

Identical spatio-temporal patterns of rapid motor-cortex activation for action-related nouns and verbs: MEG study*

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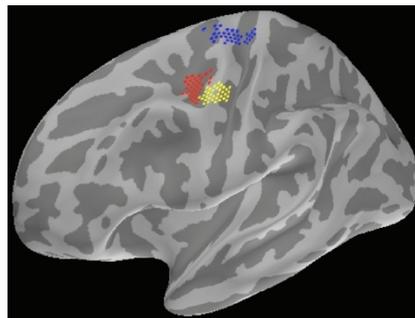
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Background and Objectives. Perception of action verbs is known to selectively activate the respective representations in the motor cortex at the early stage of word recognition. We investigated, for the first time, whether the action nouns follow the same spatial-temporal activation patterns as that known for action verbs. Furthermore, we aimed to specify, using distributed source modeling of MEG data, whether the action words activate primary and/or secondary areas of motor cortex as well as the time-course of this activation.

Methods. We selected three pairs of Russian words related to actions performed by hand, foot and mouth, and each pair included a verb and a noun having the same word stem. The stimuli were presented within the mismatch field (MMF/MMN) paradigm in three blocks corresponding to the word pairs, which were used as rare unexpected deviant stimuli, while the frequent standards were pseudo-words chosen for each word pair in a such a way that their onsets were phonologically identical to the test words, and the acoustic disambiguation point between the 2 deviant words and the standard pseudo-word always occurred at 260 ms after the word onset. The MMF source activation time courses in the motor cortex were analyzed.

Results and Conclusions. We demonstrate for the first time that both lexical categories of Russian action words activate the motor cortex somatotopically but source distribution is shifted somewhat anterior to primary motor cortex (Fig.1). Moreover, cognate verbs and nouns have very similar spatial-temporal pattern of motor cortex activation that reaches its peak just ~100 ms after the word disambiguation point and ~30 ms ahead of the MMF response in the auditory cortex.

Fig.1. Cortical regions in the motor cortex that were selectively activated by action nouns and verbs: hand-related (red), foot-related (blue) and face-related (yellow). Grand average



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