

EXPLORING PRIORITISATION EFFECTS ACROSS DIFFERENT FORMS OF BINDING

IN WORKING MEMORY

Hatice Cinar^a, Amanda H. Waterman^a, Amy L. Atkinson^b, Richard J. Allen^a

University of Leeds (UK)^a, Lancaster University (UK)^b

Email: pshc@leeds.ac.uk

INTRODUCTION

- **Prioritisation** is a method which involves directing attention to a specific item in the limited capacity system of working memory.
 - Some items associated with higher points relative to other items in the sequence.
 - Improves recall for higher value items (Hu et al., 2014)
 - Might reflect focus of attention/episodic buffer
- **Binding:** Visual information generally consists of multi-feature objects. Binding between features of items can be function of working memory.
 - The binding types investigated in this study are:
 - **Unitised** : coloured shape
 - **Spatially separated** : shape and colour presented simultaneously in separate, vertically adjacent locations.
 - Some studies show better performance for unitised bindings relative to spatially separated bindings (Karlsen et al., 2010).

AIM

- The main aim of this study is to investigate whether prioritisation has a differential effect on different types of binding.
 - 1) Can we observe better performance for high value items?
 - 2) Can we observe a binding unitisation advantage?
 - 3) Do prioritisation and binding types interact? i.e., is it more difficult to prioritise spatially separated bindings?

GENERAL METHOD

- Three experiments were conducted. A 2x2x4 repeated measures design was implemented in each experiment,
 - 2 types of binding conditions: **unitised** (coloured shape); **spatially separated** (colour and a shape presented simultaneously, but at vertically adjacent locations)
 - 2 priority conditions: **priority** (serial position 1 (SP1) more valuable than the other items); **no-priority** (all items equally valuable)
 - 4 probed serial positions: **SP 1,2,3,4**
- Four shape-colour pairs presented to participant and asked to recall the colour of one shape following a delay

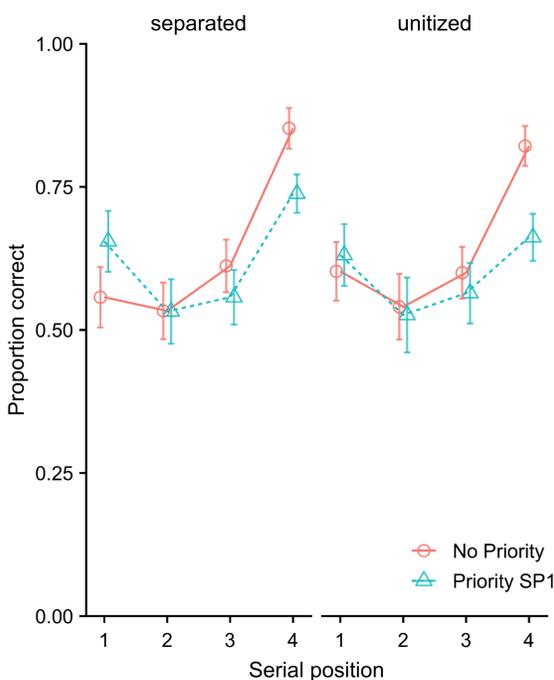
EXPERIMENT 1

- 27 students (19 females; M.age = 21.1 years; range = 19-23 years).
- Online experiment, items presented at the centre of the screen

Unitised



Spatially Separated



- ❑ No priority boost at SP1 in either binding condition.
- ❑ No difference between binding types

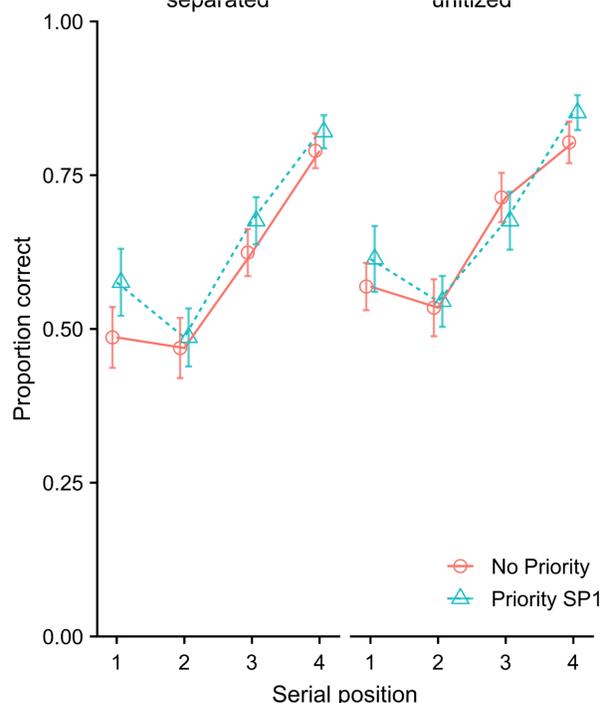
EXPERIMENT 2

- 27 students (15 females; M.age = 21.4 years; range = 19-27 years)
- Online experiment, items presented at different spatial locations

Unitised



Spatially Separated

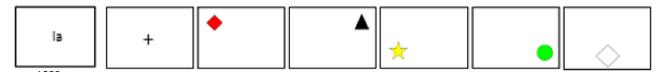


- ❑ No priority boost at SP1 in either binding condition.
- ❑ An effect of binding, with higher performance in the unitised condition.

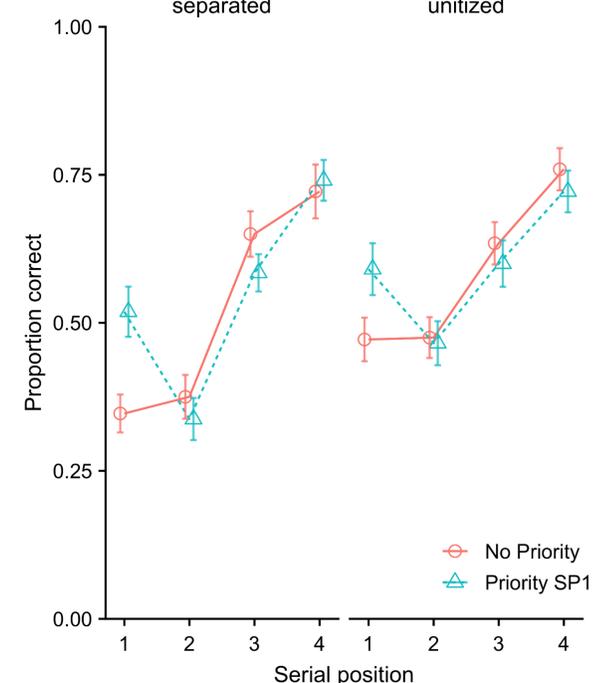
EXPERIMENT 3

- 31 students (25 females; M.age. = 20.43 years; range = 18-30 years)
- In person experiment; items presented at different spatial location with articulatory suppression

Unitised



Spatially Separated



- ❑ A priority boost at SP1, with higher performance in the priority condition than in the no priority condition.
- ❑ An effect of binding, with higher performance in the unitised condition.
- ❑ The size of the prioritisation boost did not significantly differ as a function of binding type.
- ❑ Preventing verbal rehearsal appears to result in the priority effect emerging.

CONCLUSIONS

- ❑ When items were presented at different spatial locations (Exps 2 & 3), participants performed better in the unitised binding condition relative to the spatially separated condition. This suggests that location is important in producing the binding unitisation advantage.
- ❑ High-value boost emerged when verbal rehearsal was prevented. Prioritisation more useful with increased reliance on visual WM?
- ❑ Individuals can prioritise spatially separated items just as effectively as unitized bindings.

References

1. Hu, Y., Hitch, G. J., Baddeley, A. D., Zhang, M., & Allen, R. J. (2014). Executive and perceptual attention play different roles in visual working memory: Evidence from suffix and strategy effects. *Journal of Experimental Psychology: Human Perception and Performance*, 40, 1665-1678.
2. Karlsen, P., Allen, R., Baddeley, A., & Hitch, G. (2010). Binding across space and time in visual working memory. *Memory & Cognition*, 38(3), 292-303. doi: 10.3758/mc.38.3.292