

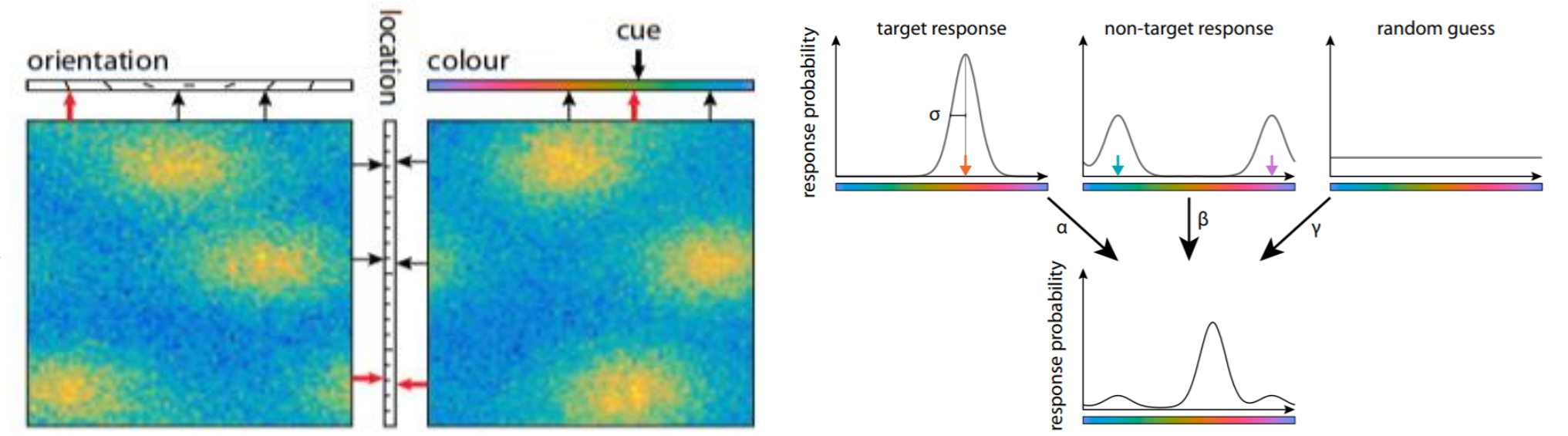


# Spatial and Non-spatial Working Memory Recall Are Substantially Different: an Exploration Based on the Feature-binding Theory

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## Introduction

- ◆ Visual working memory (VWM) refers to the ability of individuals to temporarily store and process visual information.
- ◆ Feature binding theory in VWM (Schneegans, & Bays, 2018) indicated the importance of location information processing in VWM.
- ◆ Bays *et al.* divided recall response probability into target recall (pT), non-target recall (pNT) and randomly guessing (pU).



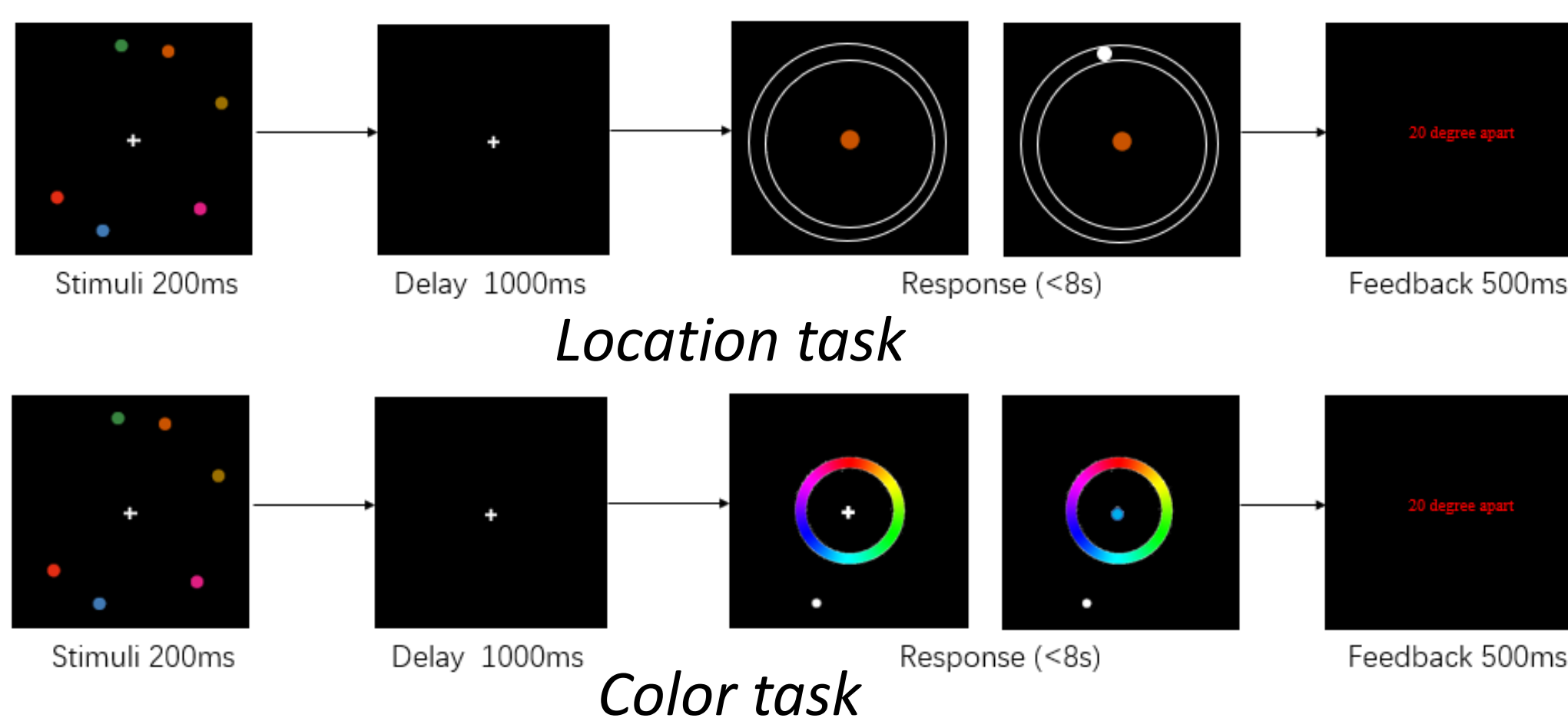
(S. Schneegans & Paul M. Bays, 2018)

- ➔ **Question:** Is there any substantial difference between **spatial** and **non-spatial** working memory recall?
- ➔ **Hypothesis:** If spatial information serves a more fundamental role in feature bindings and automatically be well-processed, **the guessing rate in spatial WM task should be much lower than non-spatial tasks.**

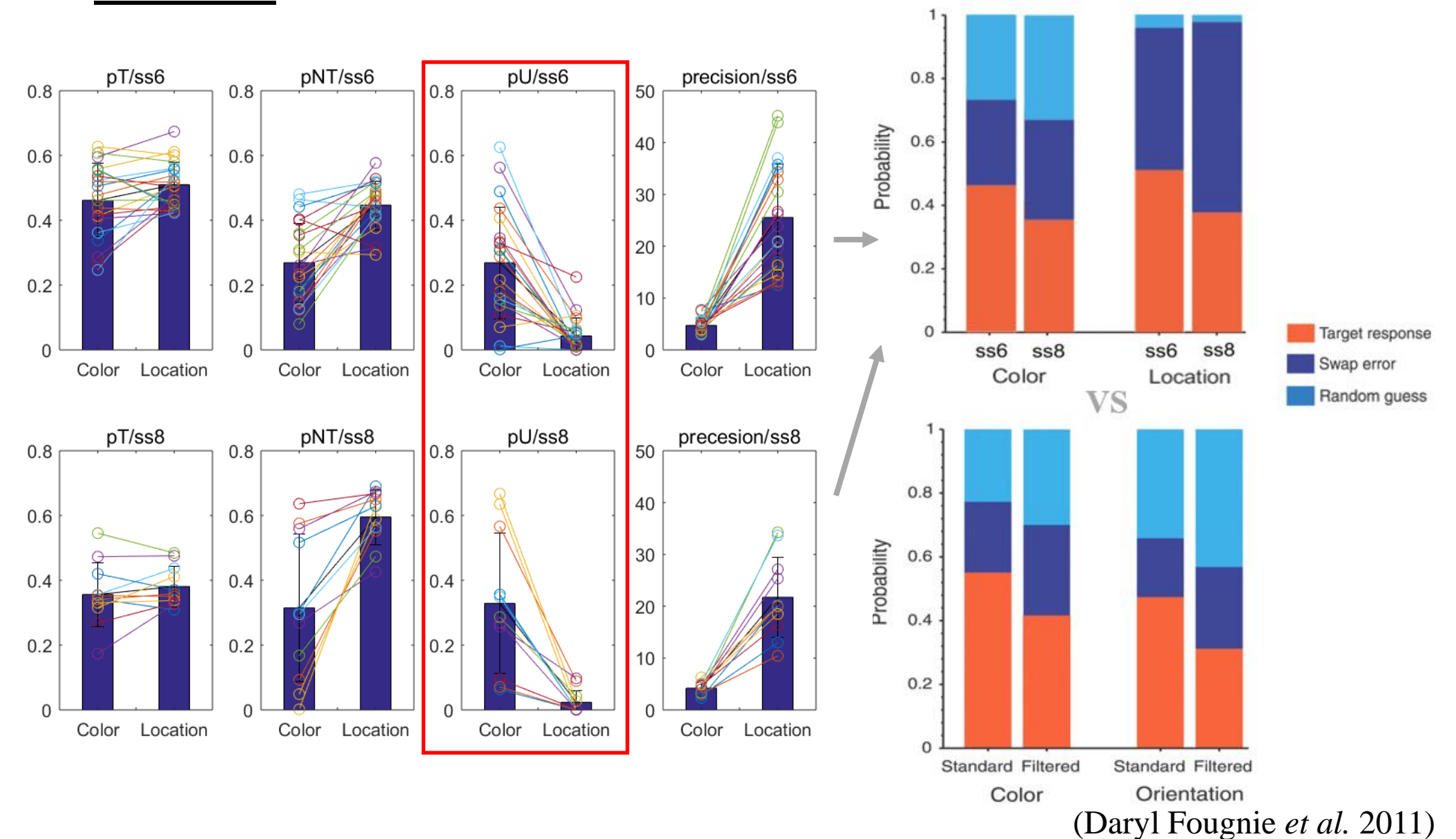
## Exp 1: 1D simultaneous recall

### Design

- ◆ 21 participants in set size=6 and 12 participants in set size=8
- ◆ location task: colored dots simultaneously presented in a certain circle and recall one location with a color cue
- ◆ color task: similar with location task but recall one color with a location cue
- ◆ 4 runs (2 location task runs+2 color task runs) for a participant, 80 trials in each run



### Result



(Daryl Fougine *et al.* 2011)

- ◆ target recall probabilities are similar, meaning that working memory capacity is similar in two feature-recall tasks
- ◆ guessing rates are much lower and standard error is also smaller in location recall task, whether set size = 6 or 8
- ◆ precision is higher in location recall task in both set size

## Exp 2: 2D sequential recall

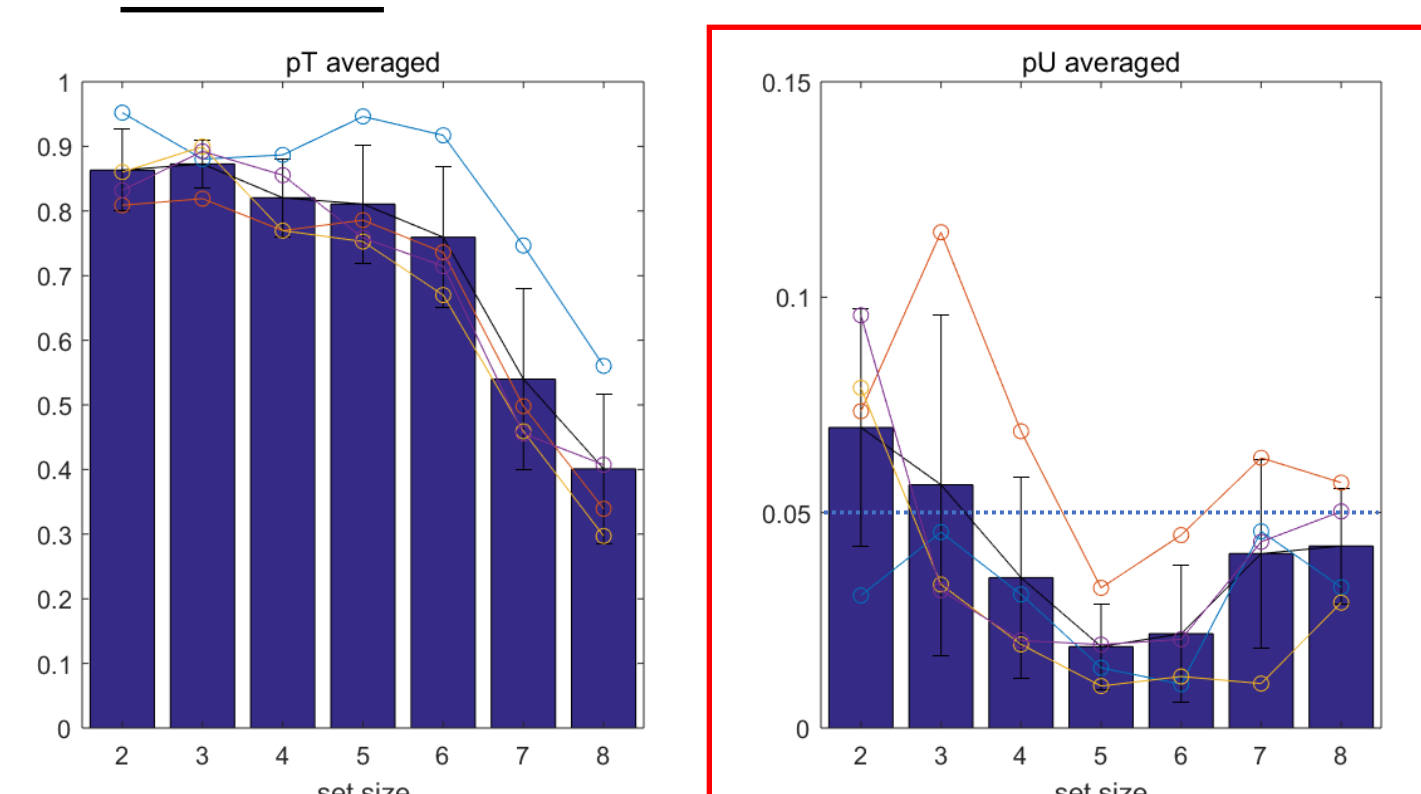
### Limits in Exp 1

- ◆ location is limited in a certain circle (only one dimension—angle) which is usually uncommon in reality
- ◆ dots are shown only simultaneously
- ◆ set size is limited to 6 and 8

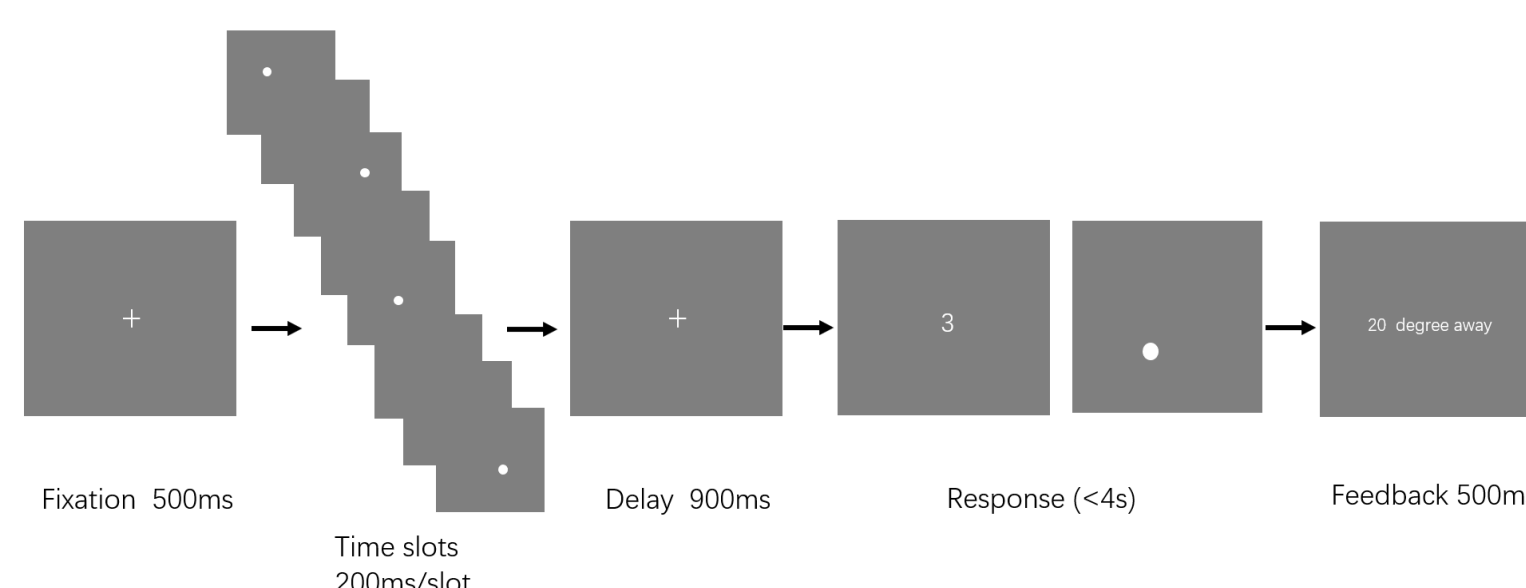
### Dataset for Exp 2

- ◆ dots' location expands to a 2-dimension region (coordinate: x, y)
- ◆ dots are shown sequentially in time slots (recall with a sequence cue)
- ◆ set size vary from 2 to 8
- ◆ 4 participants in pre-experiment; 24 blocks (6 blocks per day) for a participant, 100 trials in each block

### Result



- ◆ guessing rates are still quite low in each set size (mostly lower than 0.05)



## Conclusion

Guessing rate is **much lower** in location recall tasks. This has nothing to do with dots dimension, the way of presentation, and set size, indicating the particularity of spatial working memory.

### Further Question

*How about other non-spatial features?  
What's the mechanism behind the difference?*

## Reference

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## Contact

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