RAPID ACQUISITION OF ACTION WORLD MEANING THROUGH AUDITORY-MOTOR ASSOCIATIONS: A MAGNETOENCEPHALOGRPHIC STUDY

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The theory of embodied cognition suggests that word meaning resides on the motor and sensory body experience. In order to understand the nature of human language, it is important to decipher how the brain links word meaning with sensory-motor experience. We developed an experimental procedure that allowed investigating acquisition of word meaning by way of rapid associative trial-and-error learning. Eight pseudowords were presented to the participants; four of them were assigned to left and right hand and foot movements, while the other pseudowords did not require actions and were used as controls. Participants were instructed to learn the relations between the pseudowords and actions through a trial-and-error motor learning procedure. Auditory feedback was delivered on each trial informing whether response was correct or erroneous. Magnetoencephalogram was recorded during passive listening of the pseudowords before and after learning. The cortical sources of the magnetic evoked responses were reconstructed using distributed source modeling (MNE software). Neural responses to newly learnt words compared to control pseudowords were significantly enhanced in temporal and frontal cortical regions surrounding the Sylvan fissure of the left hemisphere. This activation was inversely related to the number of trials needed for participants to reach the learning threshold. Thus, our findings revealed a neural signature of rapid associative learning of word meaning and highlighted the role of sensory-motor transformation for association-grounded word semantics.

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