The Price of Efficiency: Automatic Chunk Activation Constrains Strategic Flexibility in Working Memory

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1 Background

Despite its crucial role in daily functioning, the capacity of visual working memory is limited.

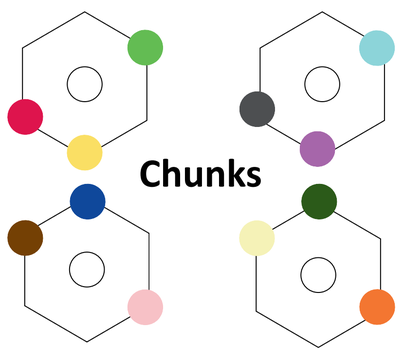
Chunking—grouping elements into meaningful units via long-term memory—helps overcome this limit.

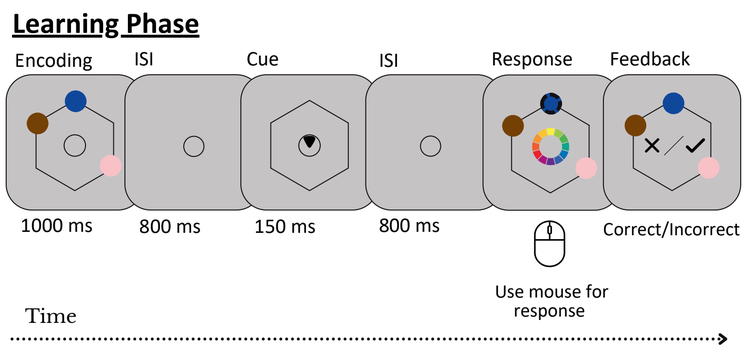
But what happens when you need just one of them?

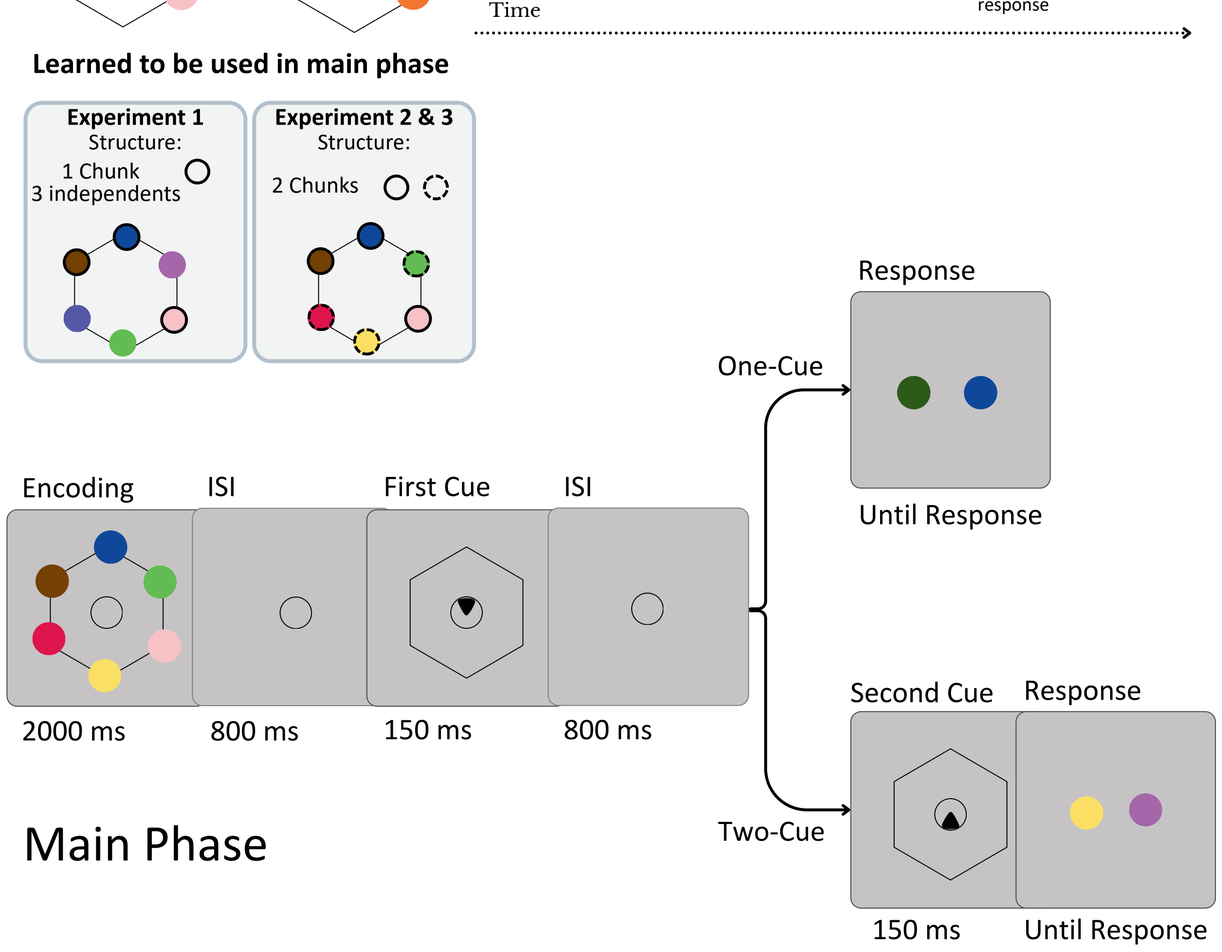
Whole access vs. Partial access

Can parts of a chunk be accessed separately from the rest?

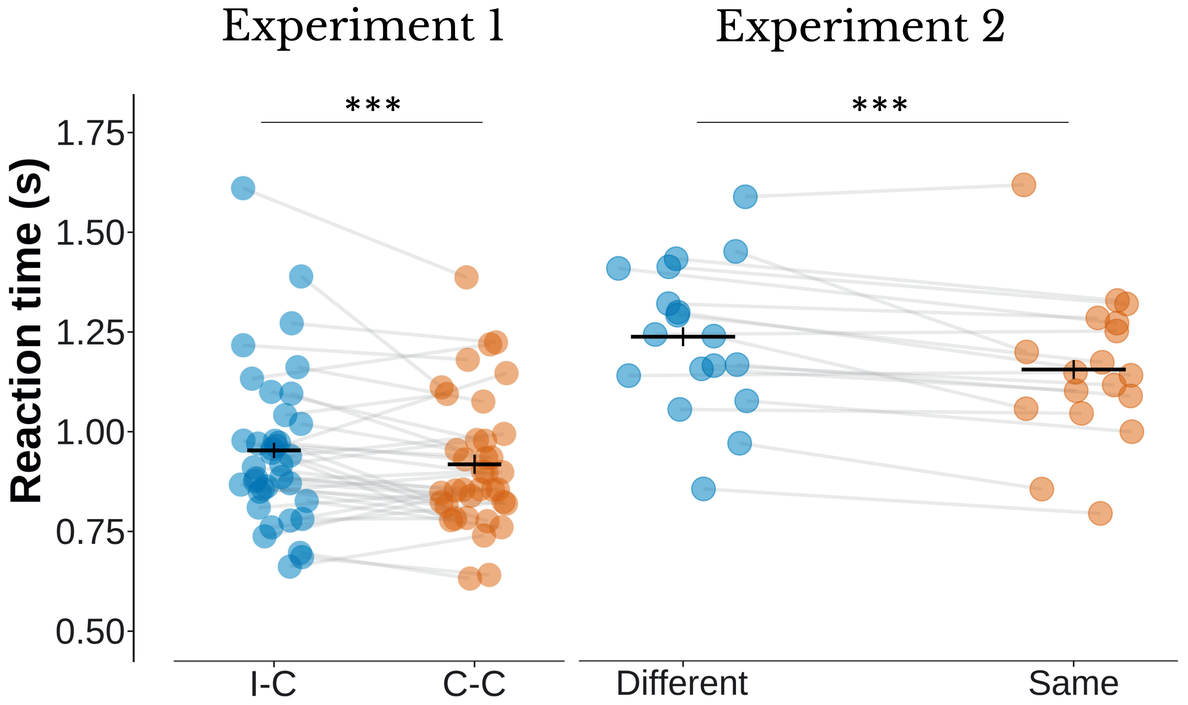
2 Experimental Procedure







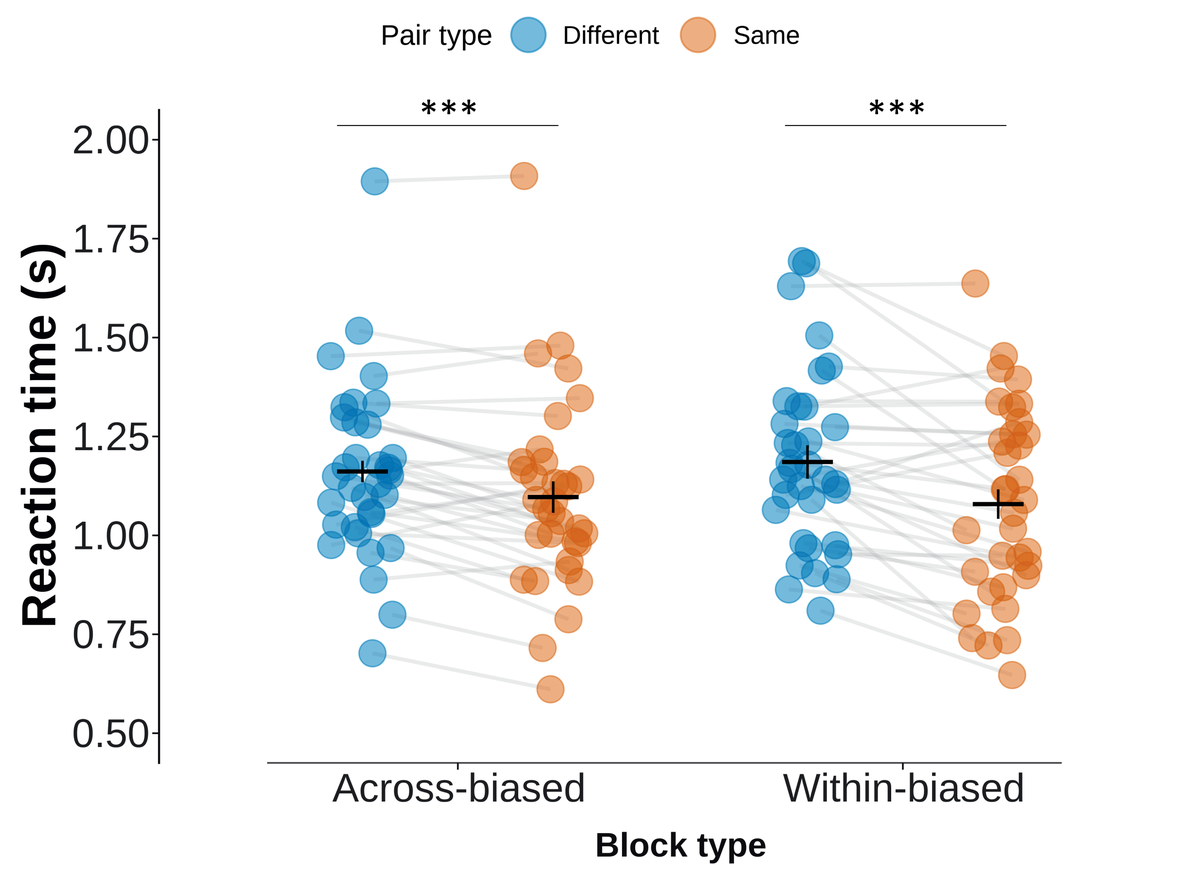
3 Results | Holistic Access



Accessing one element within a chunk facilitates access to others, indicating holistic access.

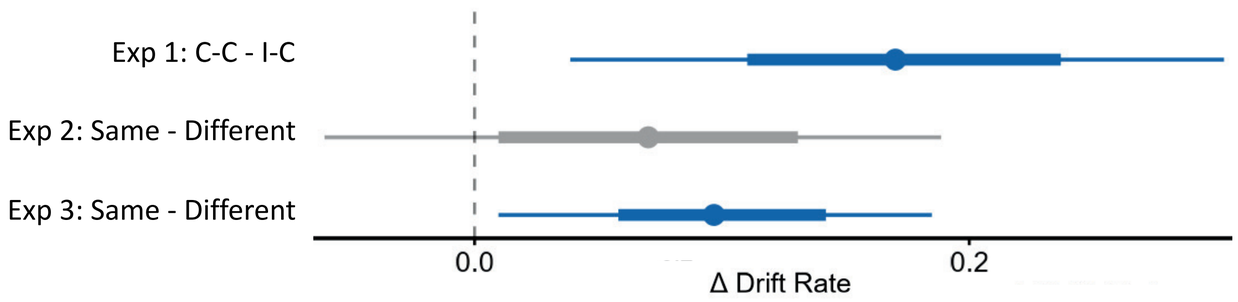
What if holistic access is suboptimal?

Can it be strategically controlled by manipulating the ratio of within-chunk vs across-chunk transitions?



Despite such discouragement, RTs were faster when staying in the same chunk than switching to the other chunk.

4 Results | Drift Diffusion Modelling



Response-time benefits are reflected in higher drift rates for within-chunk transitions.

That is, accessing one chunk element provides a stronger or more readily available memory signal for the others.

5 Conclusion

Tradeoff between storage efficiency and flexible access.

Chunked information is accessed as an integrated whole rather than as discrete, independent elements.

Chunking helps overcome WM capacity limits at the cost of reduced flexibility in accessing individual elements.

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