FROM THE EDITOR

Special Issue: Evidence-Based Applications of Biofeedback and Neurofeedback in Sport

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The cover of this issue of Biofeedback shows Canadian Mark de Jonge, K1 200-m bronze medalist at the summer 2012 Olympic Games in London and World Champion in 2015 in the sport of Canoe-Kayak (credit to Jeff Cooke for the photo).

Introduction to the Special Issue: Evidence-Based Applications of Biofeedback and Neurofeedback in Sport

Optimal sport performance is a growing area in biofeedback and neurofeedback practice (Edmonds & Tenebaum, 2012; Strack, Linden, & Wilson, 2011). Biofeedback, neurofeedback, and a variety of related self-regulation skills have been applied in ever-widening circles with Olympic and professional athletes, as well as younger athletes. Previous research in sport performance has included relaxation training, moderating dysponesis or misplaced effort, reducing anxious cognitive processes (busy brain), resolving disruptive emotional distress or traumatic memories, enhancing physiological responsiveness, and reducing reaction times (RTs; Moss & Wilson, 2012; Wilson, Peper, & Moss, 2006). More recent efforts have integrated multiple biofeedback and neurofeedback interventions with general sport psychology skills to eliminate disruptive cognitive and muscular patterns, enhance performance, and reduce RT (Beauchamp, Harvey, & Beauchamp, 2012; Blumenstein, Bar-Eli, & Tenenbaum, 2012). Researchers have also emphasized a variety of interventions dependent on the demands of the particular sport or event (Perry, Shaw, & Zaichkowsky, 2011).

Penny Werthner, PhD, dean of the Faculty of Kinesiology at the University of Calgary, served as issue editor for this special issue, which focuses on applications of biofeedback and neurofeedback interventions in sport. The authors in the present special issue present a range of approaches from an examination of the relationship between self-regulation and performance of Olympic-level athletes, to collegiate golfers improving performance as a result of a neurofeedback intervention, to case studies of the effectiveness of RT training and transcranial random noise stimulation (tRNS).

Professional Issues

Judy Crawford provides a report from the Biofeedback Certification International Alliance (BCIA) on the internationalization of BCIA. Serving the international community is a high priority for BCIA. Currently, BCIA has certificants in 32 countries and affiliate organizations in Australia and Mexico. Crawford discusses the BCIA Board’s decision not to engage in investigations of ethical complaints against BCIA certificants. The article introduces guidelines for when the BCIA exams will be translated into a new language. The article concludes with a discussion of BCIA’s international affiliate program and discussion of exciting developments in Canada.

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In the opening article in this special issue, Margaret Dupee and coauthors report on research investigating the relationship between an individual athlete’s ability to self-regulate and his or her world standing. The authors used a psychophysiological stress profile, monitoring the respiration rate, heart rate, heart rate variability, skin conductance, peripheral body temperature, and surface electromyography (SEMG; trapezius and frontalis) of 15 elite athletes. Researchers assigned a numerical rating for self-regulation based on how well the athlete returned to physiological baselines after a stress trial. The self-regulation scores correlated significantly with the athlete’s current world ranking in a competitive event. The better the overall self-regulation ability of the athlete, the better the world ranking.

Leslie Sherlin and colleagues report on a study of 16 collegiate-level golfers given a neurofeedback-based performance brain training. The athletes were randomized into two groups and received the intervention in successive
semesters. Quantitative electroencephalography (QEEG) assessments and the QWIKtest continuous performance test were conducted at baseline, after the fall neurofeedback training, and after the spring neurofeedback training, each time generating a neuropsychological assessment. The performance brain training integrates computer-based games and uses audio and visual feedback to reward desired brain states. Golf statistics were drawn from online performance databases maintained by both the men and women’s teams. Group 1 showed significant improvements during the semester of the neurofeedback training, with increases in greens in regulation, decreases in the putting average, and decreases in the average number of three putts per round. Group 2 showed significant improvements in greens in regulation, putting in regulation, putting average, and average of three putts per round.

The difference between success and failure in competitive kayak and canoe events is measured in milliseconds; RTs at the start of the event are a crucial component to optimal performance. Sommer Christie and Penny Werthner conducted a case study on a single, 26-year-old male national team 200-m canoe athlete and a RT training intervention. The researchers investigated psychophysiological patterns associated with the athlete’s best and worst RTs. They conducted a baseline psychophysiological stress assessment, followed by 10 hours of biofeedback and neurofeedback training and 10 sets of 30 RT trials. Physiological data including electromyography (EMG), respiration rate, eccodermal response, peripheral body temperature, and QEEG were recorded simultaneously with RTs in the RT trials. The authors reported a number of physiological patterns associated with the athlete’s best and worst reaction times.

Vincenza Tommasi and co-researchers reported a study on a 35-year-old male competitive shooter, using tRNS, which applies low-level electric stimulation to the scalp, to modulate cortical excitability of motor areas and enhance shooting performance. The researchers applied stimulation to the P4 site (right parietal lobe), according to the EEG 10–20 system. Previous research suggested that stimulation on the parietal lobes (P3/P4) can modulate visuospatial localization. The athlete performed 40 shots in two sessions, with sham stimulation in Session 1 and active tRNS in Session 2. The application of tRNS significantly improved the performance of the participant. Physiological patterns correlated with tRNS and improved shooting were also reported.

**Feature Articles**

Steven Kassell provides a report on a 3-week stress management intervention, including heart rate variability (HRV) and thermal biofeedback, with ninth-grade students in a charter school setting. The facilitator taught the students elements of the psychophysiology of stress, the neuropsychology of attention, and the effects of relaxation on mind and body. They learned HRV skills in school with an emWave PC®, learned hand warming with handheld thermometers, and practiced relaxation at home with an audio CD. After 3 weeks, the students showed reductions on the Test Anxiety Quiz.

Erik Peper and two coauthors provide a report on a biofeedback and stress reduction intervention for vulvodynia. The 23-year-old woman, who also served as second author on the article, developed severe vulvar pain following a yeast infection. Medical interventions failed to provide relief. She suffered chronic pain, a disruption of her sexual relationship, and depression. The four-session treatment introduced a psychophysiological model for vulvar pain and integrated breath training, a guided correction of depressive posture, SEMG biofeedback, and self-healing imagery. At 8-month follow up, she reported that she was symptom free much of the time, had resumed regular intercourse, and had learned to manage occasional pelvic area discomfort.

**References**


