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Introduction

- Studies found that switching from an egocentric to an altercentric perspective is effortful. The explanation for this cost is that an egocentric perspective is automatic and thus requires a control mechanism to inhibit the egocentric knowledge before a new representation is generated (Bradford, Jentsch, & Gomez, 2015; Ferguson, Apperly, & Cane, 2017).
- Perspective switching in the visual spatial domain was studied so far only on level 1 perspective taking tasks (e.g., Ferguson et al., 2017; Samuel, Roehr-Brackin, Jelbert, & Clayton, 2018), and not on level 2 tasks.
- Level 1 tasks involve judging *what* a person can see from his viewpoint, while level 2 tasks involve judging *how* a point of view is seen from an imagined perspective. Level 2 commonly requires more body schema strategies for a solution (Surtees, Apperly, & Samson, 2013).
- The studies that explored perspective switching did not examine sex differences.
- Women were found to be more “emphasizers” in level 2 visual-spatial perspective taking (VSPT) tasks, namely, to implement more body schema strategies. Men, in contrast, were found to be more “systemizers”, thus solving VSPT tasks by implementing analytic strategies (Kessler & Wang, 2012).
- Therefore, we examined perspective switching using a level 2 VSPT task, *the DPT* (dots perspective task; see Geva & Henik, under review).
- We postulated that women would implement a more “body schema” strategy than men, thus having more switching costs, since switching requires changes in bodily representations.

Method

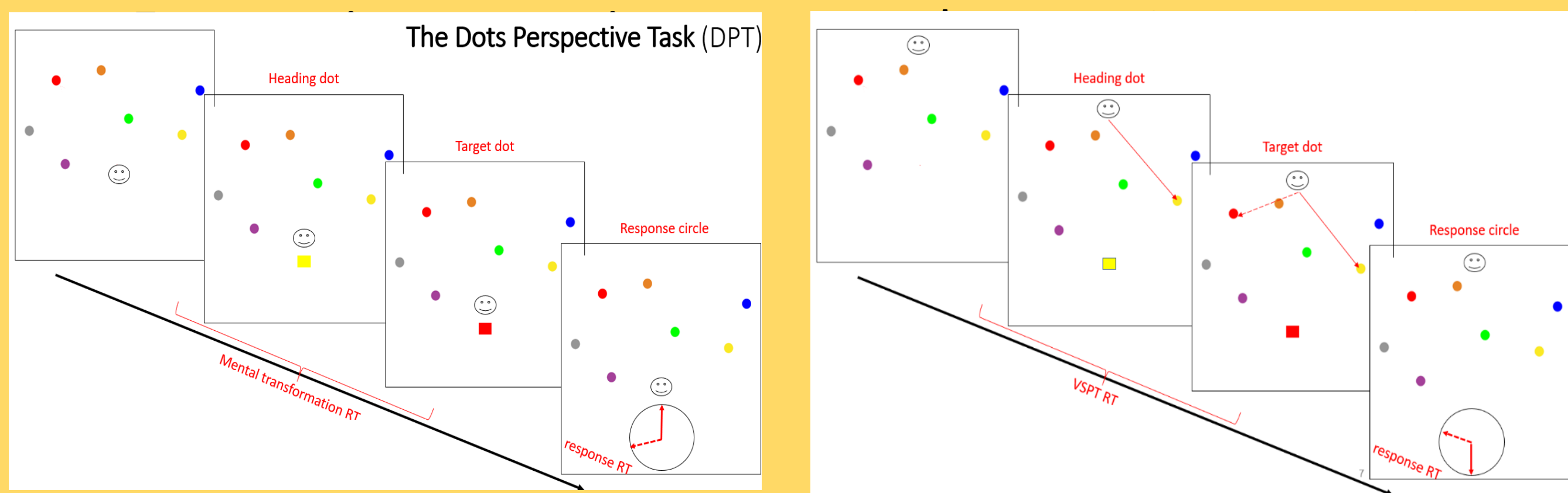


Figure 1. A schematic description of a trial in the DPT (see Geva & Henik's, under review). In each trial, participants are required to imagine they are located in the smiley face position (first screen), to imagine they are heading to the dot whose color is in the square below (second screen). Then, they are asked to estimate the direction to another dot, whose color is in the square below (third screen). Finally, the response board appears and participants are asked to move a dynamic line, using the computer-mouse, to enter the estimated angle. Participants are asked to press the space bar after each phase to move to the next screen.

Design

2x2x2: **Perspective** (egocentric / altercentric), **Sequence** (stick / switch), **Gender** (men (N=21), women (N=25)).

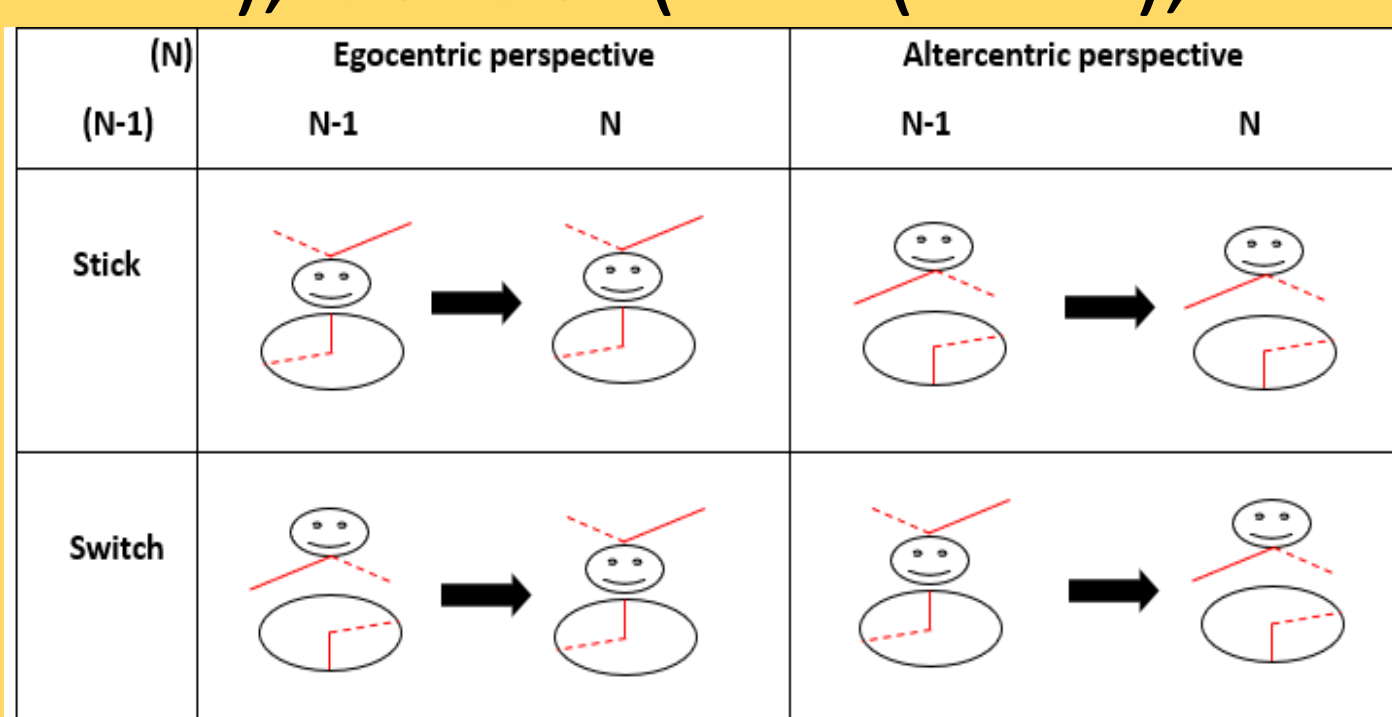


Figure 2. A schematic description of the task's four conditions. The rows represent the sequence variable (stick/switch) and the columns represent the perspective variable (N trial: egocentric/altercentric).

References

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Results

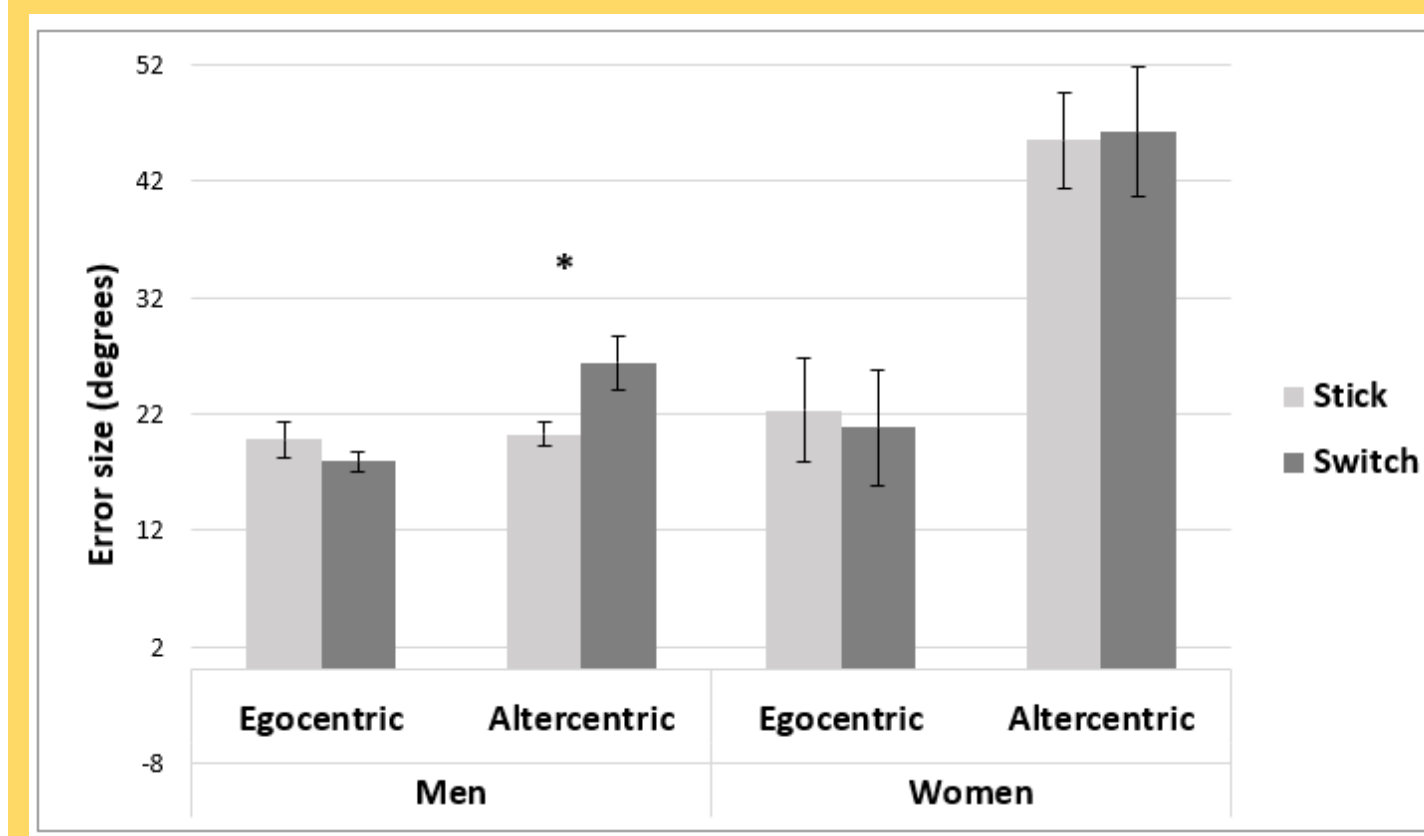


Figure 3. Error size (absolute disparity between direction and estimation) as a function of perspective and sequence.

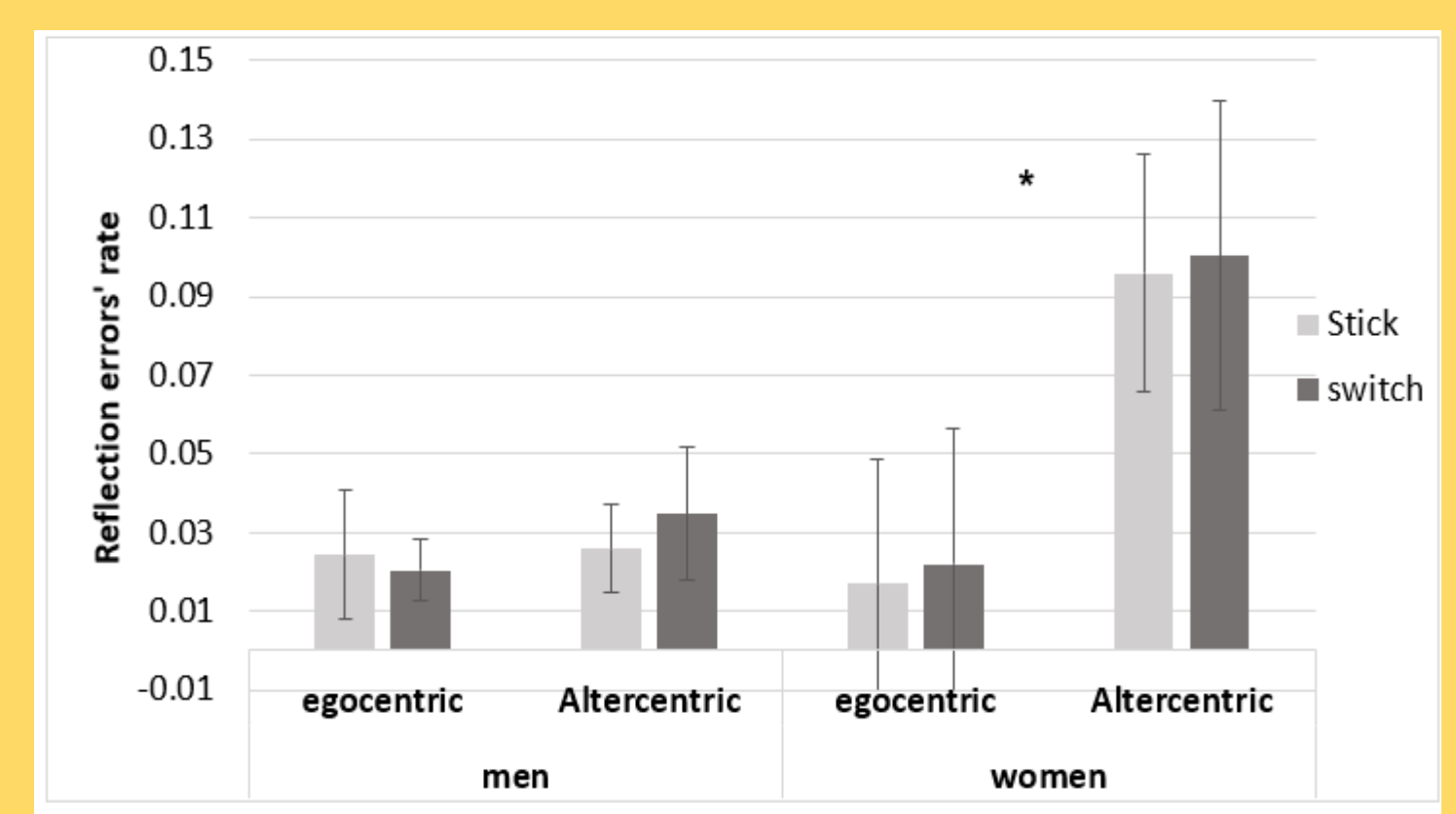


Figure 4. Reflection errors rate (rate of trials with mistakes between right and left) as a function of perspective and sequence.

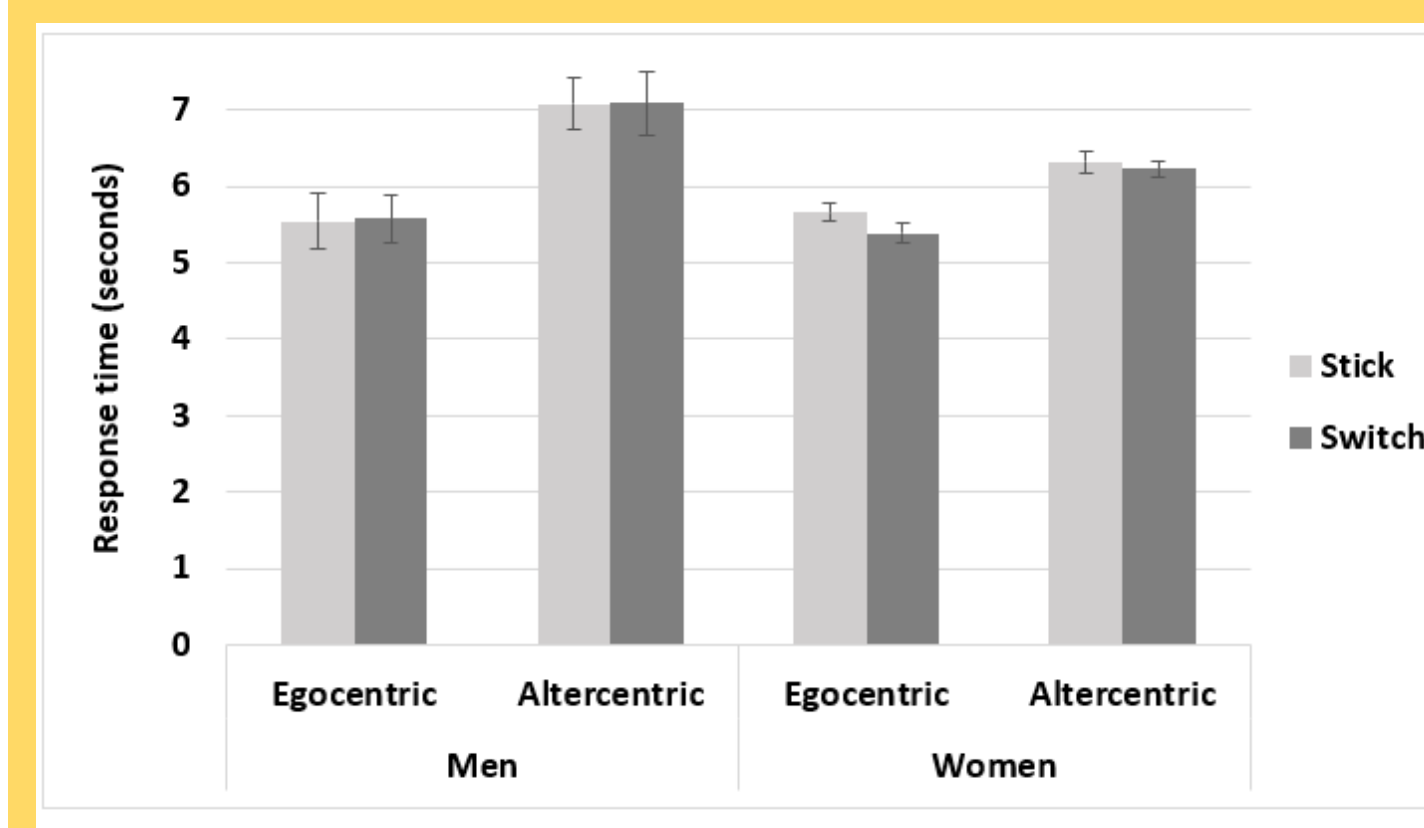


Figure 5. Mental transformation RT (time to imagine the perspective and the direction to the target) as a function of perspective and sequence.

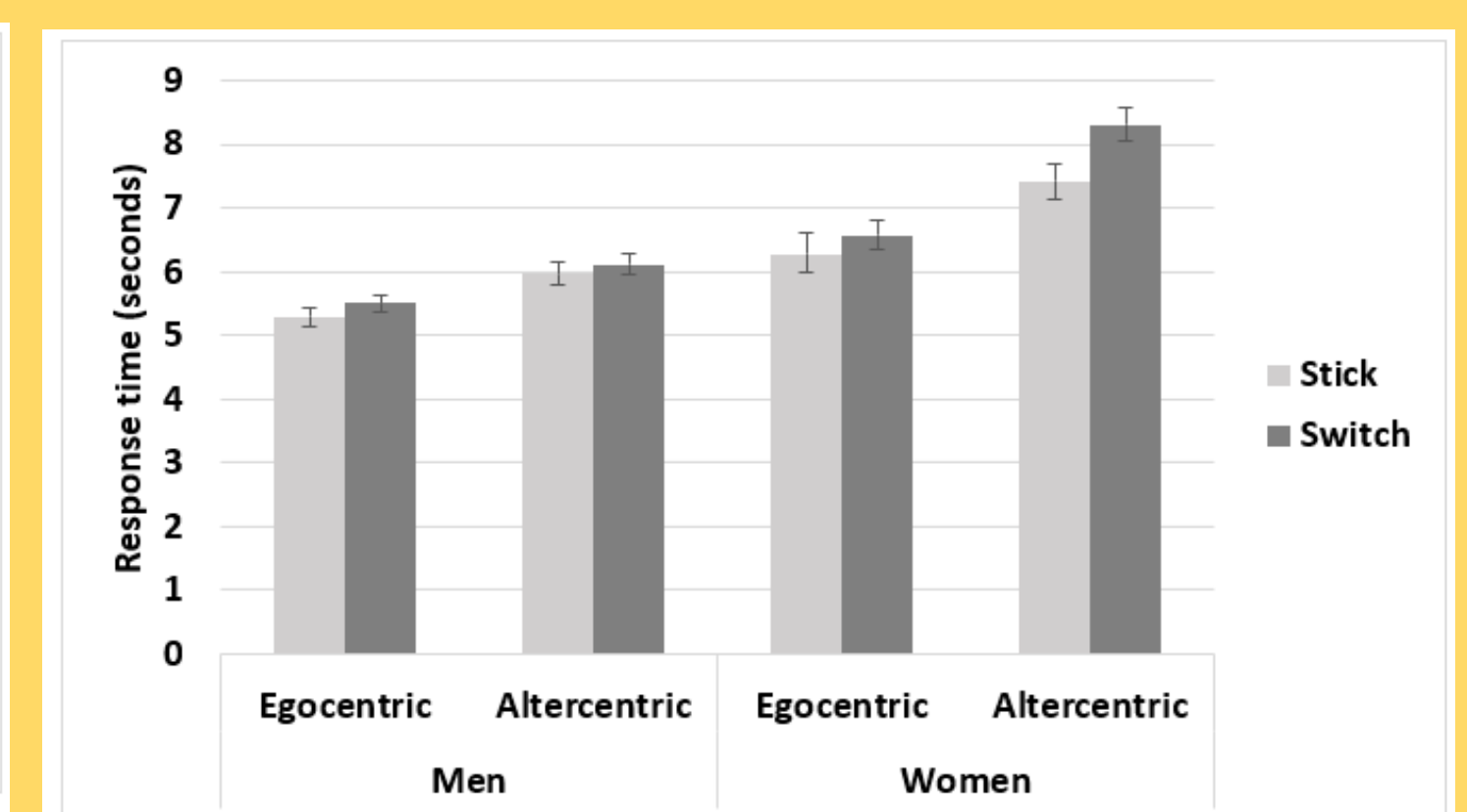


Figure 6. Response RT (time to tap the answer in the response circle) as a function of perspective and sequence.

Discussion

- Reflection errors indicate implementation of a VSPT strategy, a strategy that involves body schema (see Kozhevnikov & Hegarty, 2001). Thus, women (unlike men) were found to implement a VSPT strategy in the altercentric condition.
- In general, women were less accurate than men in the altercentric perspective.
- In the egocentric perspective, which was previously attributed to mental rotation strategy (see Geva & Henik, under review), no sex differences were found.
- A switching cost was found in RT both for switching from an egocentric to an altercentric perspective, and vice versa.
- A switching cost was found in response RT but not in mental transformation RT.
- We found a switching cost in accuracy (i.e., error size) for men but not for women, and only when switching from an egocentric to an altercentric perspective.

Conclusions

- Perspective switching was found to be an effortful process that affects judgement, but not mentalization processes, in level 2 VSPT.
- Both egocentric and altercentric perspectives require inhibition in VSPT (Samuel, Roehr-Brackin, Jelbert, & Clayton, 2019).
- Men were found to outperform women in a level 2 VSPT task.
- Women were indeed found to be more “emphasizers”, that is, to implement more body schema strategies, which may be less efficient in VSPT tasks.
- Many studies previously showed that men outperform women in mental rotation tests (e.g., Hegarty, 2018). Our findings may question that conception.
- Men, unlike women, were found to be less accurate when switching from an egocentric to an altercentric perspective.