

## FROM THE EDITOR

# Advances in Neurofeedback and Quantitative Electroencephalography

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The cover of this issue shows a LORETA image of the human brain, a three pound mass of fat and protein containing over 100 billion nerve cells. This most complex organ in the human body self-regulates and self-organizes to sustain organismic self-regulation and motility, as well as the higher intellectual functions that set human beings apart from other creatures. Neurofeedback training can provide the stimulus to assist this sophisticated organ to recover its self-regulating function when some parameters of brain function have become derailed or disordered. (The three dimensional LORETA image, provided by Jay Gunkelman, depicts a temporal lobe source for an abnormal alpha distribution.)

### Professional Issues

Sebastian Striefel opens this special issue by challenging the professional associations concerned with neurofeedback and general biofeedback—primarily AAPB and ISNR—to develop clinical practice guidelines for neurofeedback and general biofeedback. His article goes beyond a call for simple ethical practice principles; he suggests that it is time to develop practical guidelines formulating what scientific evidence tells us about the most effective treatment approaches for specific disorders. This challenge was communicated to the current leaders of both AAPB and ISNR, and John Nash, President of ISNR, Aubrey Ewing, President of AAPB, and Jonathan Walker, President of AAPB's Neurofeedback Division have each responded to Dr. Striefel's article.

### Special Issue Articles: Advances in the Use of Neurofeedback and Quantitative Electroencephalography

It is once again time to highlight the advances in neurofeedback and quantitative electroencephalography (QEEG), in research and in clinical practice. Articles in this special issue fall into four categories: elementary understanding of electroencephalography (EEG) signal recording, conceptual overviews of neurofeedback practice, basic science on the EEG, and practice applications.

### *Basic Understandings of Signal Acquisition and Signal Processing*

This special issue begins with a helpful article by Marc Saab, biomedical engineer for Thought Technology Ltd, presenting a basic understanding of the challenges involved in recording and analyzing surface EEG signals.

### *Conceptual Models for Neurofeedback Practice*

Thomas Collura presents a conceptual overview of neuronal dynamics. Collura highlights the development of "Z-score neurofeedback" as a form of normalization training, drawing on the brain's potential for simultaneous self-regulation of multiple sites and their interconnections.

Jack Johnstone also provides an overall conceptual model for neurofeedback practice, describing a staged model for addressing brain-based disorders. He suggests a first level of intervention addressing cortical arousal, a second level providing regional training for abnormalities identified by QEEG, and a third level of intervention correcting abnormal connectivity among brain regions.

### *Basic Science on the EEG*

David Kaiser describes the influences of ultradian and circadian rhythms on the human EEG, and reported a modulation in spectral activity across the day in all frequencies and sites, with a dominant peak in spectral activity around 1 p.m. each day. Failure to take such biological rhythms into consideration may lead practitioners to mistake a circadian or ultradian variation for a training effect.

### *Advances in Assessment and Treatment*

Jay Gunkelman and Curtis Cripe provide a report on a clinical series of 30 addicts who were treated with a "phenotype driven" neurofeedback program, within an integrated clinical treatment program for addictions. Their report describes not only substantial reductions in substance use, but significant improvements in neuro-cognitive function, measured psychometrically.

Gary Schummer identifies a cluster of speech and language disorders as disconnection syndromes, because they involve a functional problem in the connection between Wernicke's area and Broca's area. Schummer emphasizes disorders of both hypo-connectivity and hyper-connectivity, deficits in connection and surpluses of connection between cortical regions; either extreme can produce impairments, and neurofeedback interventions can guide normalization of connectivity.



Donald Moss



Roger J. deBeus

**Proposals and Abstracts**

Authors are invited to submit manuscripts on any topic in applied psychophysiology and biofeedback. Articles are welcome presently for special issues on Psychophysiological Approaches to Post-Traumatic Stress Disorder (PTSD), scheduled for Spring 2009, and for Advances in the Assessment and Treatment of Traumatic Brain Injury (TBI) for Summer 2009. Both of these special issue topics are timely, because of the numerous returnees from the Iraq and Afghan conflicts suffering from PTSD or TBI or too often from both disorders. Articles are also welcome for a special issue for Fall 2009 on Medical Applications of Biofeedback. Proposals and Abstracts are also invited for additional topics for future special issues of *Biofeedback*.

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