Temporal memory distortions at event boundaries are determined by competition between coarse- and fine-grained boundaries at retrieval.

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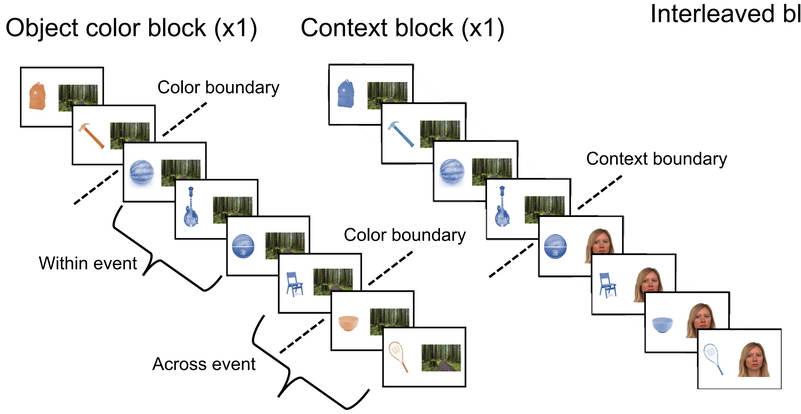
Background

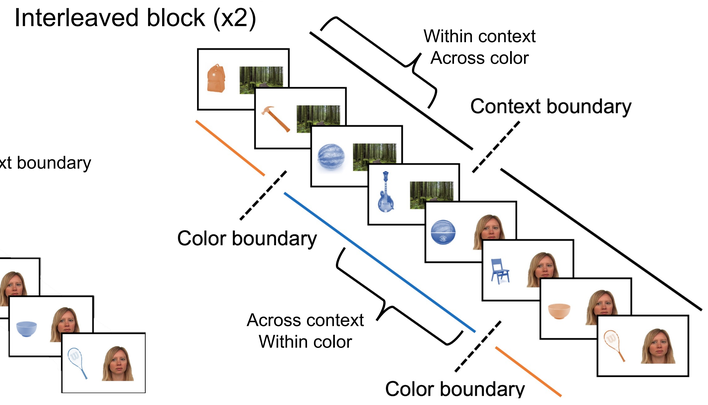
- Our everyday lives can be segmented into discrete events, denoted by salient changes called **event boundaries**[1,2,3]
- Event boundaries have been shown to **distort temporal memory** for items that occur right before and right after the event boundary[4,5,6,7]
  - Items across an event boundary are remembered as occurring farther apart in time compared to items within an event (**temporal memory expansion effect**)
  - More errors in **temporal order memory** are made for items across an event boundary compared to items within an event
- Prior studies have used a change in context (scene, face, background color) as the event boundary, and have only studied a single type of event boundary in isolation[4,5,6,7]
- The present study had two aims
  1. Do fine-grained boundaries (e.g., change in item color) produce temporal memory distortions comparable to coarse-grained boundaries, (e.g., change in context)?
  2. Do fine- and coarse-grained boundaries compete at retrieval?

Encoding phase

Experiment 1



Experiment 2

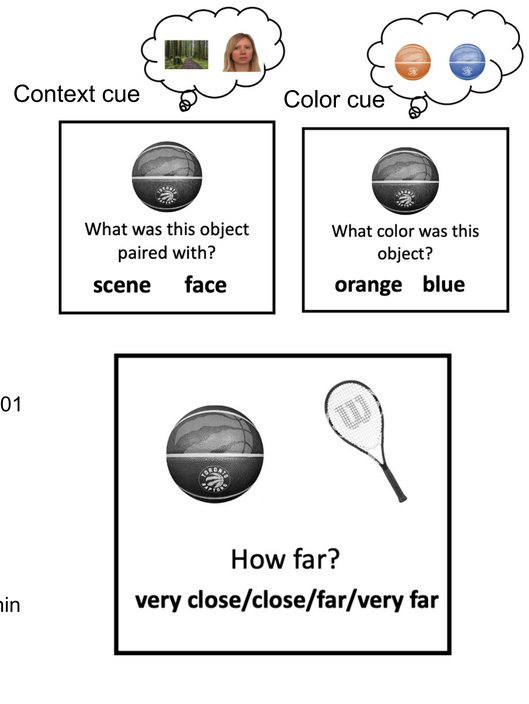


Paradigm details

Encoding Phase
- Object color block: object color changed every 4 trials
- Context block: face or scene changed every 4 trials
- Interleaved block: context and color change every 4 trials (offset)
- 32 trials per block, 8 event boundaries per block

Test Phase
- 16 trials per block
- Every pair of objects was 2 trials apart during encoding
- ~50% of object pairs were within event pairs and ~50% were across event pairs

Test phase



Statistical results

Experiment 1

Temporal distance memory
- Main effect of Block: Object color > Context $t(25) = 3.70$, $p < 0.001$
- Main effect of Boundary Type: Across > Within $t(25) = 5.39$, $p < 0.001$
- Block x Boundary Type interaction: $F(1,25) = 12.70$, $p < 0.01$

Temporal order memory
- No main effects
- Block x Boundary Type interaction $F(1,26)=8.59$, $p<0.01$

Experiment 2

Temporal distance memory
- Main effect of Boundary Type: Across Context /Within color > Within context/Across color $t(33) = 6.58$, $p < 0.001$

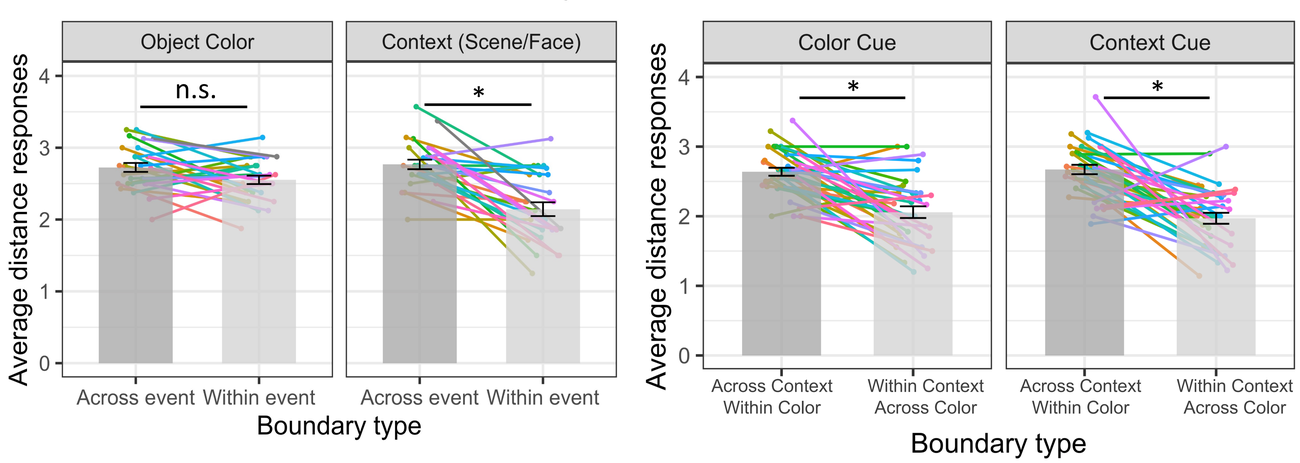
Temporal order memory
- Main effect of Cue: Context > Color $t(33) = 2.24$, $p < 0.05$

Take home points

- Not all types of boundaries affect temporal memory equally.
- Fine-grained boundaries like object color changes are not a strong enough boundary to induce temporal memory expansion and temporal memory order effects.
- Fine- and coarse- grained boundaries might compete with one another at retrieval.
- When interleaved, object color and context boundaries might compete resulting in an attenuated temporal order effect across context boundaries.

Temporal distance memory

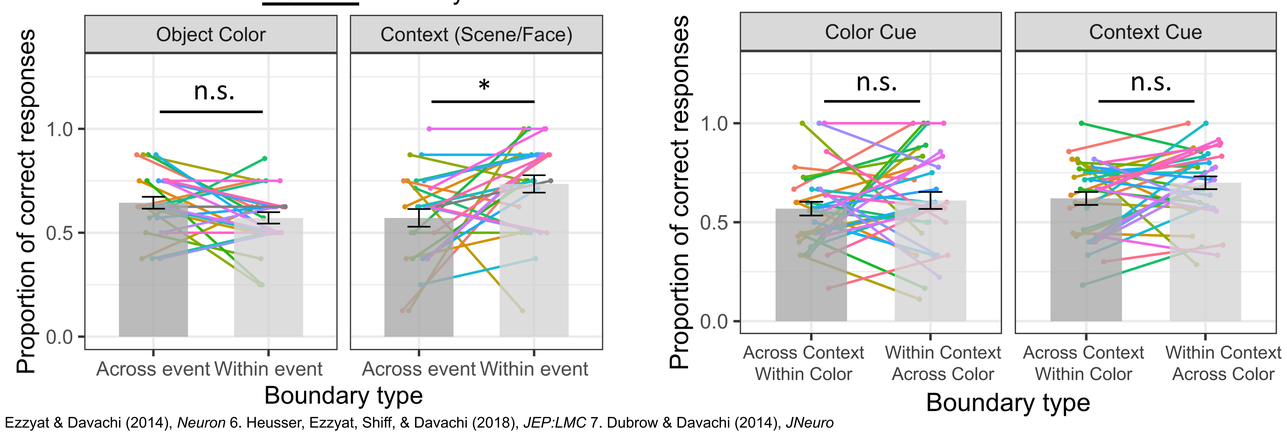
Only objects across a **context** boundary were remembered as further apart compared to objects within an event



Temporal order memory

Objects within an event (**same context**) had better temporal order memory than objects across a **context** boundary

No effect of color boundaries or context boundaries on temporal order memory



1. Radvansky (2012), *Curr Direction in Psych Sci* 2. Reynolds, Zacks, Braver (2007), *CogSci* 3. Baldassano et al. (2017), *Neuron* 4. Clewett, Gasser, & Davachi (2020), *Nature comm* 5. Ezzyat & Davachi (2014), *Neuron* 6. Heusser, Ezzyat, Shiff, & Davachi (2018), *JEP:LMC* 7. Dubrow & Davachi (2014), *JNeuro*