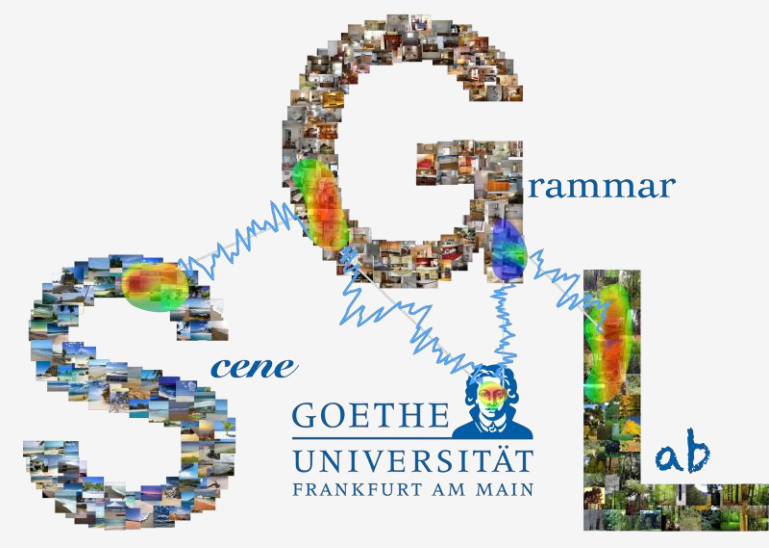


Investigating viewpoint-dependence and context in object recognition using depth rotated 3D models in a sequential matching task

Aylin Kallmayer, Dejan Draschkow, Melissa L.-H. Võ

Department of Psychology, Scene Grammar Lab, Goethe University Frankfurt

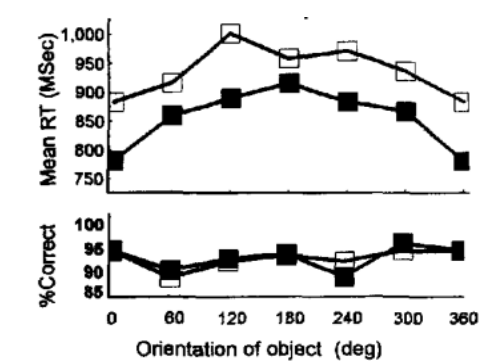


INTRODUCTION

BACKGROUND: IS OBJECT RECOGNITION **VIEWPOINT-DEPENDENT** OR **VIEWPOINT-INVARIANT**?

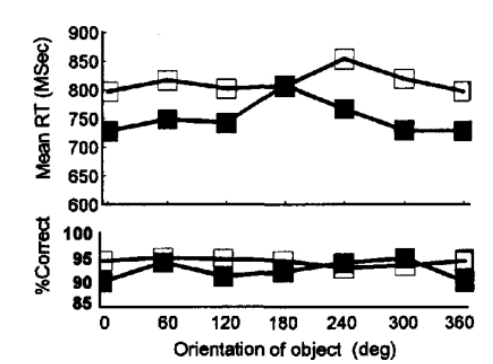


Subordinate level identification „Collie“: viewpoint-dependent



Hamm, J. P., & McMullen, P. A. (1998)

Basic level categorization „Dog“: viewpoint-invariant



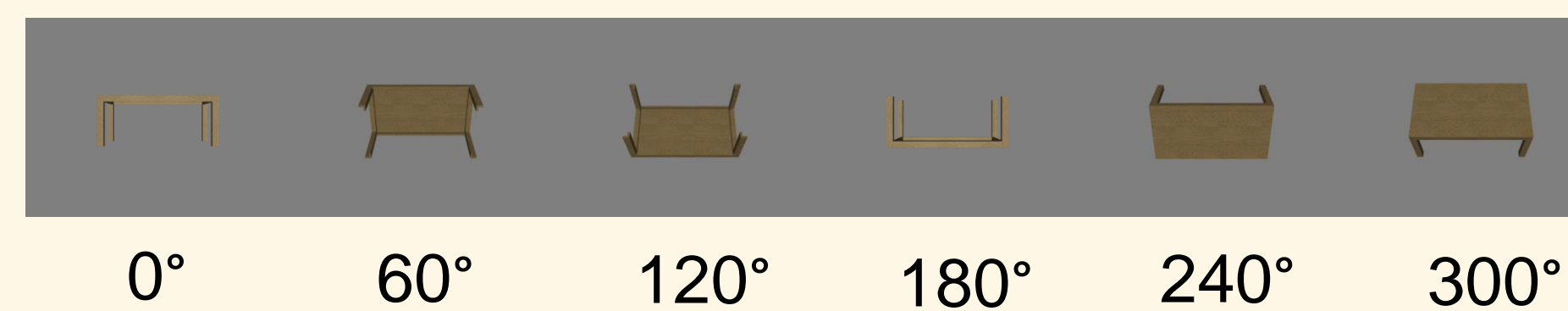
Depends on task, stimuli, goal, context...

OUR RESEARCH QUESTIONS

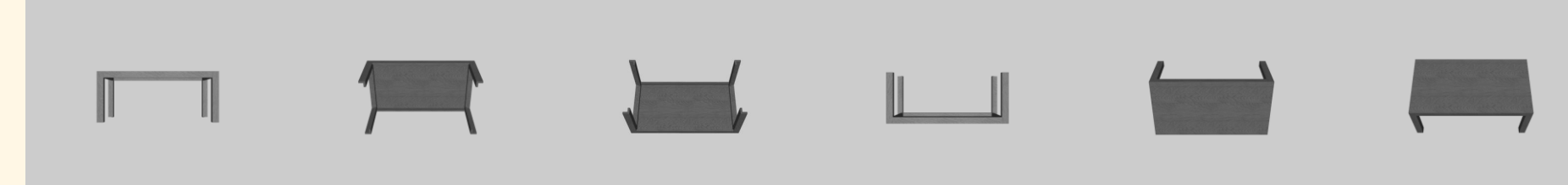
- ➔ Do we find viewpoint-dependence at basic level recognition if we use 3D models of objects instead?
- ➔ Does context reduce the effects of viewpoint?
- ➔ Is there a difference between movable and non-movable objects?

METHOD

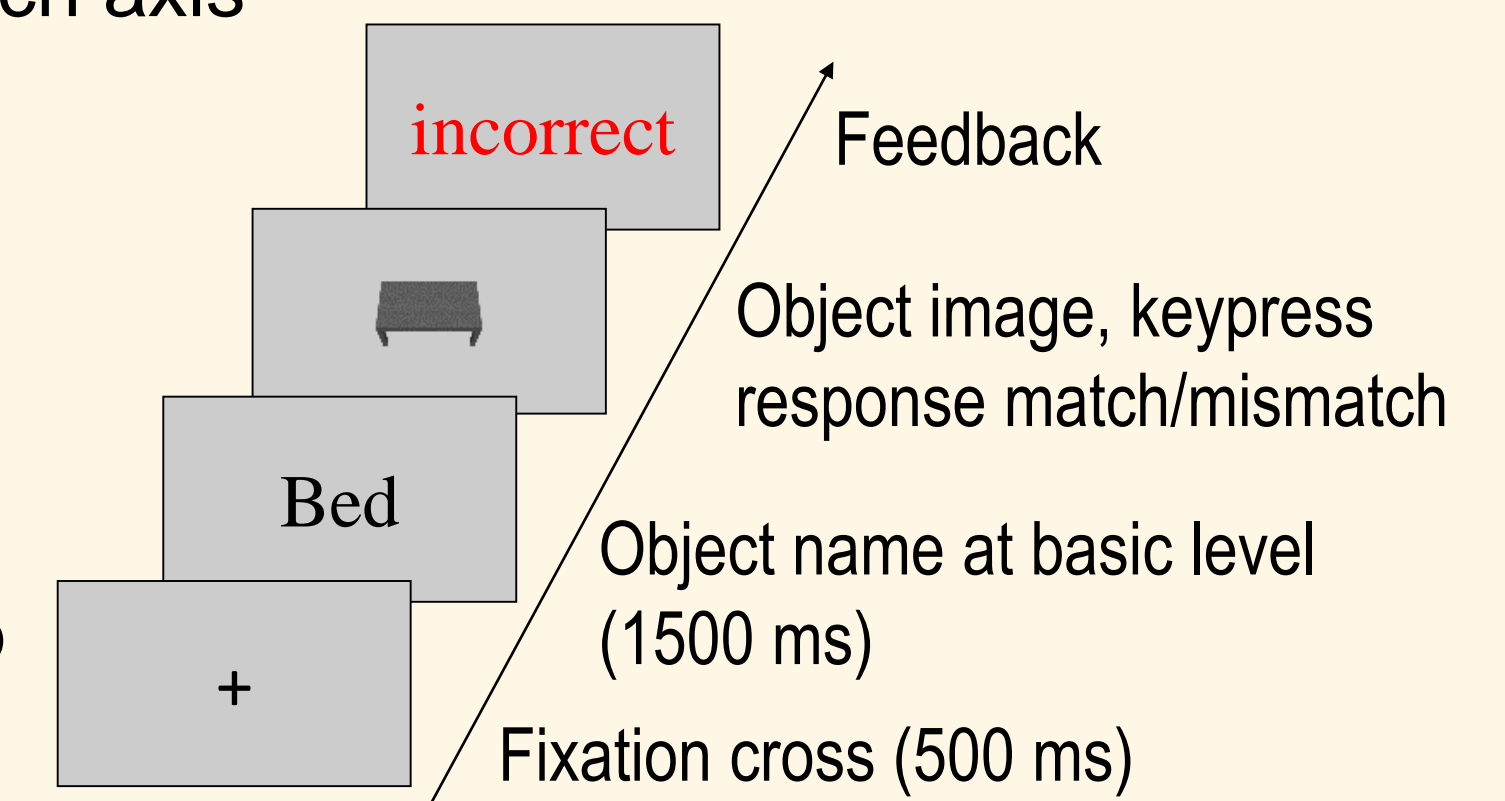
Experiment 1 (N=24): 100 3D models of objects rotated around pitch axis



Experiment 1a



Experiment 1b

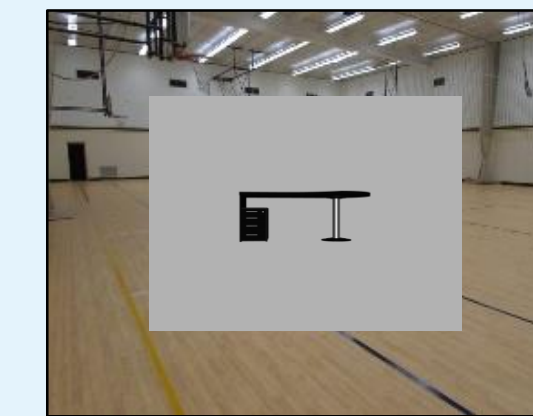


Experiment 2 (N=32): 156 3D models of objects, **canonical** (0°) and **non-canonical** (120°) viewpoints, consistent and inconsistent backgrounds

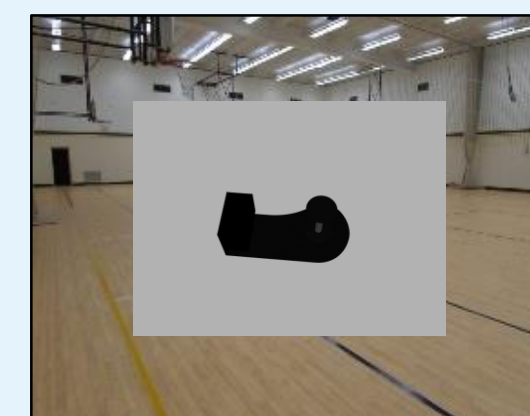
Canonical (0°) x consistent



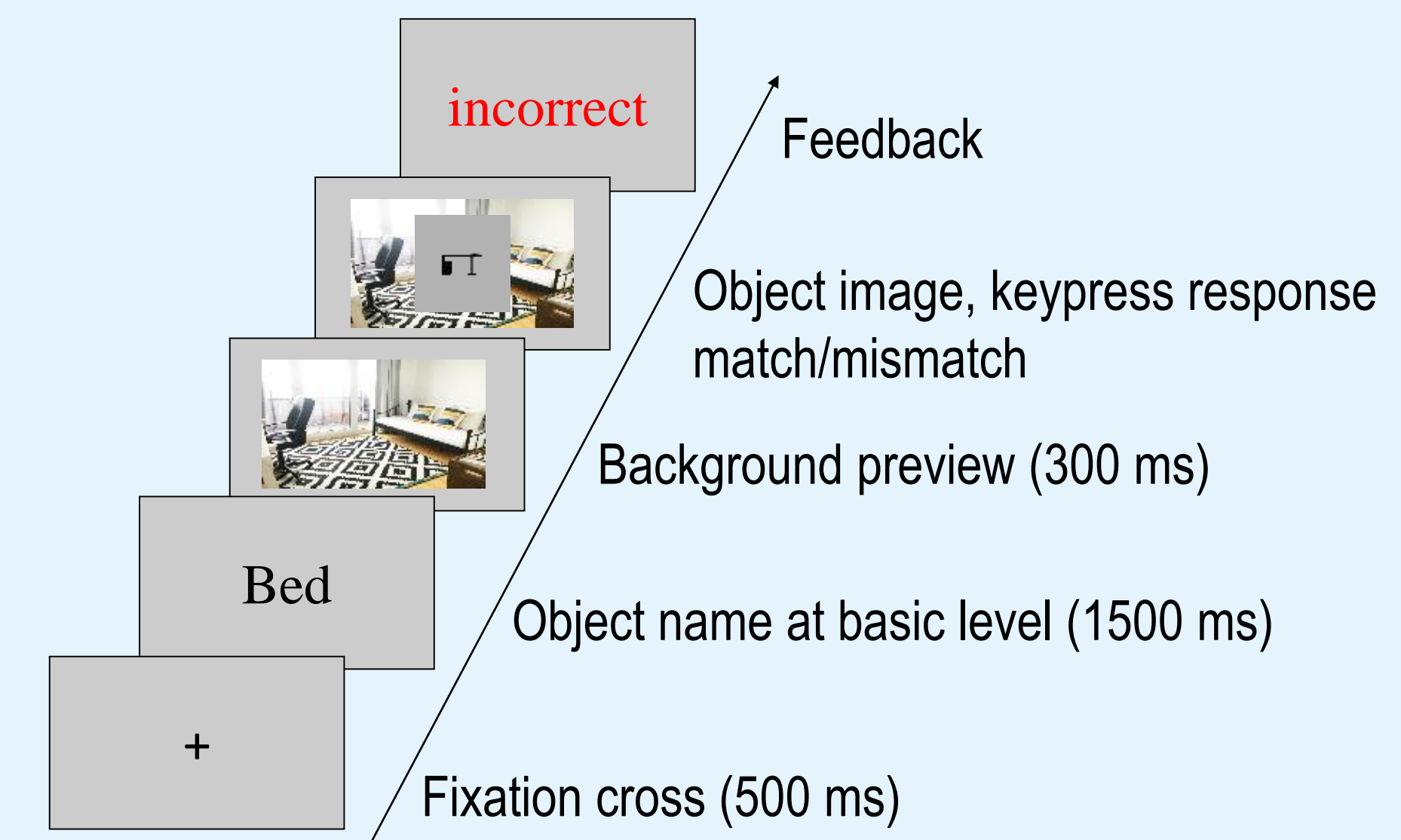
Canonical (0°) x inconsistent



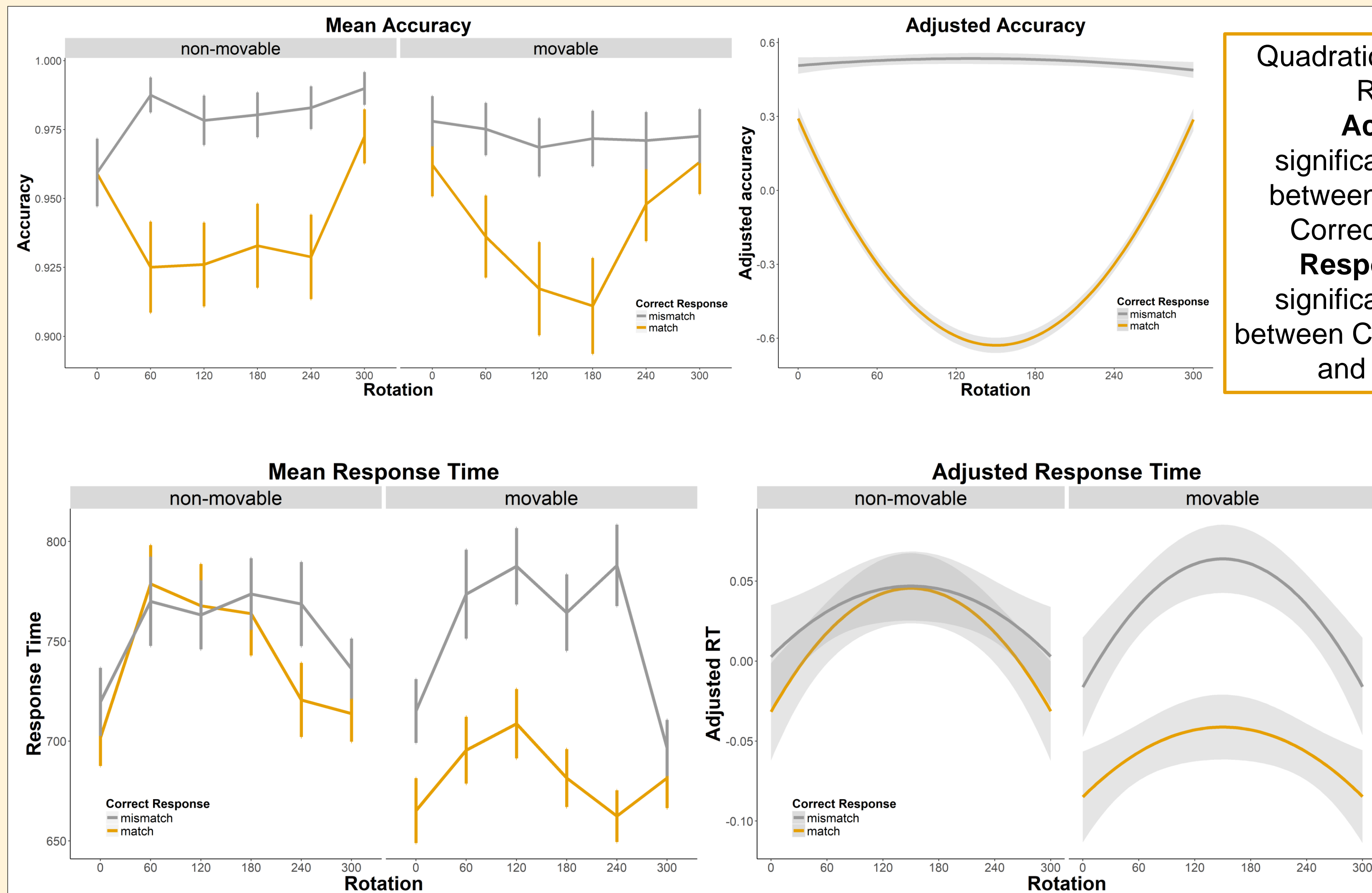
Non-canonical (120°) x inconsistent



Non-canonical (120°) x consistent

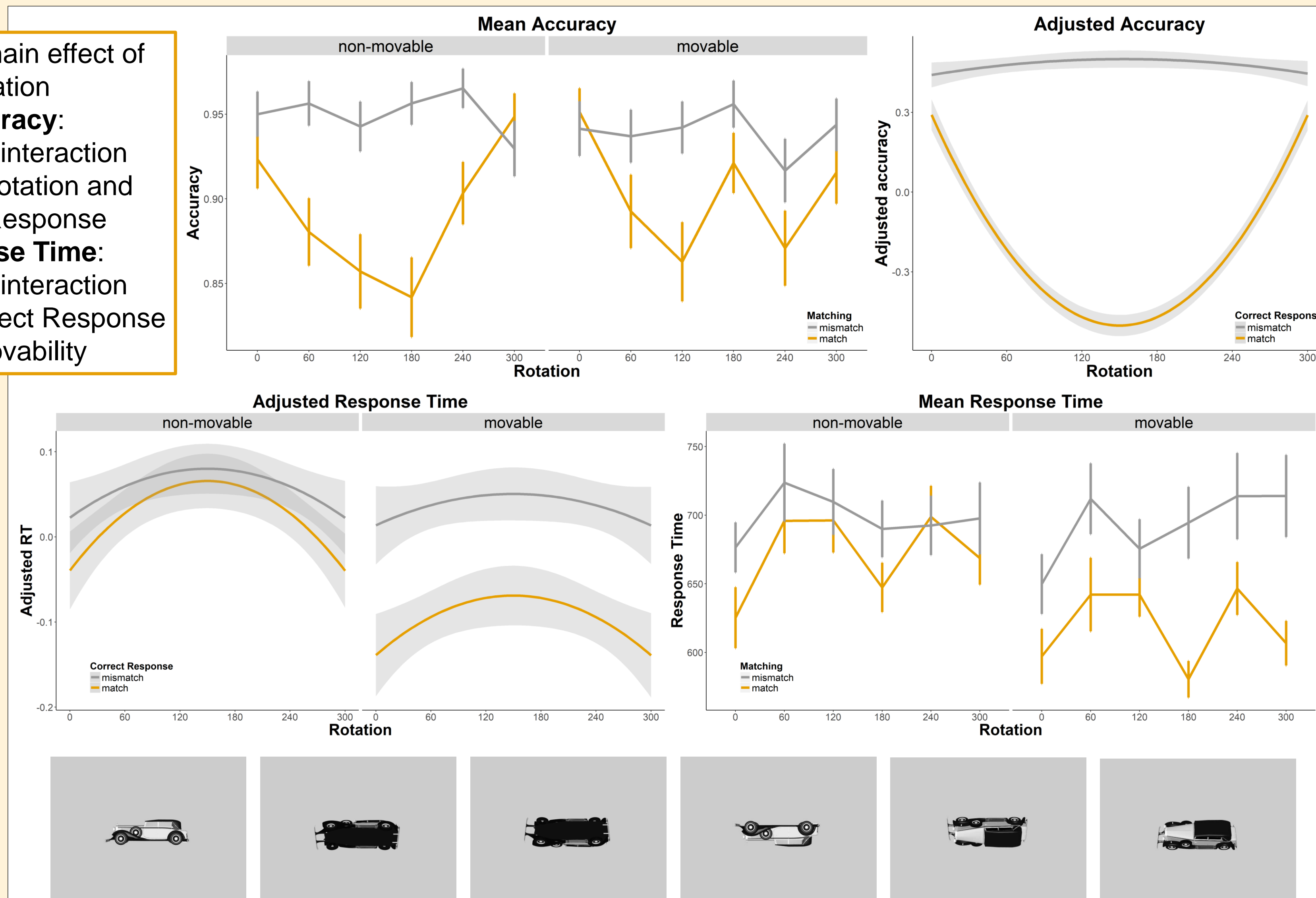


RESULTS: EXPERIMENT 1A

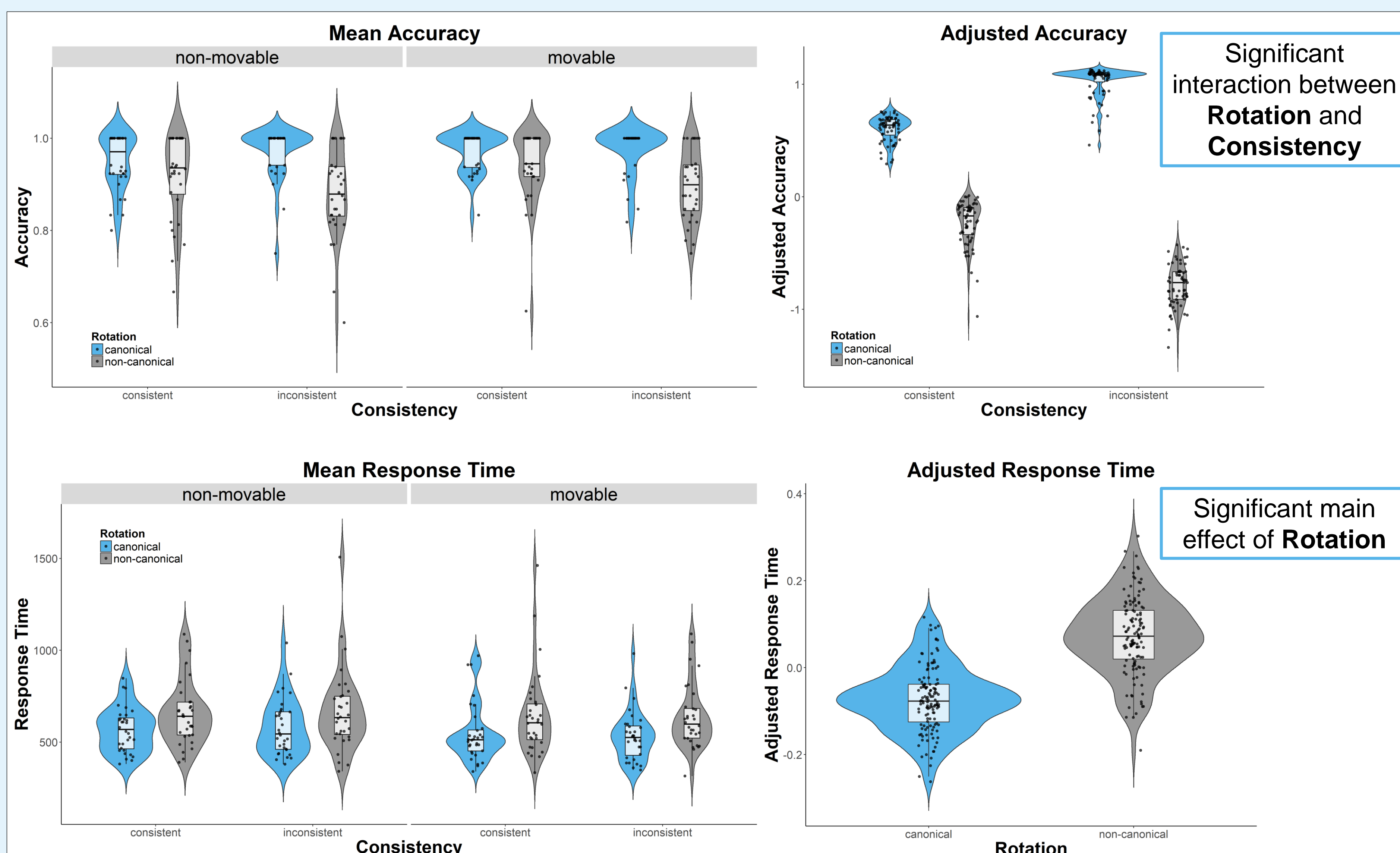


Quadratic main effect of Rotation
Accuracy: significant interaction between Rotation and Correct Response
Response Time: significant interaction between Correct Response and Movability

RESULTS: EXPERIMENT 1B



RESULTS: EXPERIMENT 2



DISCUSSION

- ➔ Two subsystems: a view-based system that works more efficiently for matching and is viewpoint-dependent and a gist-driven system that works more efficiently for mismatching and is viewpoint invariant.
- ➔ “Recovery” at 180° for movable objects: switch from view-based system to more gist-based system. Only for movable objects because they are more likely to be seen upside-down before.

CONCLUSION

Recognition of depth rotated objects around the pitch axis is viewpoint-dependent and generally faster for movable objects but context in the form of consistent backgrounds can modulate this effect, increasing accuracy for non-canonical viewpoints.

REFERENCES AND ACKNOWLEDGEMENTS

Hamm, J. P., & McMullen, P. A. (1998). Effects of orientation on the identification of rotated objects depend on the level of identity. *Journal of Experimental Psychology: Human Perception and Performance*, 24(2), 413.

This work was supported by DFG grant VO 1683/2-1 and by SFB/TRR 26 135 project C7 to MLV

Download Poster:

