Abstract Over Item-Specific Information: Statistical Learning Optimizes Memory Representations

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Abstract

Statistical learning optimizes working memory by abstracting relations among specific items. However, the mechanisms underlying the representations of abstract and item-specific information remain unclear. This study developed a learning-memory representation paradigm in which three groups of participants, i.e., control, item-specific, and abstract encoding, were presented with picture-artificial character pairs containing abstract semantic categories at high (100%), moderate (66.7%), and low (33.3%) probabilities and item-specific information. Participants performed a visual search task that assessed memory representations through the search speed for artificial characters among abstract or item-specific distractors. Participants spent more time searching among abstract than item-specific distractors in the control but not item-specific condition, indicating that by default working memory prioritizes abstract information. However, this prioritization enhanced for moderate and low probability items in the abstract encoding condition. These findings suggest that statistical learning is central to abstraction, forming flexible memory representations particularly for uncertain inputs to optimize learning processes.

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