Tracking stimulus representation across a 2-back visual working memory task

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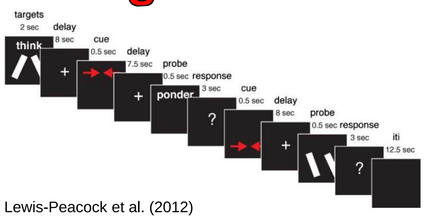
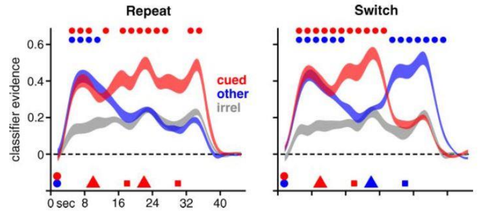
Background



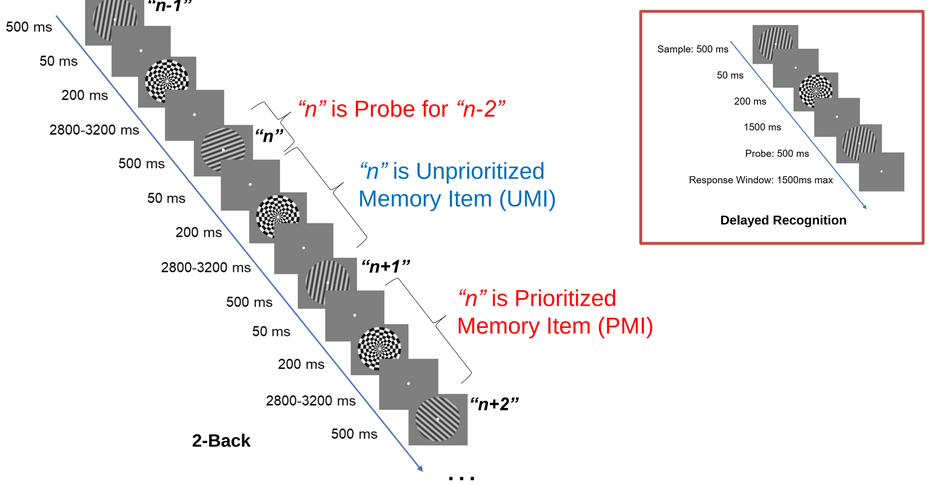
Lewis-Peacock et al. (2012)

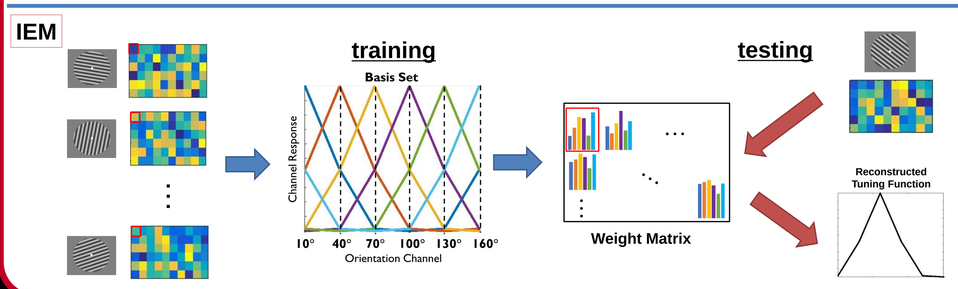


Question: Does the lack of evidence for an active neural representation of the unprioritized memory item (UMI) reflect a general WM mechanism, or is idiosyncratic to the Dual Serial Retrocueing (D-SR) task?

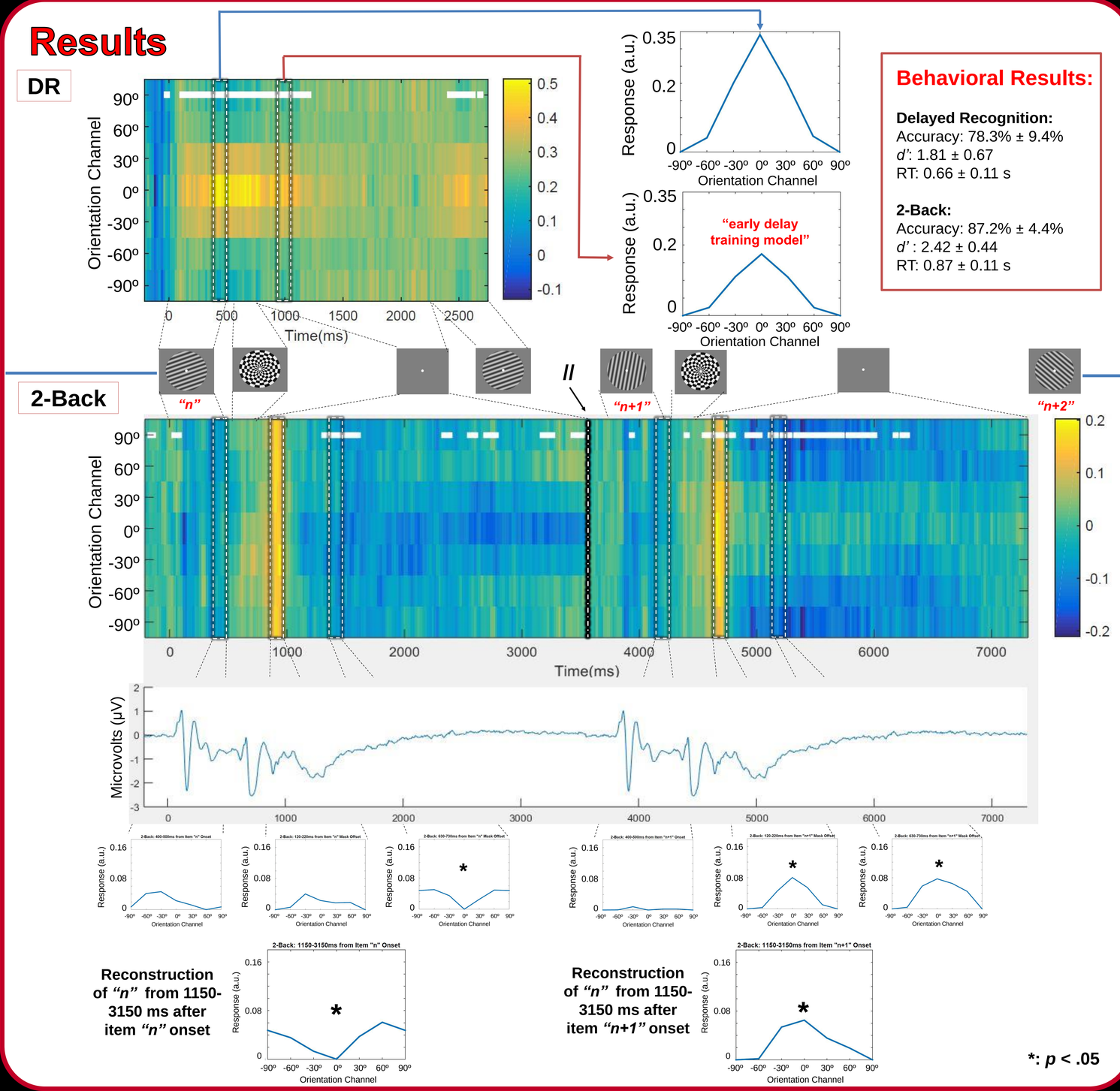
Methods

- *N* = 12
- Sinewave gratings of 6 orientations
- 2 tasks: 2-back (2B), delayed recognition (DR; for IEM training)
- 60-channel EEG; IEM: cross-validation within DR; testing 2B with DR models





Results



Behavioral Results:

Delayed Recognition:
Accuracy: 78.3% ± 9.4%
d': 1.81 ± 0.67
RT: 0.66 ± 0.11 s

2-Back:
Accuracy: 87.2% ± 4.4%
d' : 2.42 ± 0.44
RT: 0.87 ± 0.11 s

***: $p < .05$**

Conclusion

- Unprioritized memory items may be recoded into a distinct representational format, then decoded back into a "perceptual" format when needed to actively guide behavior.
- Consistent with other recent reports that UMIs are represented in a "reversed" or "opposite" representational format (van Loon et al., in press at *eLife*; Yu & Postle, *bioRxiv*).

References

Lewis-Peacock, J.A., Drysdale, A.T., Oberauer, K., & Postle, B.R. (2012). Neural evidence for a distinction between short-term memory and the focus of attention. *Journal of Cognitive Neuroscience,* 24(1): 61-79.
van Loon, A.M., Olmos-Solis, K., Fahrenfort, J.J., & Olivers, C.N.L. (in press). Current and future goals are represented in opposite patterns in object-selective cortex. *eLife*.
Yu, Q., & Postle, B.R. (2018). Different states of priority recruit different neural codes in visual working memory. *bioRxiv:* 334920.

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