

A sequence sensitive model of encoding precision

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Abstract

Canonical visual working memory models do not incorporate the temporal structure of tasks, despite memory performance in real-life contexts almost invariably operating within sequentially structured activities. To address this gap, we developed a Sequence Sensitive model of working memory and compared its ability to explain the structure of fluctuations in encoding precision and recognition speed to two established resource-based models of working memory, the Population Coding model and the Variable Precision model. We show how Dynamic Structural Equation Modeling can be used to formalize the trial-level dynamic relationship between a neural proxy of encoding precision and recognition speed as predicted by all three models. We compare the three resource-based models by fitting them to data from a large sample of 142 participants who completed 100 trials of a working memory task, the Sternberg task, while their neural activity was recorded using an electroencephalogram. Our results show that the Sequence Sensitive model outperforms canonical candidates in the context of understanding performance on a sequential trial task. However, a visual comparison of model implied and observed values, shows that all three resource-based models only explain a smaller portion of the observed variance. Thus, we should aim to integrate sequential effects into richer, more comprehensive, models that incorporate additional features of working memory, such as the interaction between encoding and retrieval processes.

Keywords

dsem; sequence effects; encoding precision

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