

Changes in EEG spectral power during interaction with a player in a computer game

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Aim and Methods: The aim was to investigate the oscillatory dynamics accompanying competition and cooperation with another player, as well as the individual mode during the construction of a figure in a computer game. Forty-two volunteers (24 females) between the ages of 18 and 45 participated in the study. Analysis of the differences in the spectral power of 126 channel EEG in different game modes was performed by using Loreta [1].

Results and Conclusion: During competition, spectral power in the theta range was higher than in cooperation mode in the anterior cingulate and medial prefrontal cortices. The increase of medial frontal theta rhythm has been known to be associated with focused attention and increased cognitive control [2–4]. It could be suggested that a greater increase in theta spectral power during competition is related to the need of mobilizing more cognitive resources and efforts in order to win the competition.

During cooperation, the spectral power of theta rhythm was lower than in individual mode in the medial prefrontal cortex and the medial prefrontal gyrus. According to Scheeringa et al. (2008) [5], default mode network (DMN) activity was negatively related to the medial frontal theta rhythm, suggesting that lower theta spectral power in medial cortical structures during cooperative mode may be related to DMN processes during interactions with another person. Alpha spectral power in the parietal and occipital cortex areas in the interaction (cooperation and competition) modes was lower compared to the individual mode. During cooperation the alpha spectral power was lower compared to the competition mode. The greatest decrease in alpha rhythm found in our study in the cooperation mode may be related to the processes of understanding the intentions of the other person.

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