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Behavioral and EEG Reactions in Children during Recognition of Emotionally Colored Sentences That Describe the Choice Situation

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Abstract : Situation of choice is an important condition for the formation of essential character qualities of a child, such as being initiative, responsible, hard-working. We have studied the behavioral and EEG reactions in Russian schoolchildren during recognition of syntactic errors in emotionally colored sentences that describe the choice situation. Twenty healthy children (mean age 9,0±0,3 years, 12 boys, 8 girls) were examined. Forty sentences were selected for the experiment; the half of them contained a syntactic error. The experiment additionally had the hidden condition: 50% of the sentences described the children's own choice and were emotionally colored (positive or negative). The other 50% of the sentences described the forced-choice situation, also with positive or negative coloring. EEG were recorded during execution of error-recognition task. Reaction time and quality of syntactic error detection were chosen as behavioral measures. Event-related spectral perturbation (ERSP) was applied to characterize the oscillatory brain activity of children. There were two time-frequency intervals in EEG reactions: (1) 500-800 ms in the 3-7 Hz frequency range (theta synchronization) and (2) 500-1000 ms in the 8-12 Hz range (alpha desynchronization). We found out that behavioral and brain reactions in child brain during recognition of positive and negative sentences describing forced-choice situation did not have significant differences. Theta synchronization and alpha desynchronization were stronger during recognition of sentences with children's own choice, especially with negative coloring. Also, the quality and execution time of the task were higher for this types of sentences. The results of our study will be useful for improvement of teaching methods and diagnostics of children affective disorders.

Keywords : choice situation, electroencephalogram (EEG), emotionally colored sentences, schoolchildren
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