Probing working memory pointers by examining contralateral delay activity with moving and updating stimuli

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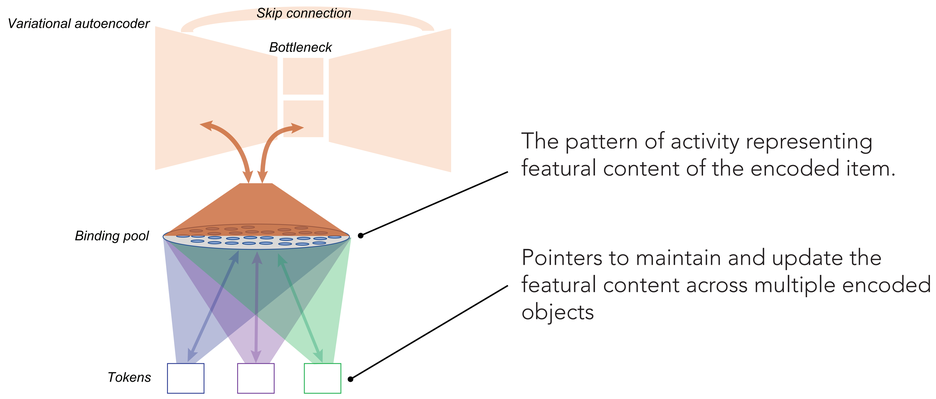
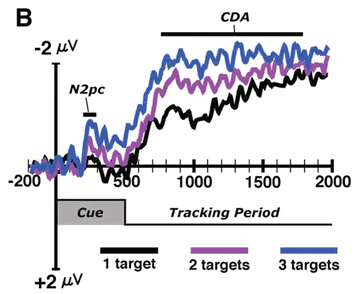
Background

A recent theoretical idea is that **object-based pointers** are a critical component of visual working memory, determining capacity limits. Like FINSTs (Pylyshyn, 1989) and object files (Kahneman et al.,1992), pointers are the proposed mechanism for binding featural content to its spatiotemporal context for storage in working memory.



The contralateral delay activity is an event-related potential that increases in amplitude with working memory load.

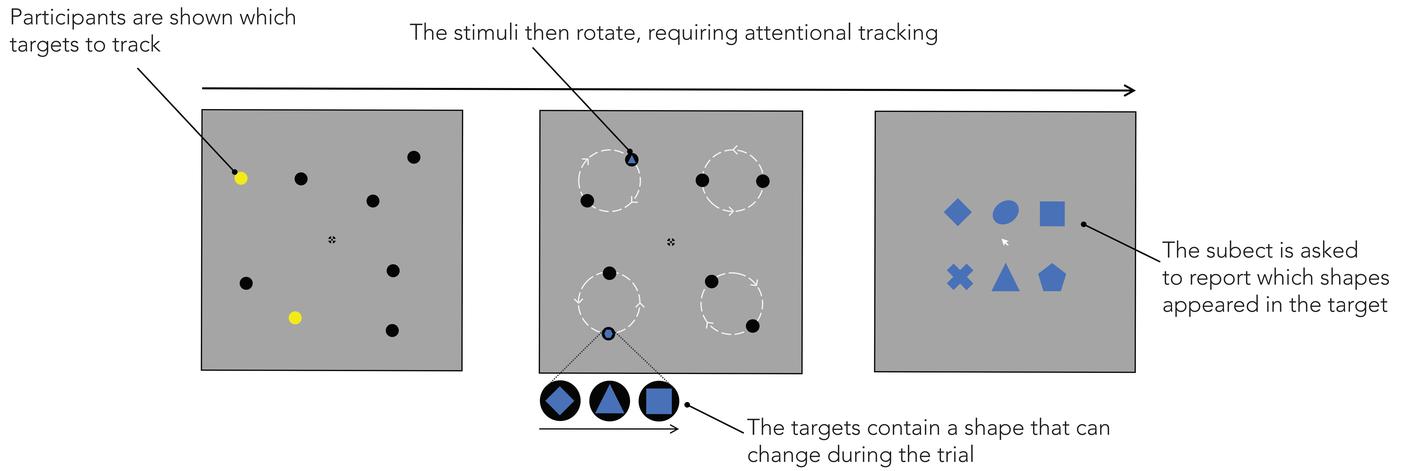


The CDA is thought to be a neural index of the number of object-based pointers (Balaban et al., 2019), but also has been shown to index the number of tracked objects (Drew and Vogel, 2008). However, attentional tracking and object-based encoding have not been directly contrasted. The multiple object tracking literature shows humans can spatially track three moving targets, but track substantially fewer targets when their identity also needs to be tracked (Oksama and Hyona, 2008).

Proposed Experimental Design

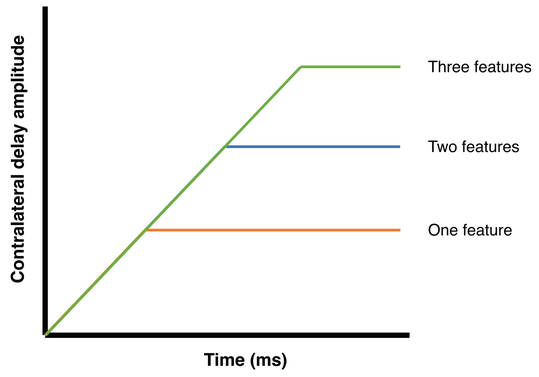
Participants will be required to track one or two moving targets. Within each of these moving targets, either one, two or three feature identities will be shown.

Experiment 1a: Report only the last shown feature.
Experiment 1b: Report all features from the target.

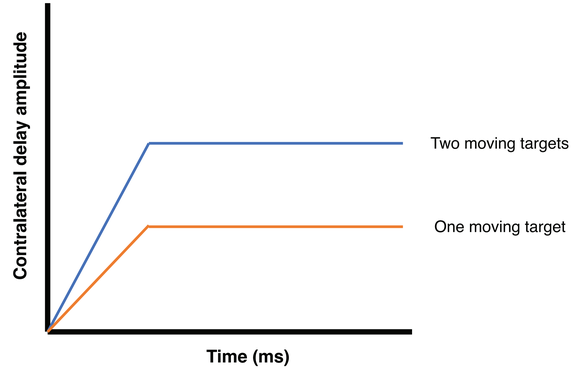


Predictions

If the CDA predominantly tracks the to-be-remembered features:



If the CDA is mostly determined by spatiotemporal tracking:



There will likely be an interaction between attentional tracking load and working memory load – potential follow-ups include applying multivariate decoding and representational similarity analysis.

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