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Effects of Monotonous Auditory Stimulation on the Human EEG

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ABSTRACT

Monotony is the result of continuous predictive or repetitive stimulations and can be considered a functional state of the central nervous system, a state characterized by lowered cerebral activity. The present work investigates the effect of monotonous auditory input on cerebral electrical activity. This was done by means of recording the EEG under three different auditory stimuli (S1, S2, S3), on 11 volunteers (average age 23 years). Data were acquisitioned during 20 minutes of auditory stimulation, with a 5 minute period of silence before and after stimulation. The characteristic features of each obtained EEG pattern depends closely on the type of the musical composition. Thus, the highest domain of variance generated under stimulation by S3 (fragments of the Mozart' s K448 Sonata) is for the frequency bands Alfa1, Beta2 and Theta, while in case of S2 (recording of a rainforest) it is for bands Delta, Beta1 and Alfa2, and in case of S1 (recording of a car driving over a rough road) is only slightly elevated for the total frequency spectrum. By comparing the period of auditory stimulation with the post-stimulation period, in case of S3 the fewest statistically significant mean values are noticeable (only for Delta and Theta indexes), in contrast to S1, which presents statistically significant differences between mean values for high frequency bands. In case of S2, statistically significant differences between mean values are similar to S3, with the addition of the Beta1 frequency band. In conclusion, each different auditory stimuli produces a characteristic pattern of changes in cortical micropotentials which could be associated with the induced psychoemotional state.

KEYWORDS

Human EEG; Monotonous Auditory Stimulation; Music; Frequency Bands; Cortical Micropotentials

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