



No Evidence for Egocentric Bias on an Explicit False Belief Task in Adults: a Mouse Tracking Paradigm

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Background

- Theories of belief processing typically claim that **processing another's false belief involves inhibiting a bias towards one's own, salient true belief** (e.g., Sommerville et al., 2013; Wang & Leslie, 2016; Rubio-Fernandez, 2017).
- But **attempts to measure egocentric bias in adults during the false belief task (FBT) have produced inconclusive results** (e.g., compare: Sommerville et al., 2013 vs. Samuel et al., 2018; Birch & Bloom, 2007 vs. Ryskin & Brown-Schmidt, 2014; Wang & Leslie, 2016 vs. Rubio-Fernandez, 2017).
- Mouse tracking (MT) offers a novel method for measuring egocentric bias in adults on the FBT.
- **MT offers "spatial" measures of the degree of attraction to an incorrect response option** during the decision making process (PL, AUC, MD), as well as temporal measures (RT).

Design & Methods

- Participants (n = 76, mean age = 27 years, 24 males) viewed short video scenarios in which an object is hidden, and an agent either has a **true belief (TB)** or a **false belief (FB)** as to its location:



Keys hidden in **BLUE** cup



Agent leaves the scene



Either: agent returns and sees keys moved to **RED** cup (TB); or keys moved in her absence to **RED** cup, then she returns (FB).



- At the end of each video, participants answer a question, selecting from two possible responses, which are always **RED** or **BLUE**.
- Question types:

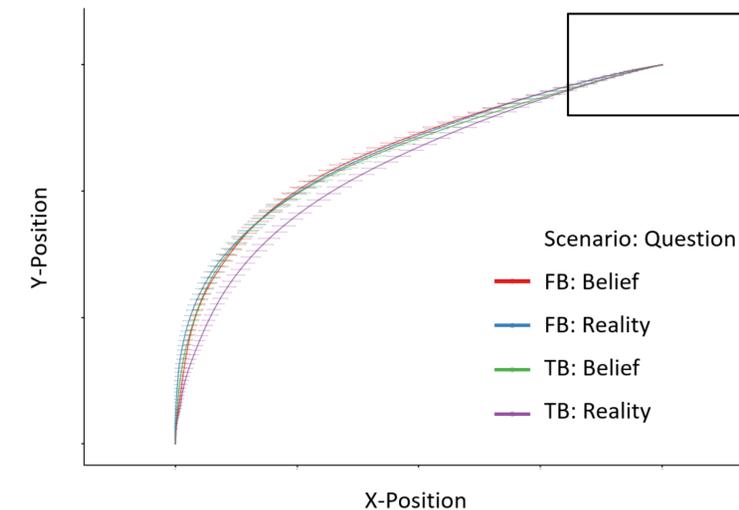
Belief: "Where does she think the keys are?" (16 per scenario)
Reality: "Where are the keys currently hidden?" (16 per scenario)
 Filler: e.g., "Which cup is nearest to him?" (32 per scenario)

- Accuracy, temporal measures (IT, RT) and spatial measures (AUC, MD, PL) recorded for each trial.
- Individual trials removed if: incorrect response; or movement initiation > 1s; or +/- 3 SD of participant mean on any measure.

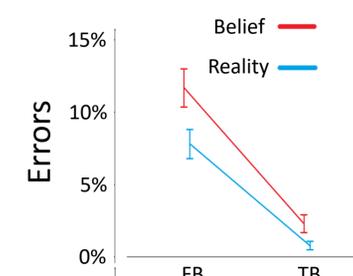
Results & Discussion

- Did **not** find any evidence of egocentric bias (see right).
- In line with other studies (e.g., Back & Apperly, 2010), main effect of question on RT suggests participants were inferring beliefs in response to the question probes.
- But MT measures of attraction suggest this belief inference process in general, whether on FB- or TB- scenarios, involves resolving competition between possible belief contents (where relevant alternatives exist).

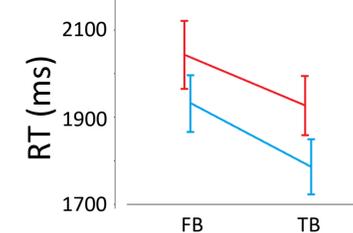
Mean trajectories per experimental condition



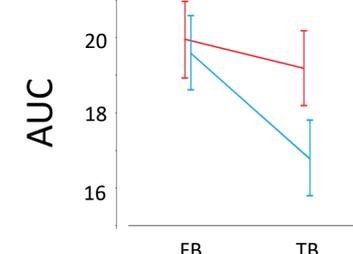
No evidence for predicted interaction on any measure:



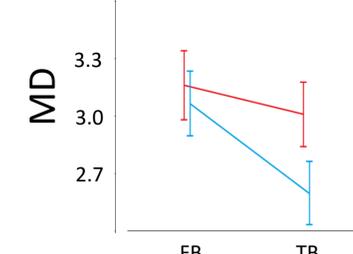
Errors: Main effect of Question (F (1,75) = 13.7, p < .001) and Scenario (F (1,75) = 83.6, p < .001) but no interaction (F (1,75) = 2.3, p = .13).



RT: Main effect of Question (F (1,75) = 45.4, p < .001) and Scenario (F (1,75) = 57.9, p < .001) but no interaction (F (1,75) = 0.8, p = .39).



AUC: Main effects of Question (F (1,75) = 6.6, p = .012) and Scenario (F (1,75) = 19.1, p < .001) and an interaction (F (1,75) = 5.3, p = .024), but **not** in predicted direction. Effect of question present in TB-, but not FB-, scenarios.



MD: Main effects of Question (F (1,75) = 7.2, p = .007) and Scenario (F (1,75) = 16.0, p < .001) and an interaction (F (1,75) = 4.5, p = .038), but as with AUC the interaction was **not** in the predicted direction.

Predicted Results (pre-registered)

- For FB scenarios, the incorrect response on the belief question reflects the participant's true belief. If there is an egocentric bias towards one's own true belief, then we predict an attraction to the incorrect response on those trials.
- This is **not the case for belief questions for TB scenarios. Neither is it the case for reality questions** for either scenario.
- Therefore predict **greater attraction to the incorrect response**, as measured by PL, MD and AUC, **for belief questions, relative to reality questions, specifically on FB scenarios:** a 2 x 2 interaction (scenario x question) on a repeated measures ANOVA.



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