

EEG SENSORIMOTOR BETA-RHYTHM REACTIVITY IN CHILDREN FROM FOUR TO 14 YEARS

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Recently, many researchers have turned their attention to the peculiarities of sensorimotor rhythms reactivity. A hypothesis has appeared that sensorimotor rhythm (mu- and beta-rhythms) power changes reflect mirror neurons activity. Especially actual is the study of beta-rhythm reactivity. Researchers believe that the power of sensorimotor beta-rhythm is more sensitive to social factors, than the power of the mu-rhythm. Sensorimotor beta-rhythm power decreases in adults during performing the movements as well as observing the movements performed by the others. This phenomenon in children is poorly understood. The purpose of the research is to study the peculiarities of central EEG beta-rhythm modulation in situations of performing independent movements, perception and imitation of other people's movements in children aged from four to 14 years.

The study involved 38 children aged between four and 14 years (17 boys and 21 girls). We recorded EEG patterns in four experimental situations: (a) independent circular rhythmic movements with a computer mouse; (b) watching the same movements, performed by the experimenter; (c) imitation of the movements performed by the experimenter; (d) auditory perception of sounds produced by the movements of the experimenter. The indicator of beta-rhythm reactivity is an index of synchronization/desynchronization.

We have identified a specific modulation of sensorimotor beta-rhythm. This rhythm is synchronized or desynchronized depending on the situation. The biggest desynchronization developed by observing the human-model movements and during imitation of his actions. The low values of desynchronization in self-fulfillment movements indicate a very moderate, limited activation of the central regions of the cortex in this experimental situation.

Significant correlation between the age of the children and sensorimotor beta-rhythm modulations in situations of movements performed by computer mouse, observation of

such movements and perception of sounds that accompany such movements, indicates a transition from synchronization to desynchronization of the rhythm in age period of 8–11 years. Age dynamics of beta-rhythm reactivity reflects a formation and development of the cortex motor area, as well as the mirror system of the cortical region. We assume that the "mirror" properties of the cortex central regions are expressed the most if a child has an internal representation of the relevant actions.

Keywords: EEG, sensorimotor rhythm, rolandic rhythm, beta-rhythm, children, mirror neurons system.

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