according to Yale –Brown Obsessive-Compulsive Scale. MMPI was administered pre-post to some of the patients and they showed significant improvements not only in OCD symptoms but also in depression, anxiety symptoms. Discussion : In follow-ups of those subjects at 24 to 40 months after completion of treatment 28 subjects were maintaining improvements in OCD symptoms through telephone contacts with the family members. This study provides a very good evidence for positive effects of neurofeedback treatment in obsessive compulsive disorder. The results of this study encourage further controlled research.

## Low-Level-Functions As A Key Indicator For Attention And Language Competence

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**Abstract:** Biofeedback and Neurofeedback training often lacks reliable measures a aside from the physiological parameters applied in the training sessions. Low-Level functions allow biofeedback trainers to close this gap and evaluate and document client's progress fast and in a competent manner. Low level functions have been found to provide solid data on the client's level of attention and language competence. Poor low level functions can be found in dyslexics as well as in stroke patients and autistic clients / clients with down syndrom. Capabilities such as order threshold, spatial hearing, pitch discrimination or pattern recognition allow for a swift and solid correlation of clients' deficiencies and training improvements. While simultaneous translators show incredibly impressive results in their low-level functions, they are the only group not showing sincere aging effects in those functions. The author will show related research, explain ways of combining biofeedback and low-level functions and allow for all audience to determine their own low-level scores.

## Stress Level In Health Professionals: Comparison Of Self-Evaluation And Physiological Measurements

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**Abstract:** This study examines stress level in health professionals. First part of study included 100 health professionals from Psychiatric Hospital Vrapče, Zagreb. We used "Work related stress level questionnaire" ( Radošević-Vidaček,B.) After we analyzed data from questionnaires we selected two groups: 25% with highest

score and 25% with lowest score. For the next part of research we used NeXus (Mind Media B.V.) systems process, record and analyze physiological signals (EMG, Temp, SC/GSR, BVP, Respiration) which we can acquire or monitor from the body. For this type of research we use developed a whole stress test. After testing we will compare self- evaluation and physiological measurements. Analysis is in a progress.

Thursday April 15, 2010

## Poster presentations

### The Effects Of Kargyraa Throat-Singing And Singing A Fundamental Note On Heart Rate Variability

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**Abstract:** This within-subjects study examined the comparative effects of Kargyraa throat-singing and singing a fundamental note on heart rate variability. Eleven male undergraduates participated in this study for academic credit. A Thought Technology ProComp™ Infiniti system monitored alpha and theta amplitude with a gold cup electrode at the vertex of the scalp and a linked ears reference, heart rate, SDRR, and HR Max – HR Min using an Infiniti EKG™ sensor with leads placed on the torso, respiration rate using a strain gauge placed over the navel, skin conductance level using electrodes on the 2nd and 4th fingers of the dominant hand, and temperature using a thermistor on the web dorsum of the dominant hand. In this within-subjects design, participants received from two to three 50-minute individual training sessions in Kargyraa throat-singing and were instructed to practice 30 minutes per day for 5 days a week. All 11 participants sustained singing of two notes at the same time for 180 seconds. They were randomly assigned to three 10-minute conditions that were separated by 5-minute buffer periods: Kargyraa throat-singing, singing a fundamental note (a, e, or u) used in throat-singing, or silence. They were monitored with their eyes open and no feedback. Planned comparisons revealed that SDRR was greater when singing a fundamental note than when sitting quietly,  $F(1,5) = 11.29$ ,  $p = .02$ , eta squared = 0.69. Throat-singing did not increase SDRR compared to sitting quietly. HR Max – HR Min was greater when singing a fundamental note than when sitting quietly,  $F(1,5) = 14.64$ ,  $p = .01$ , eta squared = 0.75 and when throat-singing than when sitting quietly,  $F(1,5) = 12.67$ ,  $p = .02$ , eta squared = 0.72. Regular practice singing a fundamental note might help reinforce HRV training since it increases both SDRR and HR Max – HR Min.

### Psychophysiological Stress Profile In Patients With Heart Failure

Dr. Figueroa López Carlos / Psychophysiological stress profile in patients with heart failure.  
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**Abstract:** Objective: Evaluate the autonomic activity in the presence of psychological stress in patients with Heart Failure (HF). Instruments: Inform consent letter, demographic information questionnaire, computerized Biofeedback equipment (8 channels ProComp Infinity Biograph Mark Thought Technology), digital sphygmomanometer. Method: 1) Cardiology doctor evaluated clinically the II or III functional class of heart failure patients; 2) The patient gave his voluntarily consent, then gave demographic information; 3) A psychophysiological evaluation was performed for 10 minutes, distributed in five stage of 2 minutes each one: base line 1 (BL1), arithmetic stressor (AS), base line 2 (BL2), emotional stressor (ES), and base line 3 (BL3). The profile consisted of a continuum record of the physiological responses: systolic blood pressure (SBP), diastolic blood pressure (DBP), skin conductance (SC), heart rate (HR), and temperature (TEMP). Results: N=107; Gender: male 59%, female 41%. Age: mean = 55 (20-85). In BL1, SBP mean response was 115 mmHg, DBP mean was 68 mmHg, SC mean response was 2.93  $\mu$ S, HR mean response was 71.10, TEMP mean response was 31.95°. In reactivity and recovery responses, SBP was 115 mmHg (3.1 to 6.6 increased, 0.36 to 1.0 decreased), DBP was 68 mmHg (1.0 to 4.4 increased, 0.7 to 0.8 decreased), SC was 2.93  $\mu$ S (0.7 to 1.2 increased, 0.4 to 0.7 decreased), HR was 71.10 (1.2 to 3.7 increased, 1.01 to 0.79 decreased), TEMP was 31.95° (0.2 to 0.4 increased, 0.3° to 0.5° decreased). The sample had a greater reactivity in the ES; furthermore the patients had a good recovery in the both LB1 and LB2. Conclusions: The results show that the psychological stress, same as physical activity, have direct influence in the cardiovascular variability. For this, a multidisciplinary work is necessary in evaluation and treatment of patients with HF, include programs of

psychology intervention for the management stress, with the objective of help to care the cardiovascular health of the patients and improve his quality life.

## Psychophysiological response to emotional words in patients suffering from Combat related posttraumatic stress disorder

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**Abstract:** Heightened physiological arousal in response to trauma associated stimuli is one the diagnostic criteria for posttraumatic stress disorder (PTSD), according to DSM-IV classification (DSM-IV, Criterion B.5).

Psychophysiological research has confirmed this finding for persons suffering from PTSD. Measures of heart rate (HR), blood pressure (BP), skin conductance (SC), and facial electromyogram (EMG) were recorded during the presentations of different trauma related cues in this patients, with the results of heightened startle responses and peripheral physiological hyperactivity, including increases in heart rate and blood pressure, muscle tension, and skin conductivity (Blanchard et.al. 1986; Shalev et al. 1993; Pittman et. al. 2006; Metzger et al. 1999.).

Larger SC response was recorded in combat veterans with PTSD after they were presented with combat-related words (Mc Nally et al., 1987). Our group has done psychophysiology research using startle probe with Croatian combat veterans suffering from PTSD and found impaired habituation, elevated baseline heart-rate and decreased respiratory sinus arrhythmia compared to individuals without PTSD (Jovanović et al. 2009). We will present preliminary results of our study of psychophysiological reactivity to emotional words (positive, negative and neutral words) presented on the screen of patients suffering from combat PTSD compared to healthy controls. This has not been done yet in Croatia for this population of patients. The hypothesis is that the patients are over-sensitive to negative words. Psychophysiological recording included: electromyogram (EMG), electrodermal activity (GSR) and electrocardiogram (EKG).

Chronic PTSD was diagnosed according to DSM-IV criteria. Structured clinical interview (MINI, Sheehan et al, 1998) was used for both groups, the Clinician administered PTSD scale (CAPS -1; Blake et al., 1990), Croatian version, was used for a group of PTSD patients. Emotional words have been chosen by 200 healthy individuals. Our findings show larger skin conductance response (SCR) to negative emotional words in patients suffering from combat PTSD compared to healthy controls.

## Electromyographic Response In Patients With Hemiparesis – There Is No Influence On The Effect Of Brucker-biofeedback-therapy By Latency To Incident Or Age

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**Abstract:** For patients with hemiparesis after stroke or intracranial bleeding the rehabilitative success usually depends on the latency between the incident and the therapy and on the age of the patients at the incident. To determine the increase of the EMG-response from the treated muscle groups of patients treated with the Brucker-biofeedback-method we compared the mean increase of the EMG-response for patients treated during the first year after the incident (group1 n=6) and after one year (group 2 n=36) and we compared the patients younger than 60 year at the incident (Group 3 n= 27) and older than 60 years (Group 4 n=15). 42 individuals with hemiparesis after stroke or intracranial bleeding were included. 27 patients received treatments of the arm muscles and 32 patients of the leg muscles. The mean increase of the EMG-response of the arm muscles was 181% and of the leg muscles 377%. There was no significant difference between group 1 and 2 and not between group 3 and 4. The results suggest that the Brucker-biofeedback-method is efficient independent from the latency between the incident and the therapy and independent from the age at the incident.

## Biofeedback Assisted Control Of Emotional Fainting: Preliminary Results

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**Abstract:** Emotional fainting is also referred to as vaso-vagal syncope, a condition of loss of consciousness associated with an acute heart rate (HR) and blood pressure (BP) drop in front of emotional stimuli. Emotional fainting often occurs in blood phobics when presented with the feared stimulus (Steptoe, 1988). A diphasic cardiovascular response (initial HR and BP increase followed by an important decrease of both variables) has been observed in these subjects when confronted with their phobic stimulus. Applied tension (AT) has been used with blood phobics in order to counterbalance the BP fall and prevent the syncope (Ost, 1991). Nevertheless AT does not specifically regulate the cardiovascular (CV) response involved in the syncope. Aim: To develop a

Biofeedback (BF) protocol of HR stabilization in which patients are trained to maintain HR within a pre-selected range while BP is monitored at regular intervals during the session. Method: Two blood phobics patients underwent a BF protocol including: baseline, HR-BF training, post-treatment baseline (according to the A-B-A' design). Other than HR, BP was also measured at regular intervals during the session. The BF treatment consisted of 12-15 sessions, including an acquisition, a maintenance and an exposure phase, the last regarding HR-BF control during the exposure to visual phobic stimuli. Results: Both patients showed an attenuation of the diphasic cardiovascular response during the exposure to phobic stimuli. Moreover they showed clinical reduction of fainting episodes associated with reduced self-reported anxiety. These preliminary data indicate that HR-BF can be used with blood phobics in order to reduce the occurrence of syncope by modulating the CV response associated with fainting. These effects were maintained at 6 months follow up.

## Effects Of Neurofeedback Training For An Increase In Upper Alpha Power On Cognitive Performance In A Choice Reaction Time Task: A Preliminary Study

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Abstract: We tried to examine the hypothesis that neurofeedback training applied in order to increase upper alpha power could improve cognitive performance in certain tasks. Fourteen female and 14 male college students participated. Neurofeedback training was carried out in order to enhance the magnitude of upper alpha power by using a neurofeedback training system (A620, Autogenic Systems). This training consisted of six sessions: two two-minute resting sessions as baseline with open eyes and closed eyes, respectively, and four five-minute neurofeedback training sessions with a visual presentation of the feedback stimulus. The participants were divided into two groups on the basis of their performance in the neurofeedback training: 14 subjects were categorized as a successful group because their magnitude of upper alpha power was greater in the training session than in the baseline resting session with open eyes; all the other participants were categorized as failed groups. After the completion of these training sessions, a type of choice reaction time task was carried out. This task consisted of four trial blocks. In the first two blocks of this task, the participants were asked to press (1) a red button when a red circle appeared on the PC screen in front of the participants and (2) a blue button when a blue circle appeared. In the remaining two blocks, the standard of response was reversed; they were asked to press the red button when a blue circle appeared and the blue button when a red circle appeared. An ANOVA and post hoc tests revealed that the female participants in the successful group showed a shorter response time than those in the failed group. The results of this preliminary study suggested a possibility that neurofeedback training for an increase in upper alpha power might help enhance some aspects of cognitive performance.