Looking at Nothing Facilitates Memory Retrieval

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Introduction

- Humans integrate visual, linguistic and spatial information to form an *episodic memory trace.*

- Upon processing spoken words, participants make eye movements on a blank screen to locations that were previously occupied by the named objects or related to those [1].

- [2] suggested that 'looking at nothing' facilitates memory retrieval when spatial information at encoding and at test match.

Hypothesis

- **Memory retrieval is facilitated when participants are allowed to make eye movements on a blank screen to locations that were previously occupied by named objects or related to those .**

- **Due to a mismatch in spatial coordinates, remaining central fixation during memory retrieval is hypothesized to lead to performance decrease.**

Conclusion

- **Performance accuracy is worse in conditions of central fixation.**
- **We observed no RT differences within or between the experiments.**
- **Match of spatial coordinates might be crucial for memory retrieval.**
- **Maintaining central fixation during linguistic processing affects performance accuracy.**
- **Analyses showed no RT or accuracy difference between visual shape and semantic similarity judgment task in Exp1 and 2.**

Open issues

- The exact role of spatial indexes in language-vision interactions.
- Increased cognitive load in Exp2 due to dual task situation.
- Working memory as a nexus of information binding.
- Neuronal substrate of information binding.

References

[1] Altmann, G. (2004). Language-mediated eye movements in the absence of a visual world: the 'blank screen paradigm'. *Cognition, 93*(2), B79-B87. **[2]** Ferreira, F., Apel, J., & Henderson, J. M. (2008). Taking a new look at looking at nothing. *Trends Cogn Sci, 12*(11), 405-410.

Experiment 1

Critical base word: ***beker*** ('beaker')

Phonological Competitor: **beer** ('bear')

Semantic competitor: **vork** ('fork)

Visual shape competitor: **klos** ('bobbin')

Unrelated distractor: paraplu ('umbrella')

5 seconds to name all four objects

beker (beaker)

Name the objects as fast as possible.

Between-subjects design *task:*

*Listen to the spoken word and indicate as fast as possible...*

Group 1: *...the position of the object similar in* semantic *to the spoken word*

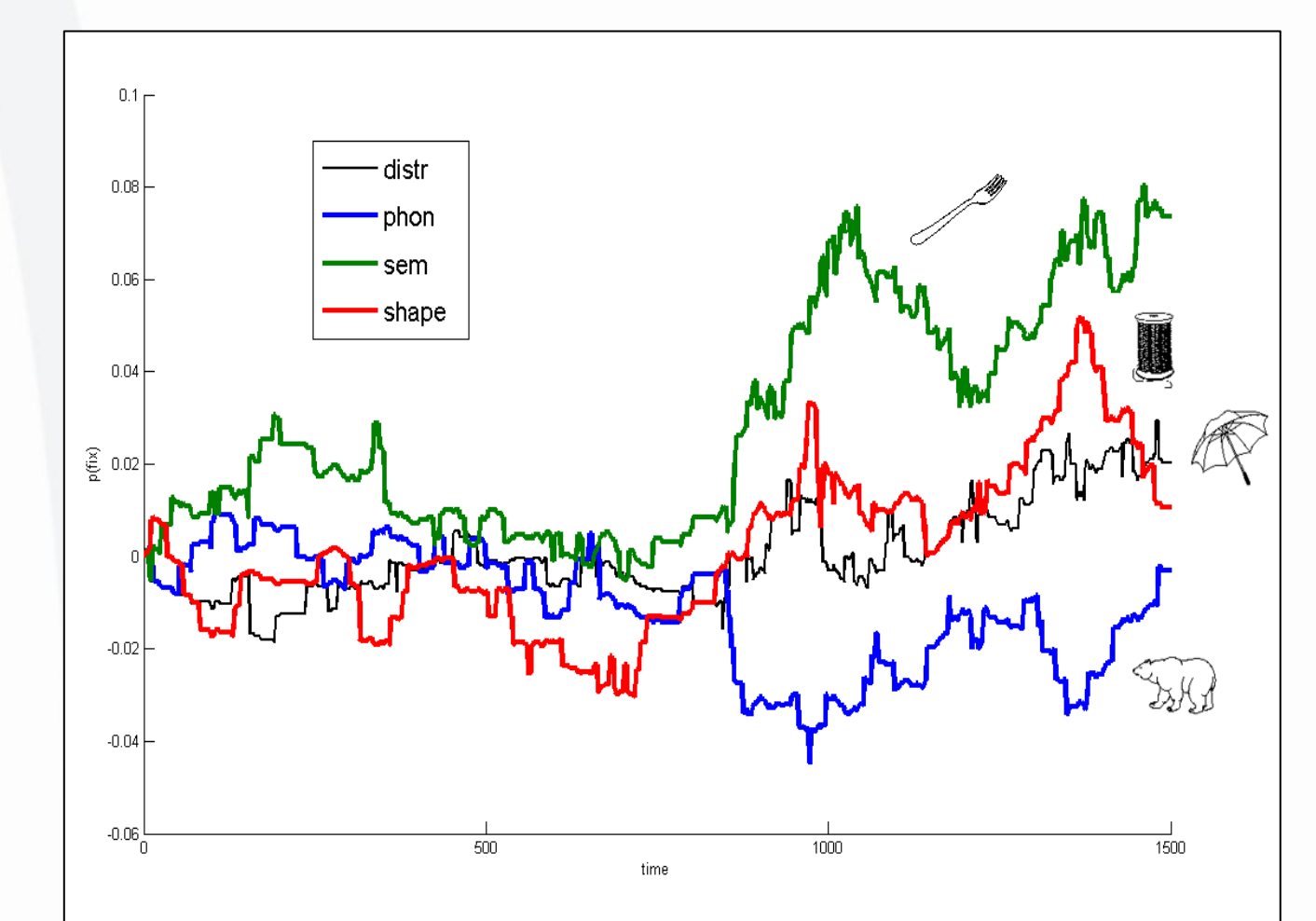**Group 2**: *...the position of the object similar in* visual shape *to the spoken word*

Results

- Performance accuracy between the two tasks (semantic: 65.59%, visual shape: 67.85%) was similar
- We found no RT difference between the two tasks
- In both tasks participants made fixations to locations on the blank screen that were previously occupied by the respective target objects
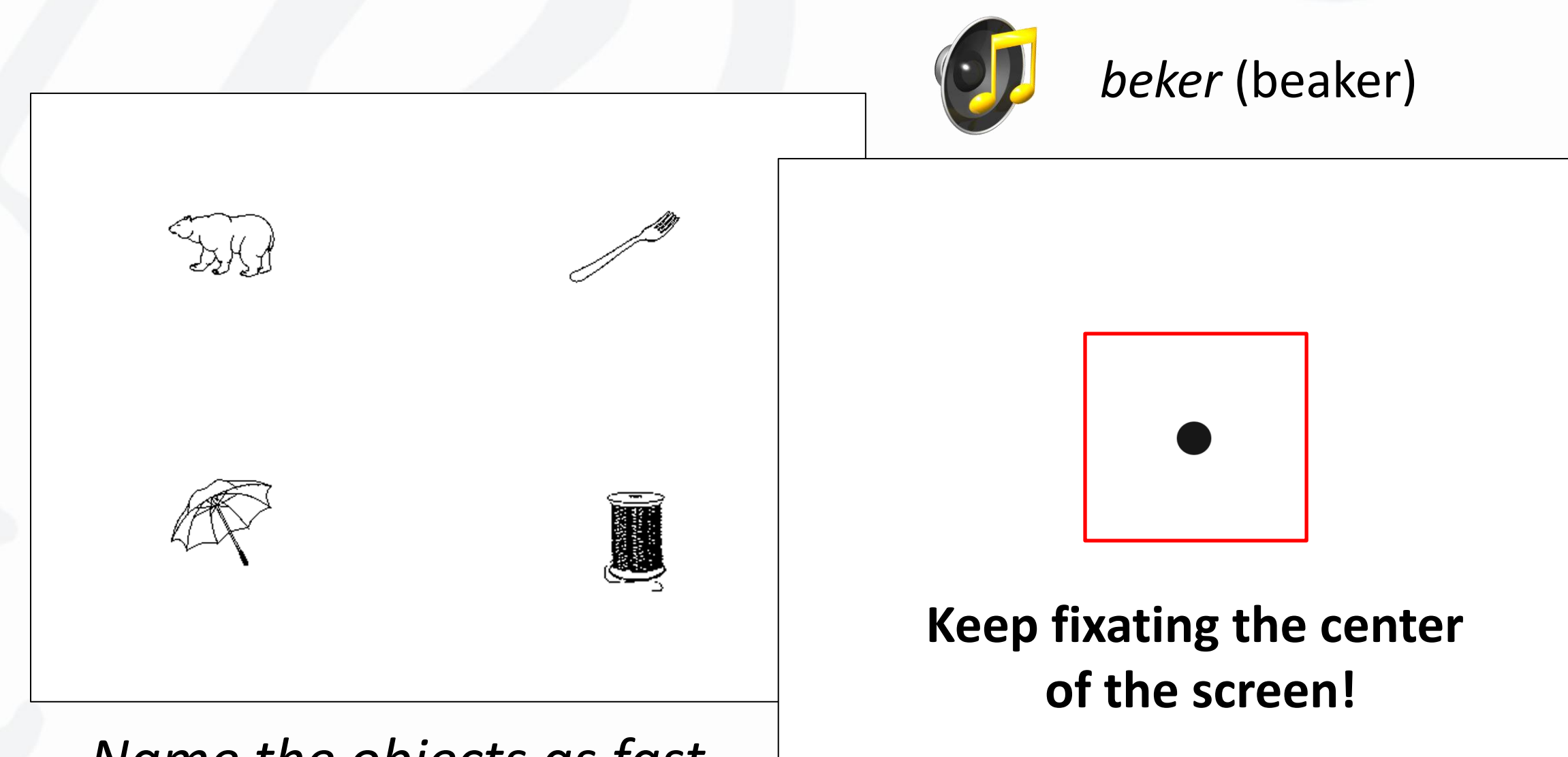
Visual shape similarity judgment
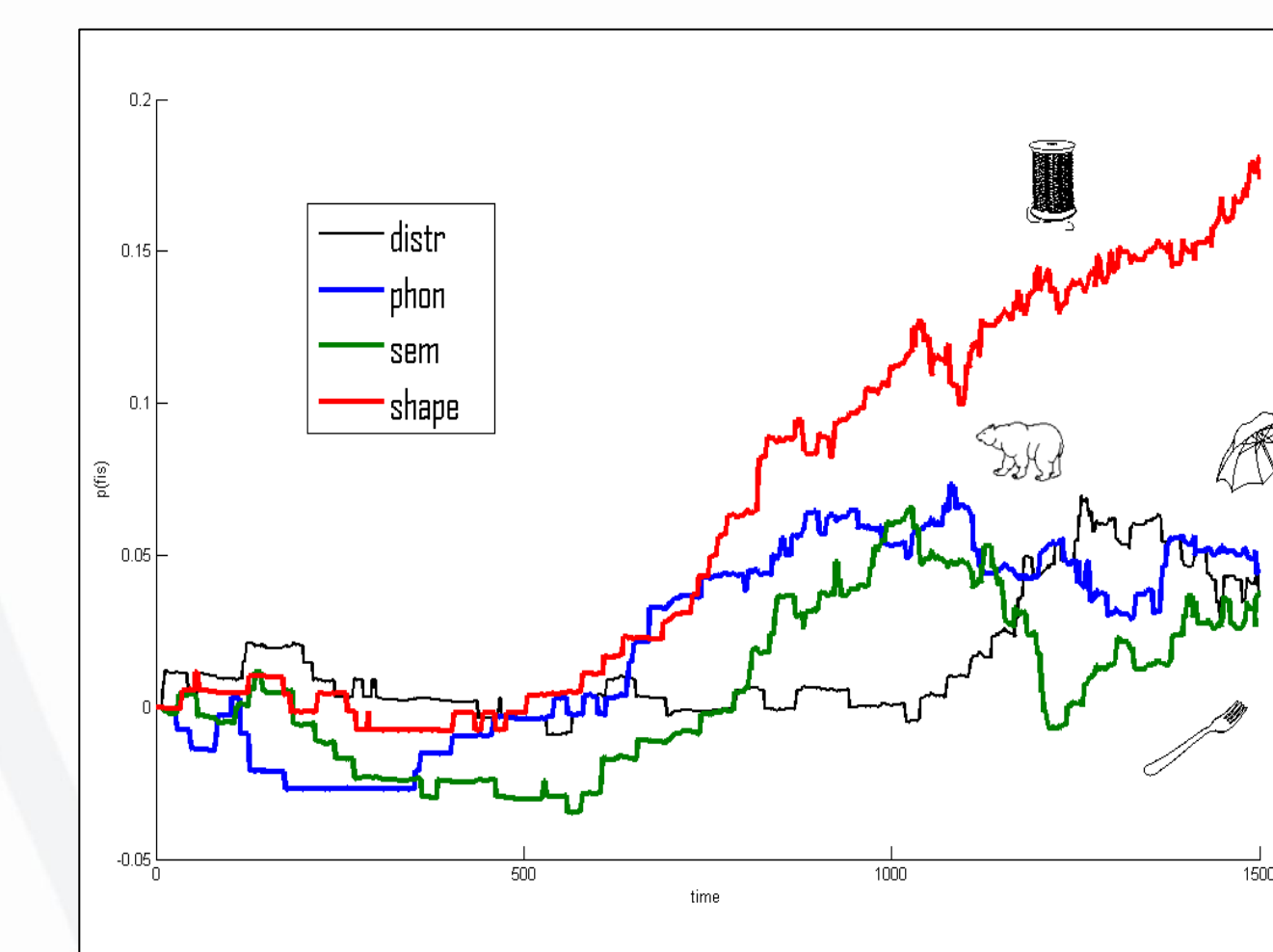
**Semantic similarity judgment**

Experiment 2

beker (beaker)

Name the objects as fast as possible.

Keep fixating the center of the screen!

Between-subjects design *task*
Semantic **similarity judgment**
Visual shape **similarity judgment**

Results

- Performance accuracy between the two tasks (semantic: 46.21%, visual shape: 51.21%) was similar
- We found no RT difference between the two tasks

Performance in Experiment 1 & 2
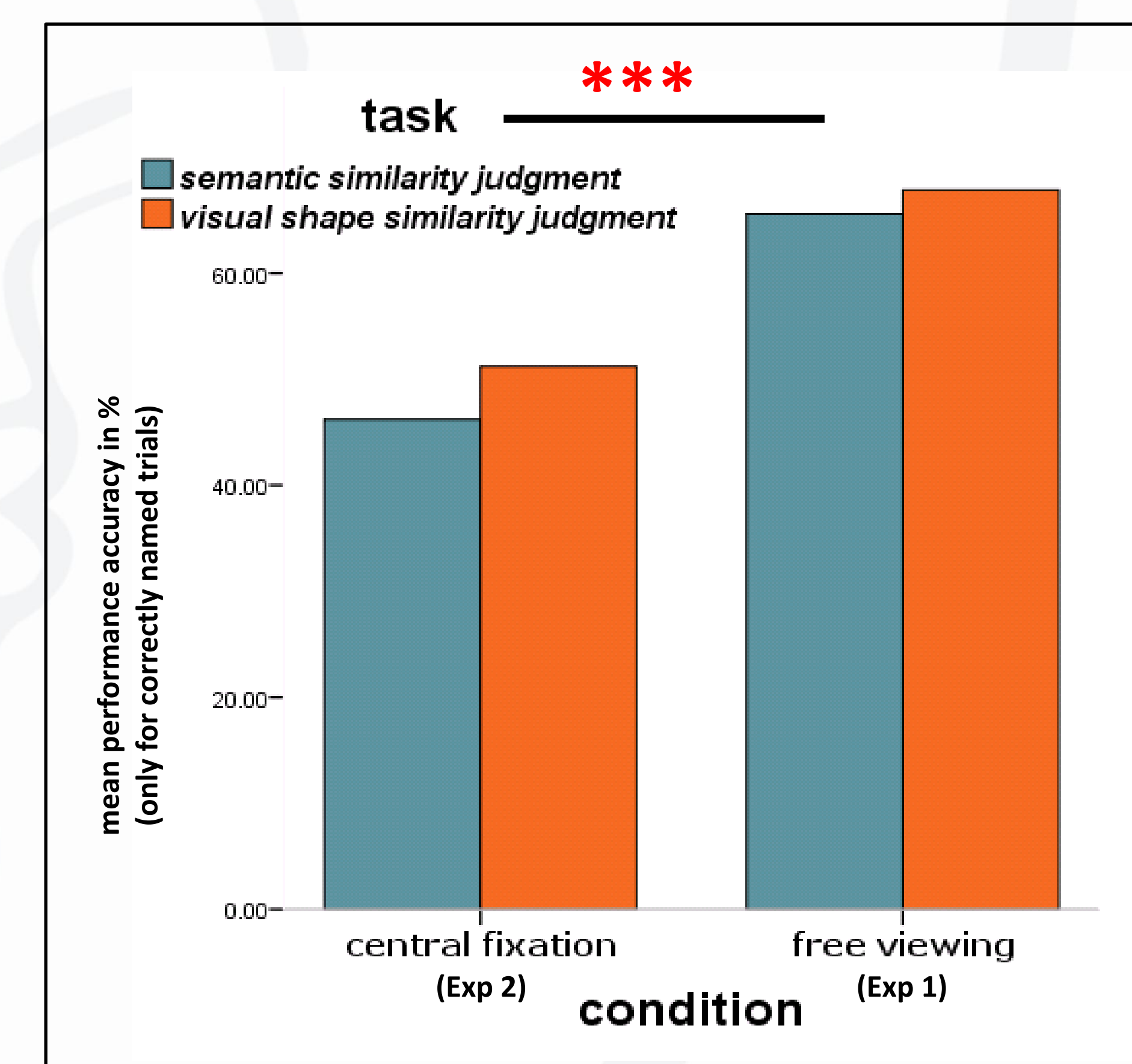
- Performance accuracy in Exp 2 was significantly worse than in Exp 1.
- We found no RT difference between the two experiments.
- No interaction between task or condition was observed.
- When spatial coordinates at encoding and at test did not match memory retrieval was impaired.