

A Summary of Performance Enhancement Literature with a List of Research Articles

While studies demonstrate some success in a range of activities, the performance enhancement research to date is controversial. Scientists need to be rigorous in their work and the conclusions they reach based on their research. One pervasive issue is that while subjects are trained to change a particular range of brainwave activity to produce performance enhancement, despite attaining performance enhancement, these improvements are not accompanied by measurable achieved differences in brainwave activity. So the research demonstrates that there is a relationship between the intervention of neurofeedback training and success in performance enhancement, but the nature of the relationship is not known, or demonstrated.

Examples of this are given by Vernon (2005), in his review of the literature, “For instance, attempts to increase low frequency EEG oscillations in archers has been associated with improved accuracy, despite no clear pattern of changes in the EEG (Landers et al., 1991). Suppression of theta activity has been associated with increased attentional performance, but again there was no reported change in baseline levels of the EEG (Beatty et al., 1974).” And “Suppression of theta activity has been associated with increased attentional performance, but again there was no reported change in baseline levels of the EEG (Beatty et al., 1974)”. And further, “Research examining the effects of low beta neurofeedback training on cognitive performance has met with some intriguing results (Egner & Gruzelier, 2001, 2004; Rasey et al., 1996; Vernon, Ahmed, et al., 2004; Vernon, Egner, et al., 2004; Vernon et al., 2003).”, but he faults these studies for not showing changes in measurable EEG.

Vernon has the same comments on successful research showing enhancement in artistic performance in music and dance (Egner & Gruzelier, 2003; Raymond et al., 2005). It is important to note that Vernon is himself involved in this research, and his criticism is aimed at how to further the research programs he and his colleagues are involved in. Thus, along with other authors in another article assessing the literature, they state:

“But most importantly our validation places SMR and beta1 training on a firmer footing in applications to ADHD in children and adults, while the improvement in semantic memory have implications for neurorehabilitation and addressing the ageing process in the elderly. The outcome of the alpha/theta training effects with music students confirmed a significantly beneficial effect on a highly ecologically valid and pedagogically relevant performance measure, while the size of the performance improvements in music and dance implies great potential for the implementation of this application in the performing arts, and studies are underway to extend the applications for music and dance (Gruzelier, Egner, & Vernon 2006).”

If you wish to pursue this research in its original form, some of it is available on-line by using Google Scholar. Vernon's article, which formed the basis for this summary is:

Vernon, David J. 2005 Can Neurofeedback Training Enhance Performance? An Evaluation of the Evidence with Implications for Future Research *Applied Psychophysiology and Biofeedback, Vol. 30, No. 4*

Another available on-line:

Gruzelier, John and Egner, T. and Vernon, D., 2006. Validating the efficacy of neurofeedback for optimising performance. *Progress in Brain Research*, 159 . pp. 421-431. ISSN 00796123 [Article]: Goldsmiths Research Online.

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