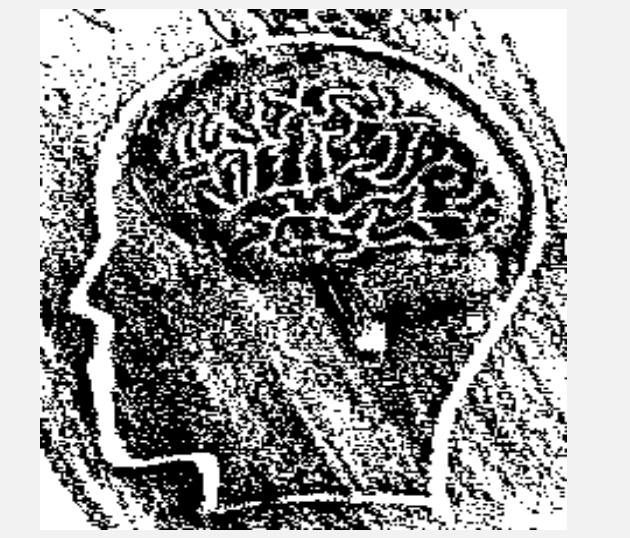


Locus of Differential Divided Attention Effects on Component and Associative

Information in Working Memory: Encoding vs. Maintenance

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BACKGROUND

Divided attention at encoding does not seem to reduce memory for associations between components of the same object in visual working memory (WM) to a greater deal than memory for individual components, supporting the idea that features of a single object are held in a single unit (intra-item binding). It's unclear if this is true for associations across multiple different stimuli, or inter-item associations.

Recent initial findings have shown that presentation of concurrent load during a WM task for paired stimuli disproportionately affects recognition memory performance on tests on associations between components relative to tests on the individual components themselves (Peterson and Naveh-Benjamin, 2017; Peterson, Decker, & Naveh-Benjamin, 2019a; b). This contrasts with long-term memory (LTM) findings, which fail to show any differential associative deficit as a result of concurrent task load (e.g., Naveh-Benjamin, Husain, Guez, & Bar-On, 2003).

One possible explanation for the differences observed between the effects of attentional load on WM and on LTM for inter-item pairs is the fact that LTM paradigms typically employ divided attention only during the encoding phase of stimuli presentation, and not during the maintenance interval. In contrast, the studies in WM typically manipulate the load during both the encoding-presentation of the to-be-remembered information, as well as during the maintenance-retention period before the test phase.

It may be the case that a lack of attentional load during maintenance of information may still allow for associative information to be encoded in the LTM paradigm, but not the WM paradigm.

Purpose: To determine if the detrimental effect of concurrent load on WM tests of associative information, relative to component information, is due to disruption during encoding of stimuli, or during maintenance-retention of these stimuli

METHODS

Experiment 1: 69 college aged adults
Experiment 2: 62 college aged adults

Study Phase:

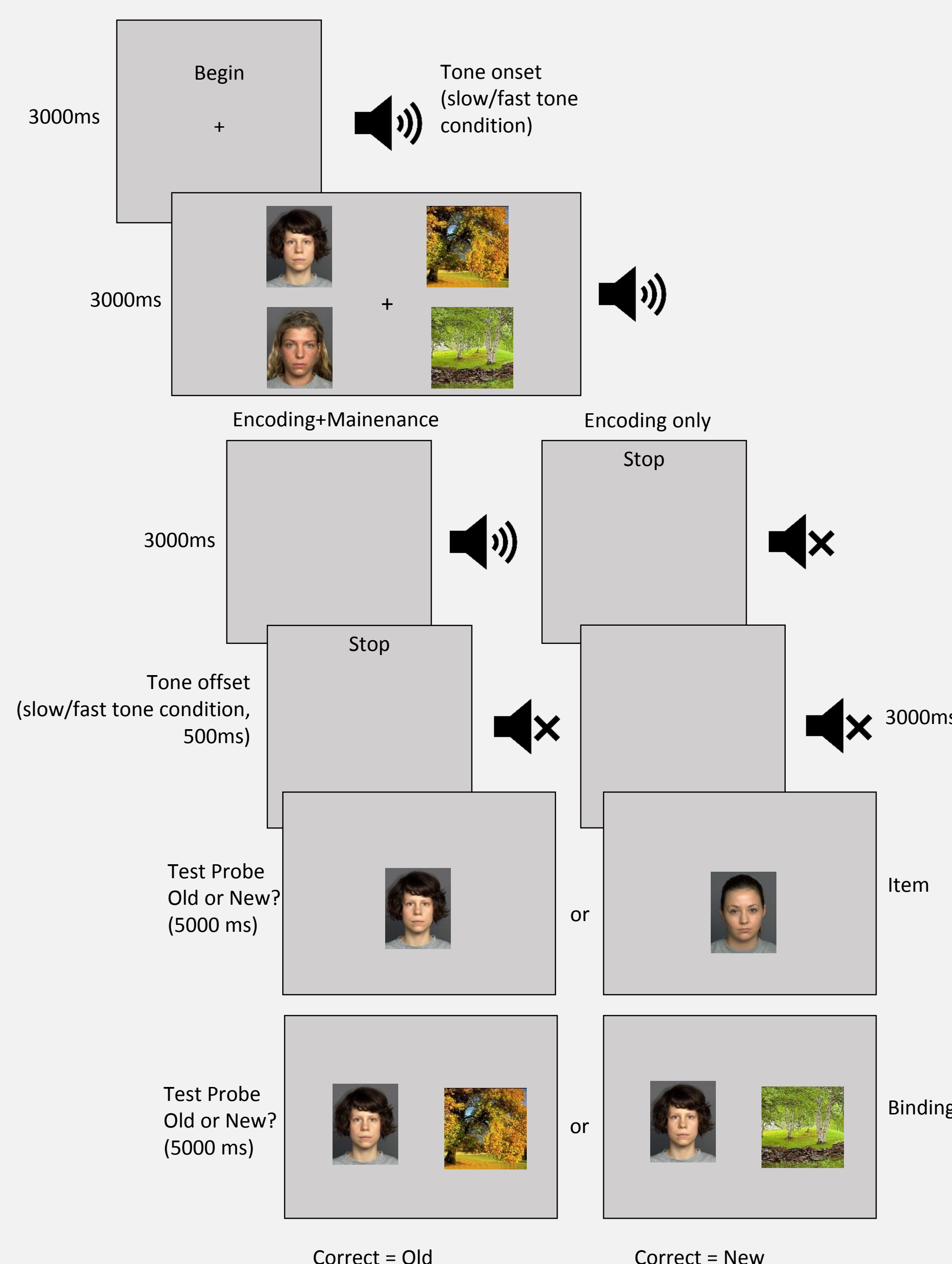
- Six study lists of 32 sets of face scene pairs in experiment 1, and unrelated word pairs in experiment 2, in three different conditions:
 - Full Attention – No secondary task
 - Slow Tone Condition – Three tone choice RT task with tones presented every 3,000 ms
 - Fast Tone Condition – Three tone choice RT task with tones presented every 1,500 ms.
- Tones presented during encoding and maintenance both in half of blocks, and during encoding only in the other half.

Test Phase:

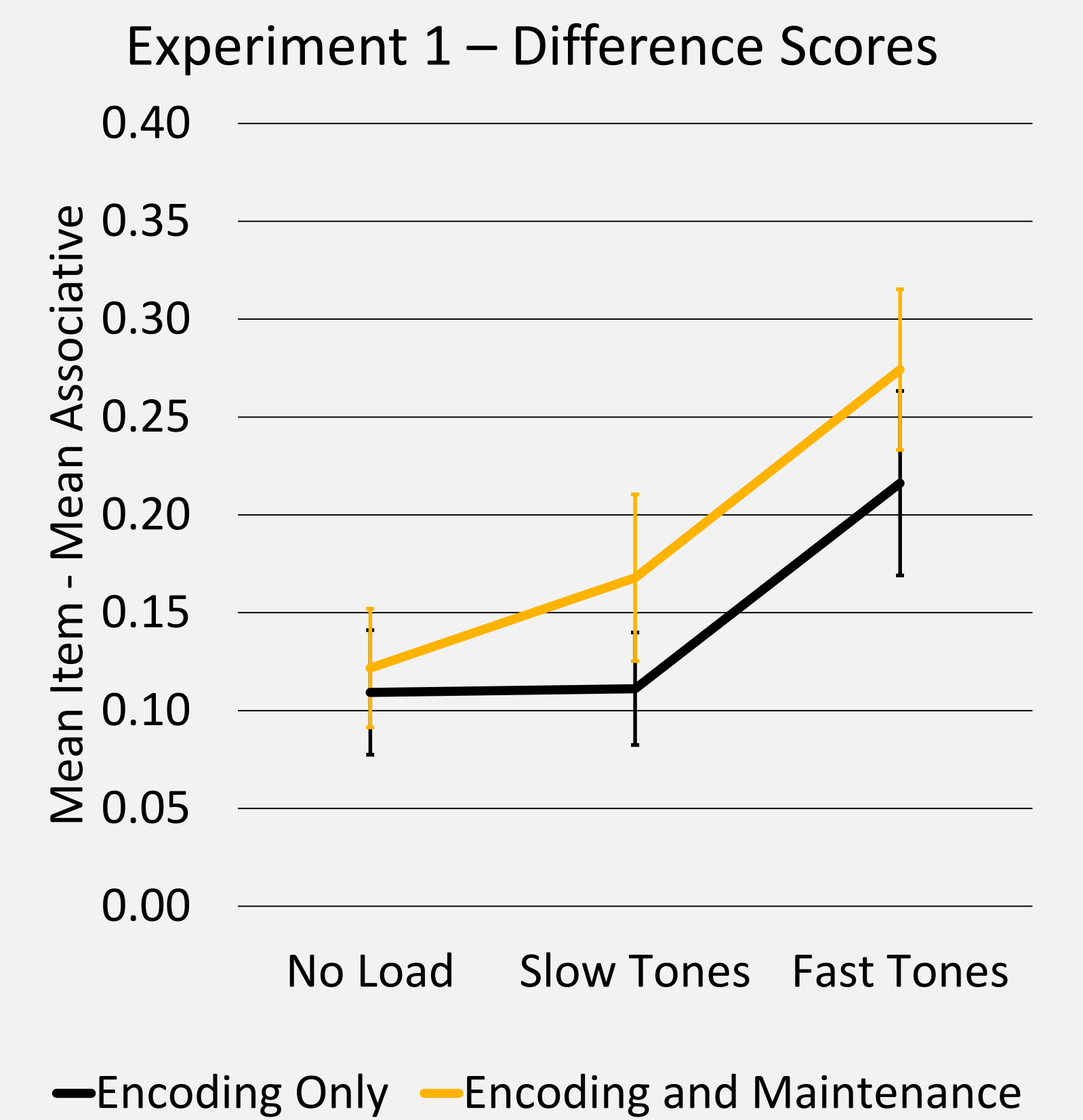
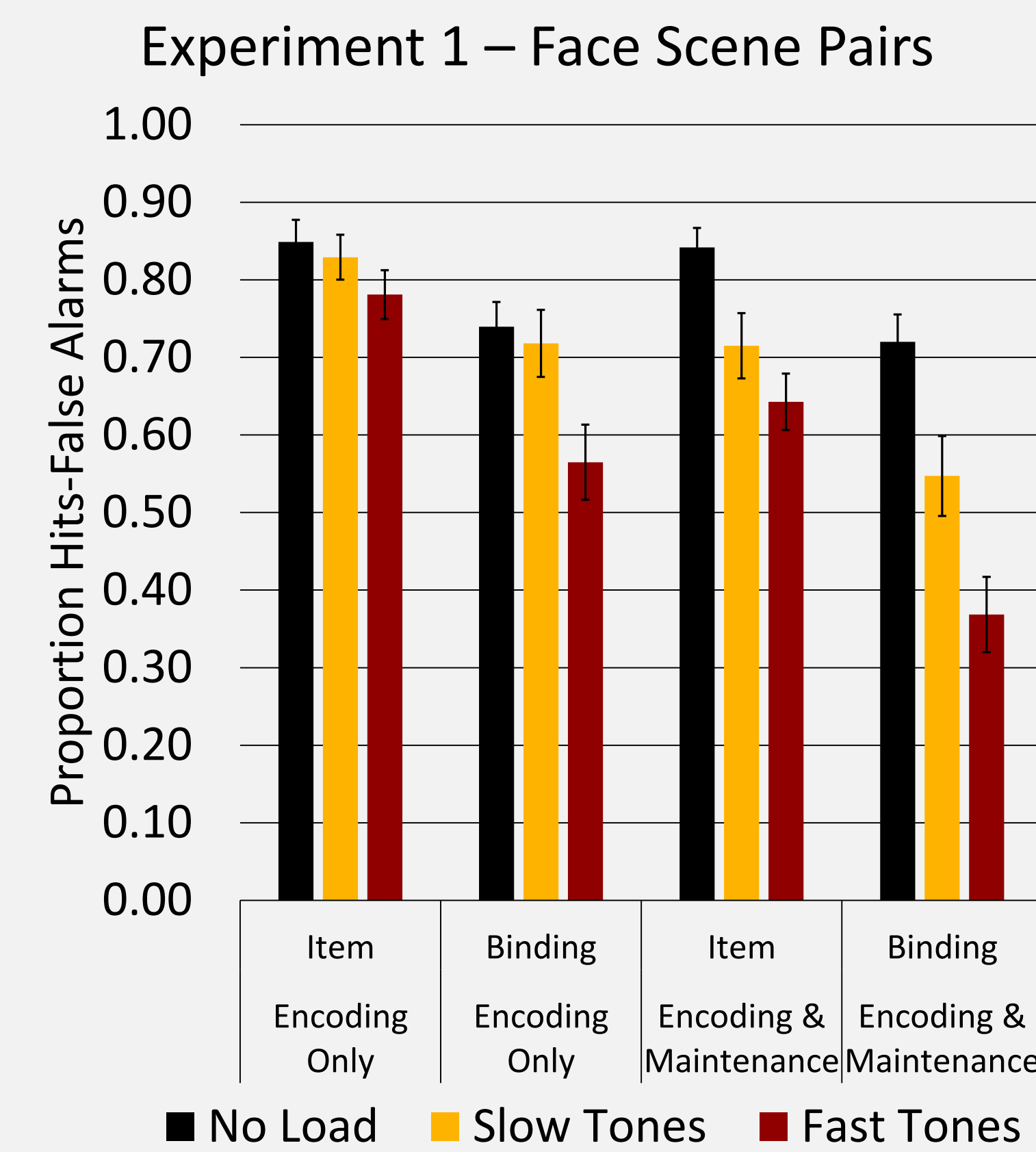
- Old vs new item recognition tests for individual words.
- Intact vs recombined pairs associative test.

Analysis:

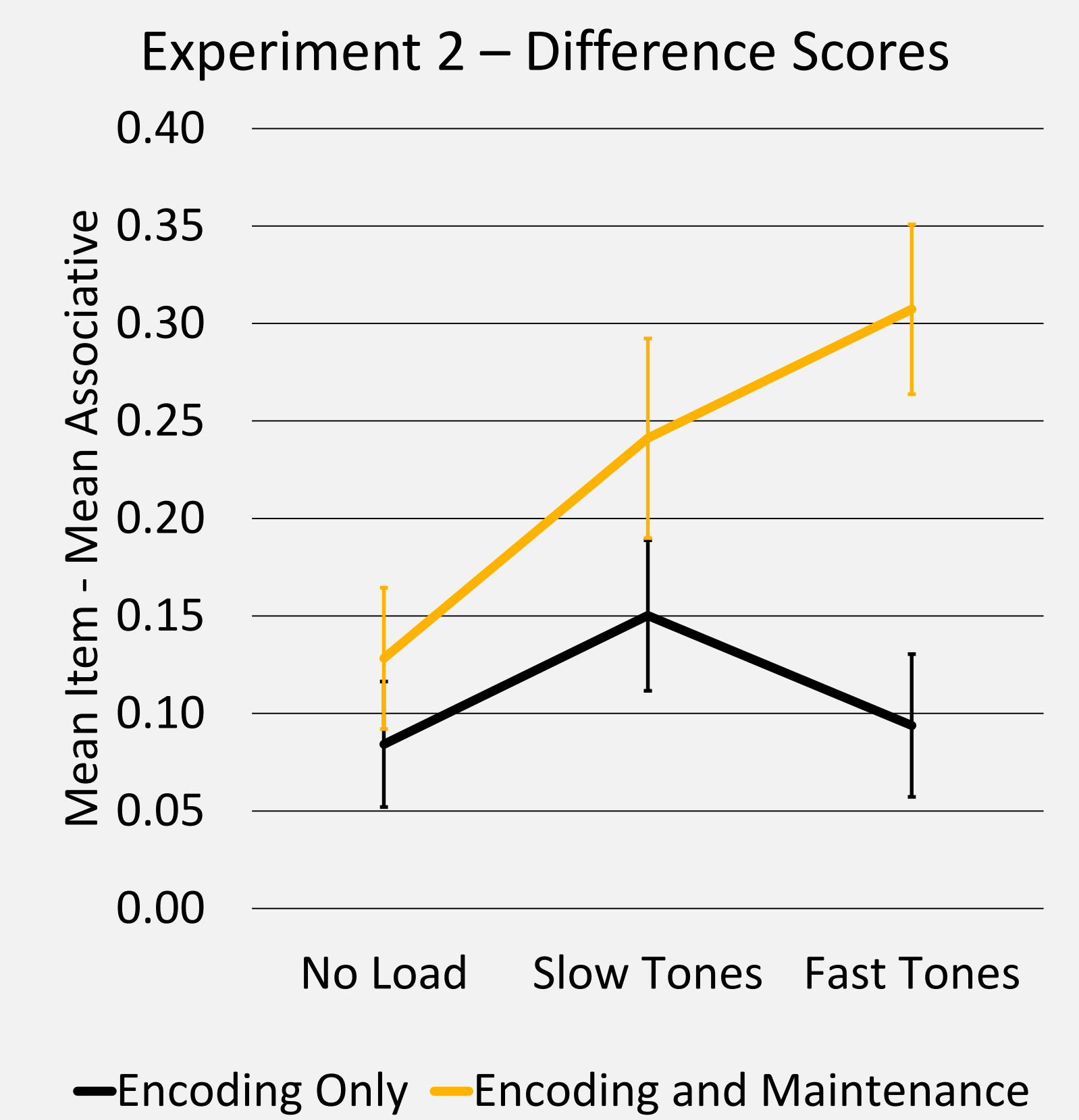
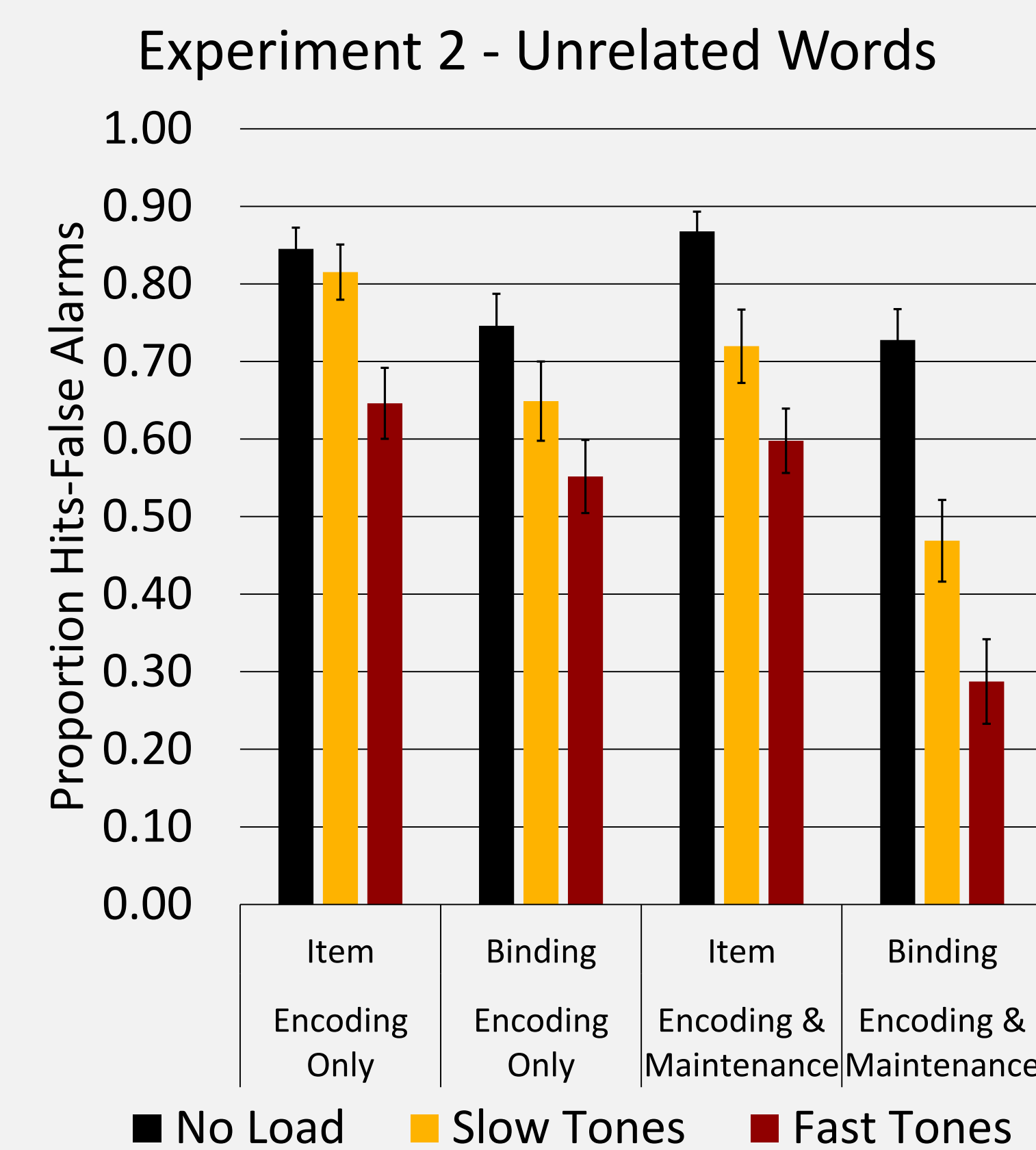
- Hits minus False-Alarms rates across load level, phase of load presentation, and test type



RESULTS



Repeated measures ANOVA show a significant two-way interaction in Experiment 1 between load and test type, and a significant three-way interaction in Experiment 2 between load, test type, and phase of presentation



CONCLUSIONS

- Divided attention in WM affects associative memory more than component memory
- Presentation of divided attention at encoding only is sufficient to disrupt visual associations, but not verbal associations
- For visual WM, differences between LTM and WM paradigms are insufficient to explain differential results
- Participants may have been able to retrieve and rehearse verbal information during the maintenance period, without divided attention, in a way not possible for visual information.

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