

45/08 - "Refining the methodology of alpha electroencephalographic biofeedback and exploring its effect on cognition and mood"

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Objectives: EEG biofeedback has been used to help train individuals to learn to consciously control certain aspects of their brainwave activity. However, a number of methodological questions remain concerning the nature of such training which limits our understanding of the process and the possible effectiveness of the technique. Hence the aim of this project was to examine more closely the nature of such training by using distinct reward thresholds, incorporating an equal contact mock feedback control group and performing follow-up measures to examine the possible long-term effects.

Methods: Using a standard pre/post intervention design we recruited 96 participants from four institutions (CCCU, RAMS, UEA and AU). Participants initially completed a range of cognitive (Conceptual Span Task; Mental Rotation Task, Alternative Uses Task) and mood measures (Profile Of Mood States, STAI, BIS/BAS). They were then randomly allocated to either a real or mock feedback condition utilising either a fixed low, medium, high or non-fixed variable reward threshold. All participants then completed 10 training sessions, approximately twice per week, with the aim to increase the amplitude of their alpha (8-12Hz) EEG rhythm. On completion of the training participants again completed the cognitive and mood measures, and again at follow-up after a delay of approx 4 wks.

Results: Initial analyses showed no evidence of a clear change in the EEG for those completing the biofeedback training. In addition, the differential reward thresholds had no effect on changes in EEG. A more fine tuned analysis, focusing on the effects of each institution, found that the biofeedback training enhanced the peak frequency, width and power in the individual upper alpha range (10-12Hz) but only for those with a low resting baseline frequency (<10Hz) and only in the Russian (RAMS) sample.

Conclusions: It would seem clear that the training paradigm adopted here was not effective in eliciting clear changes in the EEG.

Discussion: The project was less successful than anticipated in identifying potential methodological factors that could positively influence learning. Nevertheless, the pattern of findings not only provides a reasonable indication of what does not work but also highlights possible avenues for further exploration. For instance, the motivation level of the individual, identifying a possible distinction between responders and learners and using resting peak alpha levels as a marker for change.

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Bial

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