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Hand constraint affects semantic processing of hand-manipulable objects: An fNIRS study

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Abstract

Embodied cognition theory predicts that semantic processing shares processing resources with sensorimotor systems. The present study aimed to reveal mechanisms for impact of motor simulation on semantic processing of objects, which are manipulated by hands. We measured activation of inferior parietal lobule (IPL) by functional near-infrared spectroscopy (fNIRS) to examine the effect of constraint on hand movement. Participants were faced with two words representing name of objects that can be manipulated by hand (e.g. cup) or objects that cannot be manipulated by hand (e.g. windmill), and answered which object was larger. We analyzed effect of two factors on IPL activity: hand constraint and hand manipulability of the objects represented by the words. We found that (1) IPL activity for hand-manipulable objects was significantly higher than non-manipulable objects under control condition, and that (2) the difference in IPL activity between hand manipulable and non-manipulable objects was significantly reduced under hand-constraint condition.