

COMPARISON OF THE EEG SENSORIMOTOR RHYTHM REACTIVITY EFFECTS UNDER CONDITIONS OF SYNCHRONOUS IMITATION OF BIOLOGICAL AND NON-BIOLOGICAL MOVEMENT

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A sample of healthy individuals (N=62) underwent two series of recording the EEG under consecutive conditions of relaxed wakefulness, self-produced circular hand movements with a computer mouse, and a real-time imitation of observed (on the monitor) movements of either biological (hand) or non-biological (colored spot) nature. The differences in the EEG sensorimotor rhythms (alpha, 8–13 Hz; and beta1, 14–20 Hz) amplitude were analyzed separately for each series under the electrodes C_z, C₃ and C₄. 16 subjects were excluded from further analysis due to the lack of alpha suppression under C₃ electrode during self-produced hand movements which is expected to be seen as an inherent property of alpha sensorimotor rhythm in the contralateral to the moving hand brain hemisphere. For the rest subjects, both alpha and beta1 sensorimotor rhythms demonstrated a significant suppression effect during the self-paced hand movements. The condition of synchronous imitation of the colored spot movements didn't reveal significant differences in the amplitude of both sensorimotor rhythms in comparison with the preceding condition of self-controlled hand movements. The condition of the real-time imitation of another man's hand movements appeared to induce additional suppression of the beta1 sensorimotor rhythm under the three central electrodes when compared to the condition of similarly performed self-paced movements. This additional beta suppression was observed under each central electrode and didn't significantly differ among them. The classical alpha band sensorimotor rhythm didn't produce any significant changes. The authors hypothesize that this additional beta suppression might be relevant to the social nature of this imitation task and has little to do with task-specific attention difference effects since otherwise there would be certain alpha modulations which were not the case. There is briefly discussed a possible relevance of the acquired results to the functional role of the mirror neuron system during social interaction.

Keywords: imitation, biological movement, electroencephalogram, sensorimotor rhythm, mu-rhythm, alpha-rhythm, beta-rhythm, mirror neurons.

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