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אנו שמחים לארח את

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Visual Associative Processing is Mediated by a Unified Representation for Semantic and Spatial knowledge

It is well known that semantic associations can facilitate object recognition, such as when an exposure to a scene facilitates recognition of a semantically related object within that scene. Similarly, spatial regularities within a visual display may guide spatial attention to the region within a scene most likely to posses a target object, causing facilitated recognition of that target. Are semantic and spatial associative knowledge represented jointly or separately? While both types of knowledge clearly contribute to visual recognition, a joint representation may be especially beneficial as it may depict the functional relations between objects, allowing generation of predictions regarding the identity of objects, as well as their spatial position and function within a scene.

To determine whether semantic and spatial associative factors affect object identification with, or without interacting (implying a unified vs. independent representations, respectively), we used a priming task in which these factors were independently manipulated. Specifically, object stimuli serving as prime and target were either semantically related or unrelated, and were either properly or improperly positioned with respect to each other. Results from an initial behavioral study clearly revealed an interaction in RTs for target objects, namely, a semantic priming effect only under the spatially congruent, but not the spatially incongruent condition. In a subsequent fMRI study, similar behavioral results were obtained, along with an interaction in brain activity within semantic- (e.g., Inferior Prefrontal cortex) and object- processing (e.g., Fusiform gyrus) regions (i.e., BOLD activation was greater for semantically related than unrelated targets only in the spatially congruent condition). Upon repetition of the object pairs, these same brain regions showed repetition-priming effects that were further qualified by a semantic spatial interaction (i.e., greater repetition-priming for targets that were semantically related than unrelated, only in the spatially congruent, but not in the incongruent condition).

These results indicate that object recognition benefits from contextual representations that bind spatial and semantic information, and directly modulate activation in object–processing cortical regions. Visual associative knowledge, therefore, is represented in a functionally meaningful way that depicts both objects' identities and their spatial relations within a particular scene.

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