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Summary of Contents with Abstracts

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EDITORIALS

**Placebo and the Two Faces of Neurotherapy**

David L. Trudeau, MD

SCIENTIFIC ARTICLES

**Applied Research Using Alpha/Theta Training For Enhancing Creativity and Well-Being**

Tracy Boynton, PhD

Introduction. Previous research has supported anecdotal reports of a possible correlation between the state of hypnagogia and the enhancement of creative ability (Green, 1972; Green, Green, & Walters, 1970, 1974; Parks, 1996; Stembridge, 1972; Whisenant & Murphy, 1977). Some psychologists (e.g., Maslow, 1963; Rogers, 1978) have suggested that there is also a correlation between creative ability and enhanced well-being.

Methods. This study utilized an 8-week repeated-measures experimental design to investigate the effects of electroencephalogram (EEG) biofeedback on the willful use of hypnagogia for increasing creativity and well-being. The sample size of 62 (30 experimental subjects and 32 controls) was comprised of both sexes with a mean age of 45. The EEG parameters of hypnagogia were broadly defined as the presence and predominance of alpha and theta brain wave activity. Creativity was defined by the three most readily agreed upon divergent thinking abilities: (a) fluency (the ability to generate numerous ideas), (b) flexibility (the ability to see a given problem from multiple perspectives), and (c) originality (the ability to come up with new and unique ideas).

**Attention and Neurofeedback Synchrony Training: Clinical Results and Their Significance**

J. T. McKnight, PhD

L. G. Fehmi, PhD

Background. Previous research on information processing by the primate brain prompted further investigation of phase synchronized alpha brain wave activity at five loci in humans. The results of this investigation indicated that a particular form of attention was associated with production of whole brain synchrony.

Method. Patients were treated with a dual approach, a systematic program of attention training coupled with the regular practice of multi channel alpha phase synchrony training. One hundred thirty-two clinical patients were treated for a variety of stress related symptom categories by six therapists in different locations. Patients were rated for symptom intensity, frequency and duration.

Results. It was found that learning to develop this particular form of attention, coupled with the regular practice of multi channel alpha phase synchrony were effective in resolving many common stress related disorders. Analysis of 132 cases using this dual approach found that more than 90 percent of the patients found that more than 90 percent of the patients reported an alleviation of symptoms. These positive results were found with stress-induced headache, joint pain, and gastrointestinal disease.

Conclusion. The authors propose that there exists a common mechanism operating in these widely different successful applications; to wit, attentional flexibility, which is

**Results.** Hypnagogia was analyzed through multiple univariate analyses of variance. The EEG data showed that both experimental and control participants were able to achieve light to deep hypnagogic states in every training session. T-tests results on fluency and originality scores from the Torrance Test of Creative Thinking and the Christensen-Guilford Associational Fluency Test showed no significant changes in pre- and post-tests for either group. However, flexibility in thinking, as measured by the Alternate Uses Test was significantly increased ( $p < .001$ ) for all participants. Well-being, as measured by the Friedman Well-Being Scale, also significantly increased for all participants ( $p = .002$ ).

**Discussion.** The data suggest that willful use of hypnagogia may indeed increase creativity and well-being. Participants reported increased personal creativity, stress reduction, heightened self-awareness, emotional equanimity, and improved work performance.

KEYWORDS. Neurofeedback, EEG feedback, alpha/theta state, hypnagogia, creativity, well-being, altered states of consciousness

### **Neurofeedback Therapy of Attention Deficits In Patients with Traumatic Brain Injury**

Ingo Keller, PhD

**Background.** Impairments of attention are a frequent and well documented consequence of head injury. The purpose of this study was to evaluate if Neurofeedback Therapy (NFT) can enhance remediation of attention deficits in patients with closed head injuries (CHI) who are still in the phase of spontaneous recovery.

**Method.** Feedback of beta-activity (13 - 20 Hz) was used for the treatment of attentional impairments in twelve patients with moderate closed head injuries. A matched control group of nine patients was treated with a standard computerized training. All patients were tested before and after treatment with a set of attention tests.

**Results.** After ten sessions the analyses of beta activity showed that eight patients were able to increase their beta activity while the

achieved through systematic practice of audio taped attention exercises and neurofeedback phase synchrony training. Patients who participated in this program generally reported experiencing a release from their symptoms and from emotional conditioned responses in favor of more flexibility and more stable homeostasis. The significance of this "release experience" is discussed and attention-neurofeedback training is compared to other interventions, which rely exclusively on peripheral modalities of biofeedback training.

KEYWORDS. Attention, biofeedback, neurofeedback, EEG phase synchrony, headaches, hypertension, irritable bowel syndrome, dissolving pain

### **Changes in Lateralized Memory Performance in Subjects With Epilepsy Following Neurofeedback Training**

M. B. Serman, PhD  
DeLee Lantz, PhD

Both seizure reduction and neuropsychological improvements have been reported following neurofeedback training directed to normalization of the sensorimotor EEG. These findings could be interpreted as nonspecific effects rather than specific changes brought about by EEG training. The present study demonstrated neuropsychological changes of a selective nature that would be difficult to interpret as nonspecific. Epileptic subjects with unilateral temporal lobe lesions were administered memory tests prior to EEG training, after control training, and after sensorimotor EEG normalization training. Successfully trained subjects showed exclusive improvement on memory tasks specific to the hemisphere contralateral to their lesion, and no improvement on memory tasks specific to the hemisphere with the lesion. Such selective changes are difficult to interpret as nonspecific effects of participating in a study, and would seem to require genuine alteration of neural substrates as a result of EEG training.

KEYWORDS. Neurofeedback, epilepsy, complex-partial seizures, lateralized memory, neuropsychological tests

### **CURRENT CONCEPTS IN NEUROTHErapy**

**Pills, Politics and Placebos**

<p>remaining four patients showed a decrease of beta activity. Mean duration of beta activity was prolonged about 50% after training. Patients who received NFT improved significantly more in the attention tests than control patients.</p> <p><b>Conclusion.</b> The results suggest that neurofeedback is a promising method for the treatment of attentional disorders in patients with traumatic brain injuries. It is suggested that NFT should focus not only on the enhancement of beta activity, but also on the duration patients are able to hold beta activity. It is proposed to use NFT also with patients in the early phase of rehabilitation.</p> <p>KEYWORDS: Attention deficit, closed head injury, neurofeedback therapy, rehabilitation</p> <p><b>Optimal Functioning Training with EEG Biofeedback For Clinical Populations: A Case Study</b> Linda A. Mason, MA Thomas S. Brownback, MEd</p> <p>This case study of a mature female executive with Dissociative Disorder Not Otherwise Specified (DDNOS) demonstrates the Quality of Life Continuum (QLC) and the efficacy of specific EEG biofeedback protocols in enhancing performance and improving global life functioning for people with clinical disorders. The QLC begins with the functioning level of people with severe clinical problems and ends with superior functioning people, with three levels of functioning in between those two ends of the continuum. It is a graphic for demonstrating that any level of functioning can be improved through the use of protocols specifically designed for optimal functioning.</p> <p>KEYWORDS. Peak performance, optimal functioning, EEG biofeedback</p>	<p>T. J. La Vaque, PhD</p> <p>Randomized double blind placebo controlled clinical trials (RCT) are the current “gold standard” for demonstrating clinical efficacy of new drugs or therapies. It is very difficult for new therapeutic interventions to gain broad acceptance in the absence of such trials. Recent events have raised serious questions about the conditions under which placebo (sham) controls can be used. The international standards published by the World Medical Association (Declaration of Helsinki) prohibit placebo-controlled studies when known effective treatments exist. Additionally, there is new interest in identifying the mechanisms underlying the placebo response, which may challenge the “placebo” as a legitimate control condition. Both of these events should be of considerable interest to those interested in clinical psychophysiology in general and neurotherapy in particular.</p> <p>KEYWORDS. Ethics, placebo, RCT, Declaration of Helsinki, neurotherapy, psychophysiology, efficacy, methodology, mind-body</p> <p><b>TECHNICAL NOTES</b></p> <p><b>Rethinking Standard Bands</b> David A. Kaiser, PhD</p> <p><b>NEWS FROM OTHER JOURNALS AND WEBSITES</b> David A. Kaiser, PhD, Editor</p> <p><b>CLINICAL CORNER</b> D. Corydon Hammond, PhD, Editor <b>Low Voltage or Absolute Power Excess Beta</b> Robert L. Gurnee, MSW <b>Comprehensive Bibliography on Neurofeedback</b> D. Corydon Hammond, PhD</p> <p><b>BOOK REVIEW</b> <i>Change Your Brain, Change Your Life</i> Daniel G. Amen, MD</p>
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<p><b>EDITORIALS</b></p>	

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David L. Trudeau, MD

### SCIENTIFIC ARTICLES

#### **The Role of Slow-Wave Electroencephalographic Activity in Reading**

Efthymios Angelakis, MA, Joel F. Lubar,  
PhD, Jon Frederick, MS, Stamatina  
Stathopoulou, BA

Background: Although slow-wave EEG activity has traditionally been associated with either deep sleep or brain pathology, recent studies have revealed a relationship between this neuronal activity and cognitive functions. The present study explored the slow-wave EEG amplitude differences between resting and reading states in a group of 19 non-clinical young adults.

Methods: EEG was recorded during an eyes-open resting baseline, and three different reading tasks selectively engaging the visual, phonetic, and semantic reading modalities. Frequency spectra between 1 and 8 Hz were analyzed in two frequency bands, 1-4 Hz (delta) and 4-8 Hz (theta).

Results: Multiple t-test analyses comparing the three reading tasks with the baseline showed significant amplitude increases during reading mostly in the 1-4 Hz and some in the 4-8 Hz band. These changes were topographically different among the three reading tasks. During visual reading, amplitude increased at C3, C4, T3, T4, and T5 for the 1-4 Hz band, and at T5 and T6 for the 4-8 Hz band. During phonetic reading, amplitude increased at T3, T4, F3 and F7 for the 1-4 Hz band, and at T5 and FP1 for the 4-8 Hz band. During semantic reading, amplitude increased at T3, T4, C3, C4, F3, F7, F8, CZ and FZ for the 1-4 Hz band and at T5 for the 4-8 Hz band.

Conclusions: Amplitude increases in slow-wave EEG are part of the normal reading process and it appears at scalp electrodes close to cortical areas expected to be involved according to different reading modalities.

Discussion: When performing EEG biofeedback it may be most practical to adopt an “exercise model” approach in which the regulatory mechanisms in the brain are challenged through the sequential use of multiple protocol configurations. In this case several different training protocols proved useful in her ongoing recovery. While improvements in functioning were a result of a concerted effort involving multiple therapeutic interventions, it is likely that neurofeedback played a vital synergistic role.

KEYWORDS. Stroke, post stroke depression, EEG biofeedback, bipolar protocols, EDA

#### **Quantitative EEG Evidence of Increased Alpha Peak Frequency In Children with Precocious Reading Ability**

Shannon M. Suldo, MA, Lynn A. Olson, PhD,  
James R. Evans, PhD

Background: EEG research with specific clinical populations (e.g., Alzheimer's and mentally disabled) has confirmed that reduced alpha peak frequency often is associated with impaired cognitive functioning. However, research with high-functioning populations does not exist, and increased peak frequency in alpha has only been hypothesized to relate to advanced brain maturation.

Methods: This study compared peak frequency in the alpha band (8.0 to 12.0 Hz) of children with precocious reading ability to that of control groups. The experimental group consisted of 15 early readers (ER). One comparison sample included 15 age-level matched (ALM) children, similar to the ER group in terms of cognitive functioning and age, but reading at grade level. A second comparison group, composed of 15 reading-level matched (RLM) children, had intelligence and reading level scores equivalent to the ER group, but was 2.5 years older. Using Lexicor NeuroSearch-24 equipment and v151 software, quantitative EEG (QEEG) data on each participant were obtained from 19 scalp electrode sites.

Implications for neurofeedback involve tentative models for cognitive processes.

KEYWORDS. EEG, reading, adults, delta, theta, slow wave EEG

### **EEG Biofeedback on a Female Stroke Patient with Depression: A Case Study**

John A. Putman, MA, MS

Background: This single case concerns the treatment of a 71- year-old female stroke patient. The patient's MRI revealed that the location of the stroke was in the right side basal ganglia with damage extending into the anterior limb of the internal capsule. She presented with a virtual paralysis of the left side of her body (hemiplegia with immobilized left arm, contracted fist, minimal motor control over left leg, absence of muscle tonus in left side of face and slurred, monotonic speech).

Method: The client was provided with EEG biofeedback training on a one to two half-hour sessions per week. Bipolar montages were used along with single site protocols. This was based largely on the idea of reciprocal communication loops between widely separated cortical generators (Thatcher, Krause & Hrybyk, 1986). It was thought that encouraging communication between cortical sites would have a beneficial impact on impairments related to both functional and structural damage. EEG training protocols included SMR (12-15Hz) enhancement at C4, C4-Pz and T3-T4 with theta suppression; beta (15-18Hz) enhancement with theta suppression at C3, C3-Fpz and at C3-Fp1.

Results: Patient showed significant improvement in gross motor control and range of movement of left arm and leg. The most dramatic improvement was observed in speech (articulation, strength and tone). While substantial improvements were observed in motor ability, restoration of mood stability proved somewhat more elusive. Since she was receiving additional treatment (physical therapy and medication management), it is impossible to attribute the improvement in functioning solely to the EEG training. However, the consensus among the attending medical personnel was that the improvements

Results: As hypothesized, peak frequency in alpha differentiated the groups. Specifically, the ER group had significantly higher alpha peak frequency than the ALM group at 16 of the 19 electrode sites examined. The differences were consistent across all brain regions, as the mean alpha peak frequency at each site was between 9.0 and 9.3 Hz for members of the ER group and between 8.6 and 8.8 Hz for members of the ALM group. Peak frequency in alpha did not differ significantly between the ER and RLM sample.

Conclusions: Peak frequency in the alpha band is associated with precocious reading ability, and may be an indicator of advanced brain maturation.

KEYWORDS. Quantitative EEG, alpha, peak frequency, precocious readers, children

### **TECHNICAL NOTES**

Technical Issues Involving Bipolar EEG Training Protocols  
John A. Putman, MA, MS

### **NEWS FROM OTHER JOURNALS AND WEBSITES**

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### **CLINICAL CORNER**

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An Adverse Neurofeedback Reaction, Or, There is no Such Thing as a Neurofeedback "Demo"

Dan Chartier, PhD

Synchrony Training  
Les Fehmi, PhD

Controlling EMG During 40 Hz. Training  
D. Corydon Hammond, PhD, Frank Deits, Engineer, Michael Thompson, MD

### **BOOK REVIEW**

*The Promise of Sleep*  
W. C. Dement

<p>noted above took place with unusual expeditiousness.</p>	
<p><b>NUMBER 4</b></p>	
<p><b>EDITORIALS</b> The Empirical Support of Neurotherapy David L. Trudeau, MD</p> <p><b>SCIENTIFIC ARTICLES</b></p> <p><b>ADHD and Stuttering: Similar EEG Profiles Suggest Neurotherapy as an Adjunct to Traditional Speech Therapies</b> Brenda Ratcliff-Baird, PhD</p> <p><u>Background:</u> This study investigated differences in theta and alpha activity measured by electroencephalography (EEG) at frontal sites between stutterers and nonstutterers during focused attention tasks.</p> <p><u>Methods:</u> EEG was recorded from 22 male, right-handed developmental stutterers and 22 male, age- and handedness-matched nonstutterers in six conditions: baseline resting-eyes-open; baseline resting-eyes-closed; eyes-open focused attention; eyes-closed focused attention; eyes-closed backwards-counting math task; and eyes-open auditory delayed non-match-to-sample task.</p> <p><u>Results:</u> Significantly more theta was recorded at frontal sites (FP1/2, F3/4, F7/8 and FZ) in each condition for stutterers than for nonstutterers. Significantly lower alpha (8-10 Hz.) was recorded at these sites in stutterers than nonstutterers in all conditions. No hemisphere effects were found for either group.</p> <p><u>Conclusion:</u> The finding of more theta and low alpha activity in stutterers lends empirical support to an attentional component of stuttering. There are strong similarities in the EEG, morphology, and behavior of stutterers and individuals with attention-deficit/hyperactivity disorder (ADHD). These similarities suggest that neurofeedback, which has proven successful in the treatment of ADHD, may hold promise as a viable adjunct treatment to traditional speech therapies for</p>	<p><b>EEG NeuroBioFeedback Treatment of Patients with Brain Injury</b> <b>Part 1: Typological Classification of Clinical Symptoms</b> Rima E. Laibow, MD, Albert N. Stubblebine, MSc, Henry Sandground, Michel Bounias, DSc</p> <p><u>Background.</u> A sample of 27 patients with brain-injury distributed in five clinical classes was examined for pre- and post-treatment symptoms and associated power spectra.</p> <p><u>Methods.</u> Changes in electroencephalographic (EEG) compressed spectral arrays were analyzed with respect to the rate of rehabilitation and correlated with a checklist of symptoms for each patient and the group as a whole.</p> <p><u>Results.</u> Targeted decreases in slower (3-7 Hz.), higher frequencies (24-32 Hz.), EMG (70-90 Hz.) and increases of alpha (8-12 Hz.) and mid-range Beta frequencies (15-18 Hz.) were achieved following NeuroBioFeedback (NBF) treatment using positive rewarding tones and a simultaneous visual reward. The impact of gender and age class influence was assessed against treatment results. Single lead EEG power spectra changes were analyzed for hemispherectomized patients, stroke, car accident and trauma patients. A common EEG pattern was observed for a group of patients exhibiting vertigo with two subgroups in which vertigo resolved or did not resolve showing EEG differences.</p> <p><u>Conclusions.</u> EEG NeuroBioFeedback can successfully treat patients with brain injury with highly clinically meaningful clinical results. Changes in Cz power spectra generally occur, but do not always immediately follow</p>

stuttering.

KEYWORDS: Stuttering, attention deficit/hyperactivity disorder (ADHD), EEG, neurotherapy, neurofeedback, theta, frontal lobes

**EEG NeuroBioFeedback Treatment of Patients with Brain Injury  
Part 1: Typological Classification of Clinical Symptoms**

Michel Bounias, DSc, Rima E. Laibow, MD, A. Bonaly, DSc, Albert N. Stubblebine, MSc

Background. A group of 27 patients with brain injury were treated by electroencephalographic (EEG) NeuroBioFeedback under drug-free conditions. They were studied for distribution in classes of major syndromes for evaluation of treatment efficiency and rehabilitation rates with respect to associated EEG and other physiological changes.

Methods. A total of 48 clinical symptoms were listed, each present in at least one patient. Classes of clinical signs have been computed using both medical and statistical criteria. Claimed and presented chief complaints, secondary complaints and all associated signs were incorporated in multivariate analysis.

Results. Substantial intersection of medical and statistical distributions was observed. This provided a classification of symptoms into six classes representing the following syndromes of impaired functions: Q1 = motor; Q2 = language; Q3 = cognitive; Q4 = psychosocial; Q5 = pain-related; Q6(a&b) = neuropsychiatric; Q7 = metabolic.

Membership of a patient in a defined clinical class was based on a numerical index computed from: (a) a weighed coefficient for the patient's chief and secondary complaints, and (b) an index for both symptoms represented in the class and symptoms not represented in the class. Patients were unambiguously distributed in all classes except Q7.

Conclusions. Using a non-selected group of patients, this work provides a rationale for the membership of each patient in a set of classes

resolution of symptoms. Since EEG-NBF is limited to recording cortical surface potentials, it is possible that changes induced by the treatment which result in clinical changes may not always be reflected at the cortical surface and hence may not be available for recording and analysis there, despite subcortical integration.

KEYWORDS: EEG-NeuroBioFeedback, brain injury, EEG power spectra, concussion, gender influence.

**CURRENT CONCEPTS IN NEUROTHERAPY**

**Parameters Associated with Rapid Neurotherapeutic Treatment of Common ADD (CADD)**

Paul G. Swingle, PhD

Abstract: Although there are many types of ADD/ADHD, a common form of ADD (CADD) in children (high theta/beta ratio at Cz) can be successfully treated in less than 15 sessions. The increased efficacy relative to the standard beta enhance/theta suppress protocol results from precise but brief diagnosis, home cognitive exercises with a theta suppression harmonic, disentraining and/or entraining visual stimulation, and clear treatment termination parameters. A single case example and data from 30 patients show the usual course of treatment.

KEYWORDS: EEG, ADD, CADD, children

**NEWS FROM OTHER JOURNALS AND WEBSITES**

David A. Kaiser, PhD, Editor

**CLINICAL CORNER**

D. Corydon Hammond, PhD, Editor

Effects of Antidepressant Medications on the EEG - Jack Johnstone, PhD

Neurofeedback Training for Anger Control  
D. Corydon Hammond, PhD

of syndromes determined by the whole set of clinical signs specifically exhibited by this group of patients. Class-average rehabilitation rates ranged from 59% up to 87% following an average 23 to 132 treatment sessions, depending on syndromes.

**KEYWORDS:** Brain injury, head trauma, chief complaints, secondary complaints, syndrome classes, multivariate analysis, indices of membership strength.