

# Verb-Noun-Adjective Interactions in Sensorimotor Integration During Language Processing

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Previous research has shown that motor plans related to hand-object interactions are activated during the semantic processing of graspable object nouns. Adjectives expressing object features can modulate these motor plans, indicating sensorimotor integration. The present experiment investigated the role of verbs in this noun-adjective integration. Each trial began with a verb presented at the centre of the screen for 250ms and indicating either a hand movement ('prendi', grasp) or an eye movement ('guarda', look). This was replaced by a graspable object noun (250ms), and then by an adjective describing positive (e.g., round) or negative (e.g., sharp) manipulative features (250ms). Participants (N=32) performed a reach-to-grasp compatibility task, categorizing the object noun (artifact vs. natural) using either a power or a precision grip that either matched or mis-matched the typical grip associated with the object. Results showed that both verbs and adjectives influenced sensorimotor processing evoked by nouns. A grasp-compatibility effect (GCE) emerged with positive adjectives, while the GCE reversed with negative adjectives. Crucially, the GCEs emerged when the noun was preceded by a hand-action verb, but not after an eye-action verbs. Additionally, negative adjectives consistently increased response times across all conditions. These findings demonstrate that the sensorimotor system is automatically engaged during sentence processing, even when verb and adjective information is irrelevant to the task. This provides new evidence for embodied language processing, highlighting the integration of linguistic elements in shaping motor responses.

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