Direct effects of audio-visual stimulation on EEG

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ABSTRACT

In the course of 2 months, 25 repetitions of a 20 min audio-visual stimulation (AVS) program with stimulations at 17, 9, 4, and 2Hz were applied to 6 volunteers. EEG data were recorded from 6 scalp locations prior, during and after AVS.

In order to identify direct and transient changes in EEG under influence of AVS, total power, relative frequency band powers and magnitude-squared coherences were estimated. Intense brain wave entrainment as a direct reaction to AVS was significant through increase of spectral powers and coherences around the stimulating frequency bands in the occipital areas, spreading also to the central and frontal regions. However, these excitations were ‘short-lived’.

On the other hand some signs of interhemispheric cooperation (coherences in the narrow bands around 2, 4, and 17 Hz at parieto-occipital areas) remained increased during the investigated 3 min after AVS. As going through further AVS sessions the driving response progressively enhanced for 2 and 4 Hz stimulation in centro-parietal locations. Progress was also found in the left and right hemisphere synchronization examined by coherences.

In perspective, the results contribute to deeper comprehension of photic stimulation approaches as a technique of guided entrainment of the brain waves or intermediate increase of hemispheres’ synchronization.