Minds in motion: Inferring mental states from observed kinematics

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INTRODUCTION

- When interacting with other people, humans must infer other's **mental states**.
- Beyond verbal reports or static expressions, how else might humans do this?
- During social interactions, other people rarely remain still – their movements vary in ***type*** (e.g., endogenous vs. exogenous) and in ***speed*** (e.g., rapid vs slow).
- These kinematic cues may reliably signal mental states like intentionality.
- We ask: **Do observers use others' kinematic cues to infer their mental states?**

METHOD

- Four actors were filmed turning their heads **endogenously** and **exogenously**. (Fig. 1)
- Head **turn *speed*** was manipulated by interpolating video frame counts with a deep-learning algorithm (Huang et al., 2020), then mapping frame counts to precise speeds (50°/s, 120°/s, 180°/s, 240°/s, 360°s/).
- Head **turn *type*** was altered by having actors turn in response to a loud noise (exogenous) or by deciding to turn to the left or the right (exogenous).
- N = 100 participants from Prolific watched 10 head turn videos, then reported whether the turn seemed to be internally or externally generated.

A

B

Figure 1. Two actors turning their heads. (A) an **exogenous** turn at 240 degrees per second. (B) an **endogenous** turn at 360 degrees per second.

RESULTS

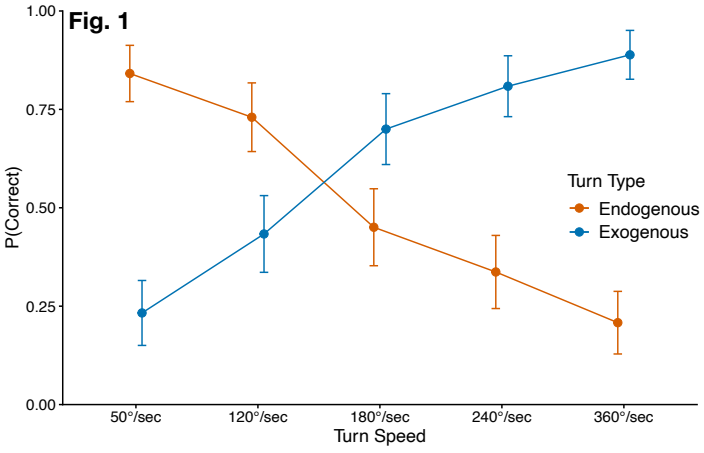

Figure 1. *Accuracy* across *turn type* and *turn speed*. A cluster-robust log. regression revealed a sig. interaction: χ^2 (4) = 115.98, p < .001. All pairwise, Tukey-adjusted simple effects were significant at p < .001. Values are plotted on the probability scale; (P(Correct = 1).

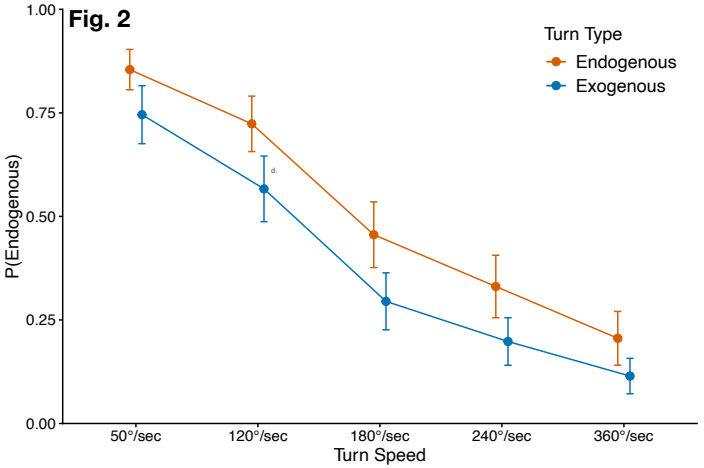

Figure 2. *Response bias* across *turn type* and *turn speed*. A cluster-robust log. regression revealed main effects of *type*, χ^2 (1) = 29.72, p < .001, and *speed*, χ^2 (4) = 111.21, p < .001. All Tukey-adjusted contrasts, were significant (p < .001), except within and between *turn types* at 240°/sec and 360°/sec. Values are plotted on the probability scale; (P(Endo = 1).

CONCLUSIONS

- Humans have **strong intuitions** about the kinematics that underlie others' intent.
- When *speed* is misaligned with intuitions, **performance markedly decreases**.
- *Speed* linearly biases *turn type* responses; ***speed* strongly signals mental states**.
- ***What's next?*** Do other people's (un)intentional head turns bias attention allocation?