

Gaze aversions act as social signals conveying the performer's cognitive state

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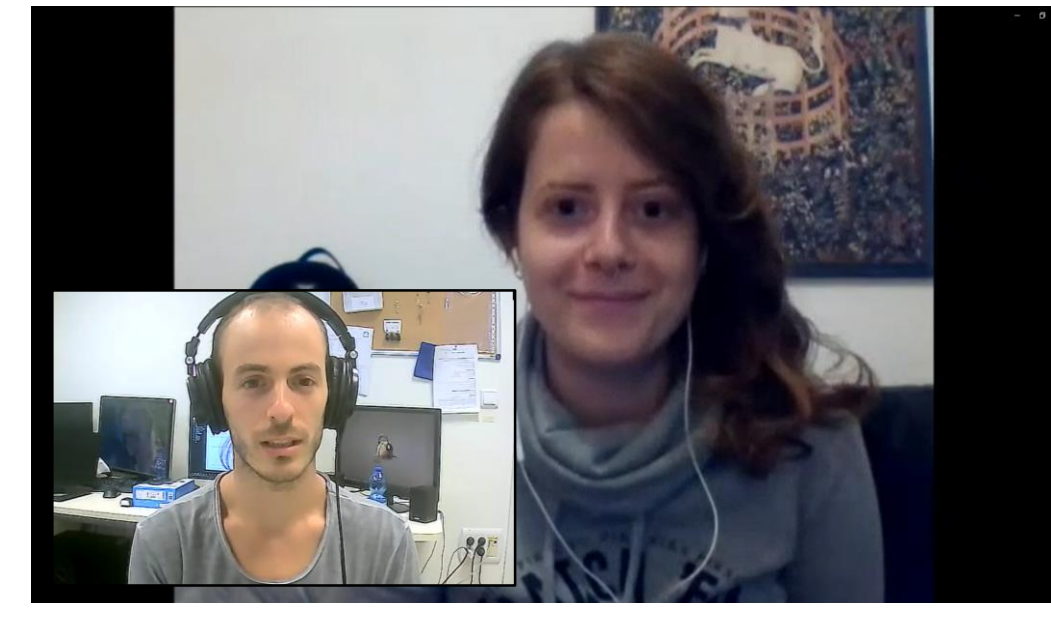
Background

- During conversations, people often avert their gaze at certain moments of the interaction, especially while they are engaged in effortful thinking [1].
- Previous studies explained this **gaze aversion (GA)** behavior as an attentional avoidance mechanism, which is sensitive to the physical attributes of the visual distraction [2] and to cognitive load [1].
- Here we hypothesize that GAs serve as social signals, conveying to conversation partners that performers are currently engaged in cognitive processing, relevant to the conversation.

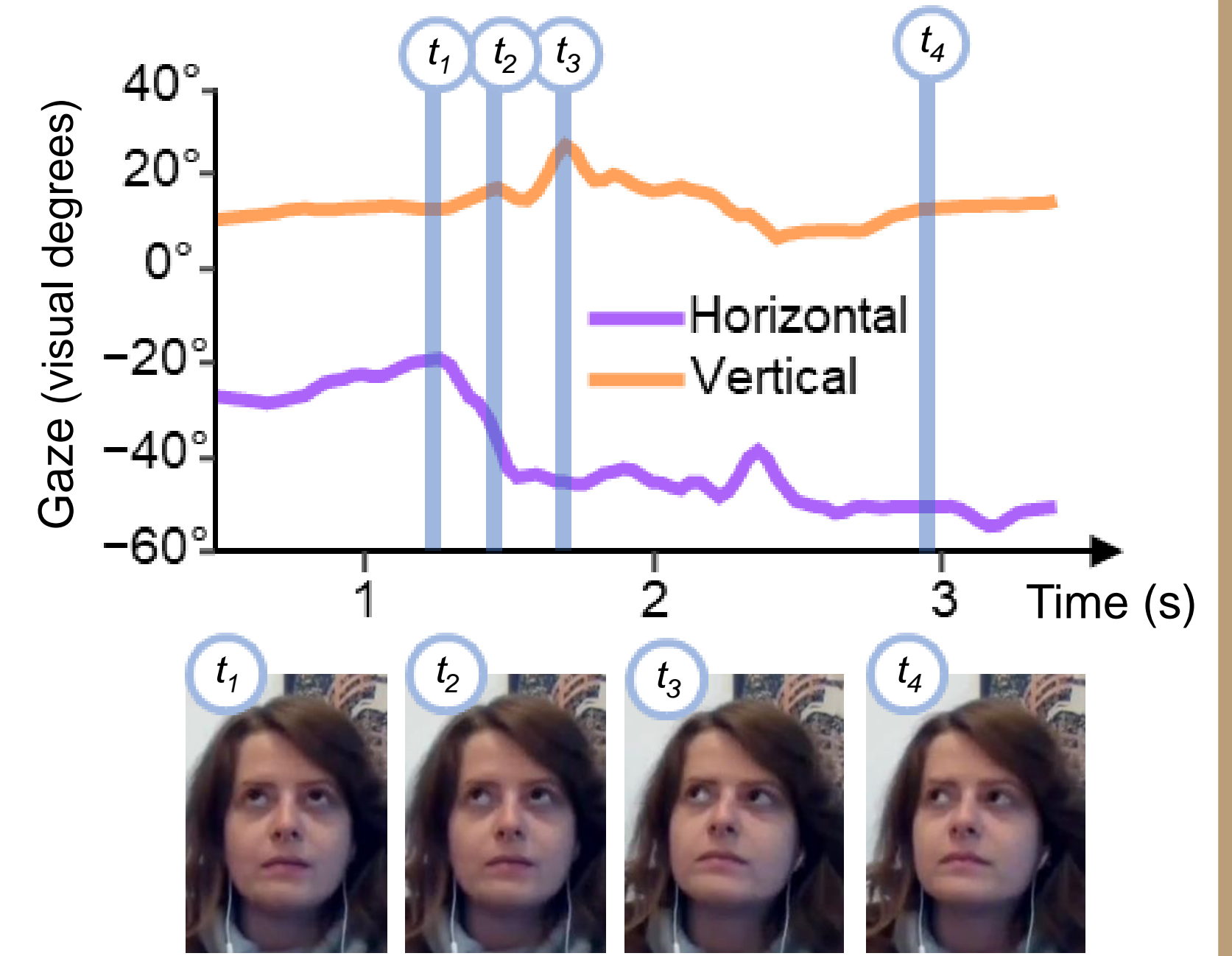
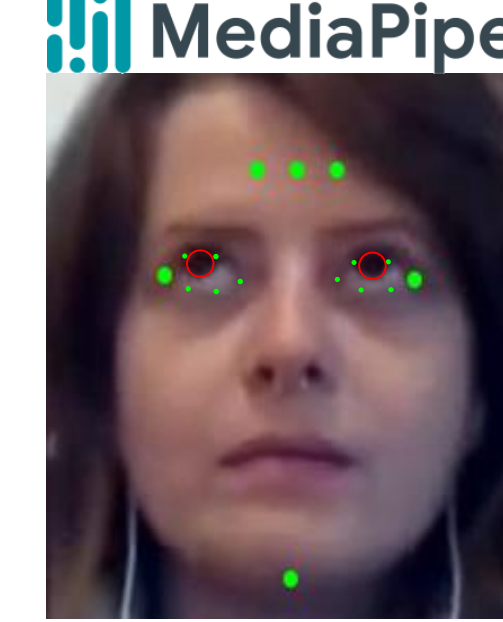


Videos collection & Eye-tracking

- Interviewees via Zoom were asked to solve arithmetic questions and alternately tap their feet.

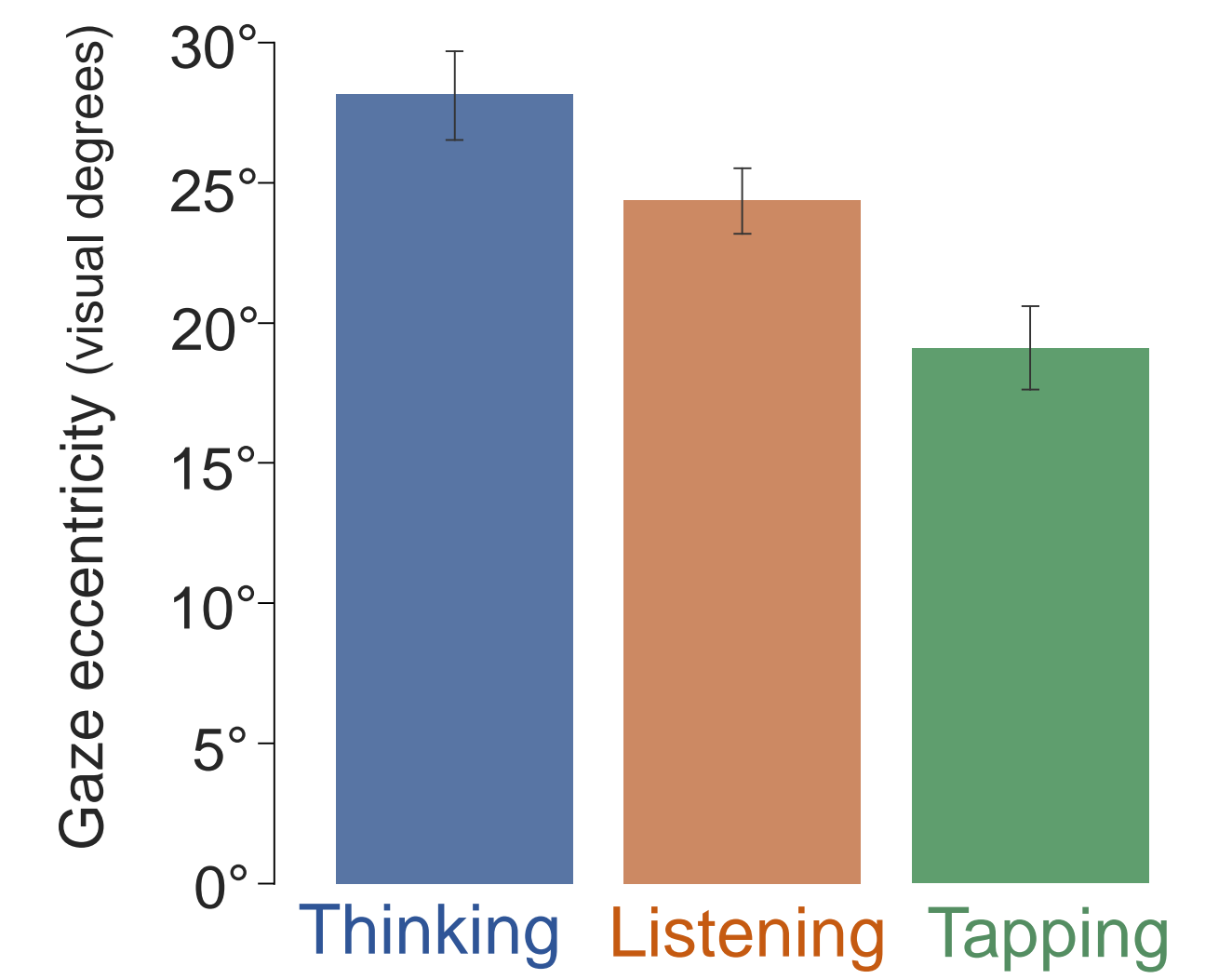


- A utilization of MediaPipe [3] tool for face and iris detection was used to extract 3D head-direction and 2D gaze direction for each video



- Recordings were trimmed into short (5 s) muted videos, in which interviewees were either:
 - Listening to a question,
 - Thinking of an answer, or
 - Tapping their feet (control)

- Analysis of these videos confirmed that participants performed more GAs while they were thinking relative to listening or tapping.



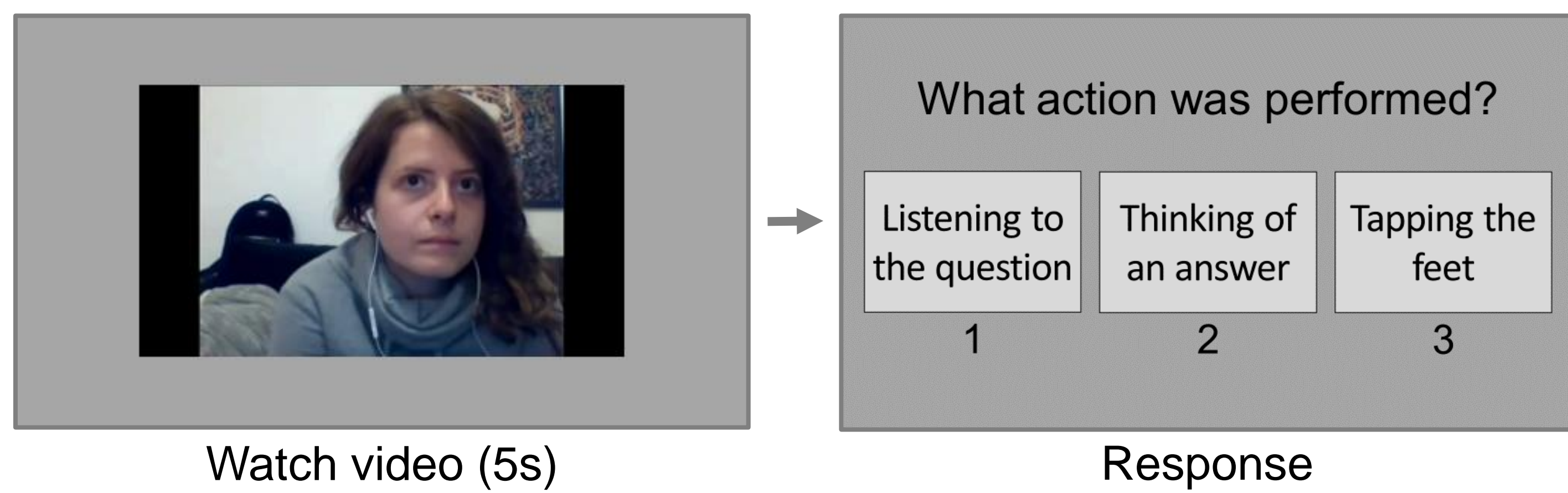
Research question

Do GAs serve as a **social signal**, conveying to observers information regarding the performer's mental state?

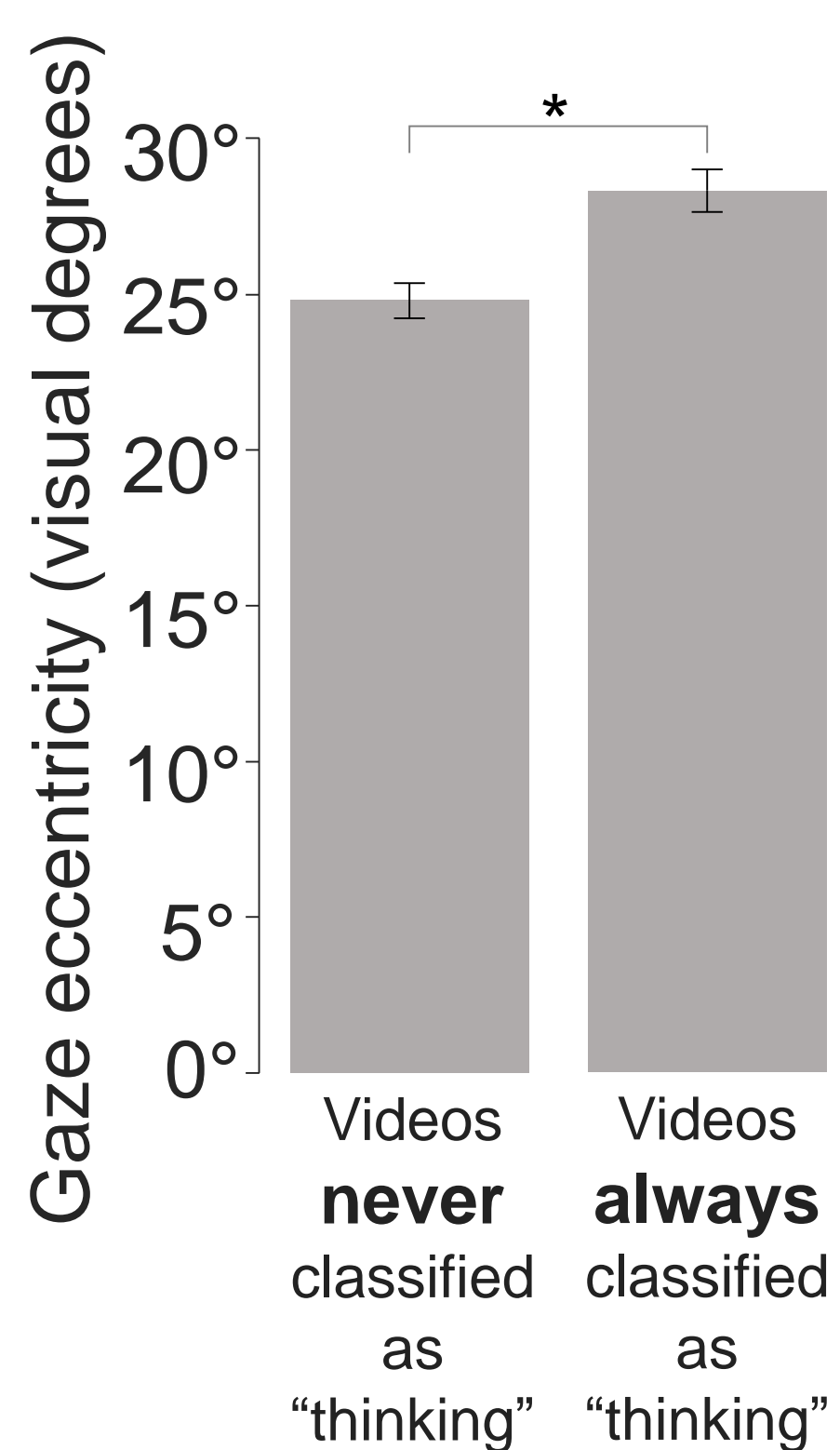
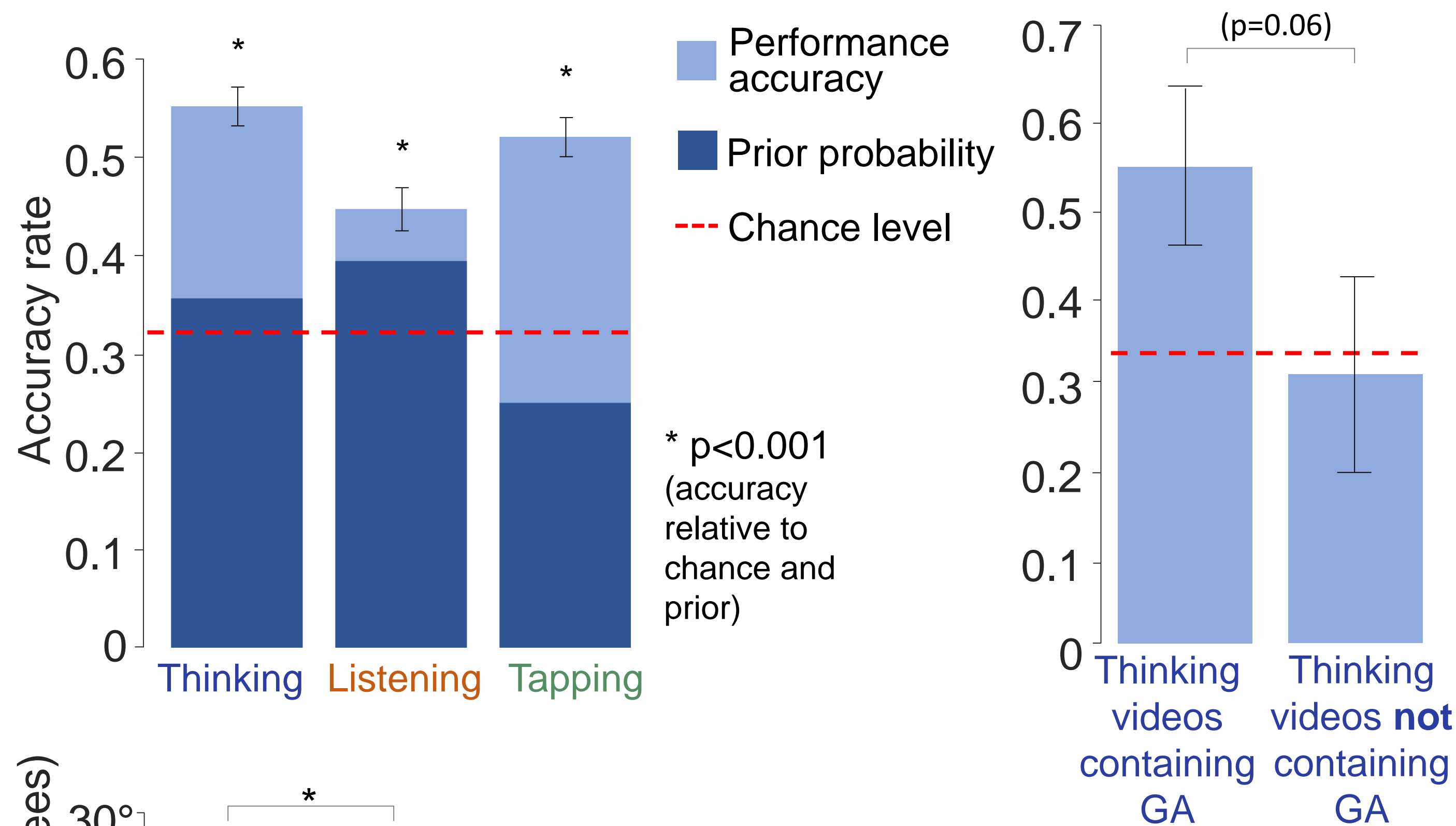
Experiment 1

Methods

- Participants (N=40) watched videos of individuals listening, thinking, or tapping and were requested to indicate what the depicted individuals are doing



Results



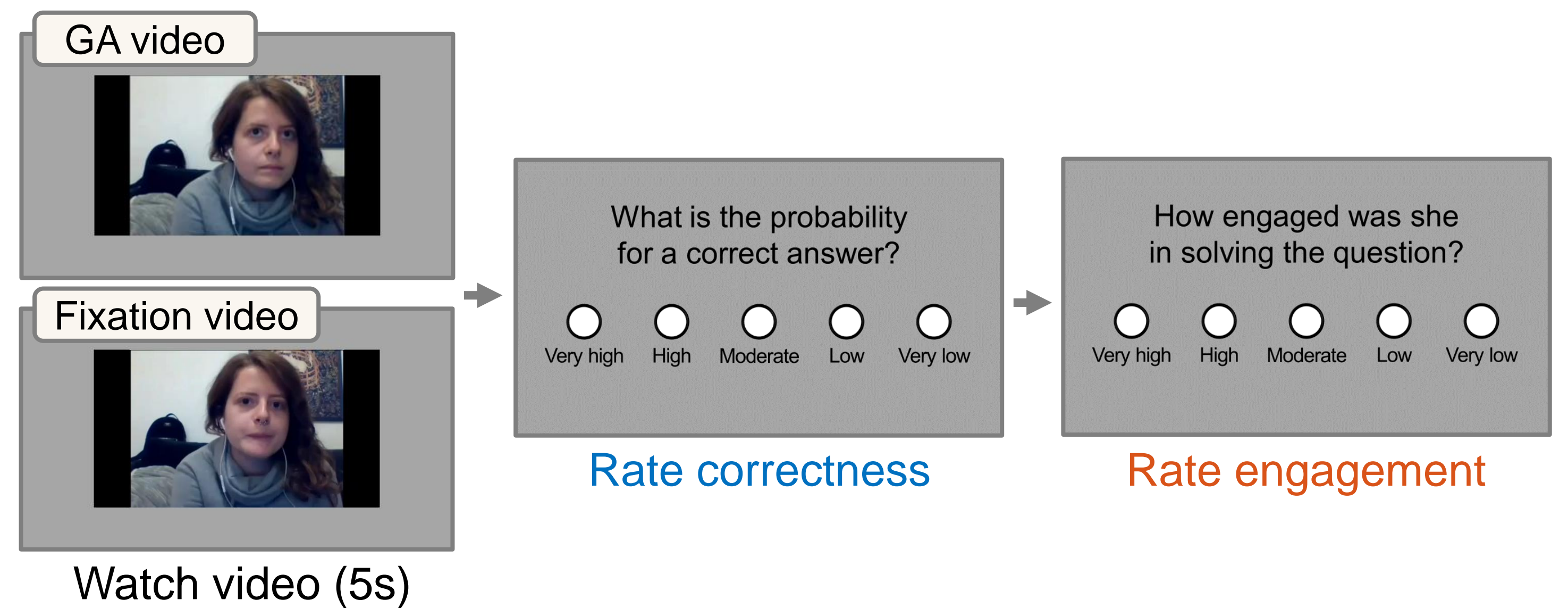
- For all three types of actions, accuracy rates were higher than chance and higher than the prior probability for choosing each action.
- The presence of GAs increased the chance of identifying "thinking" videos correctly.
- Gaze eccentricity was higher in videos classified as "thinking"

* p<0.001

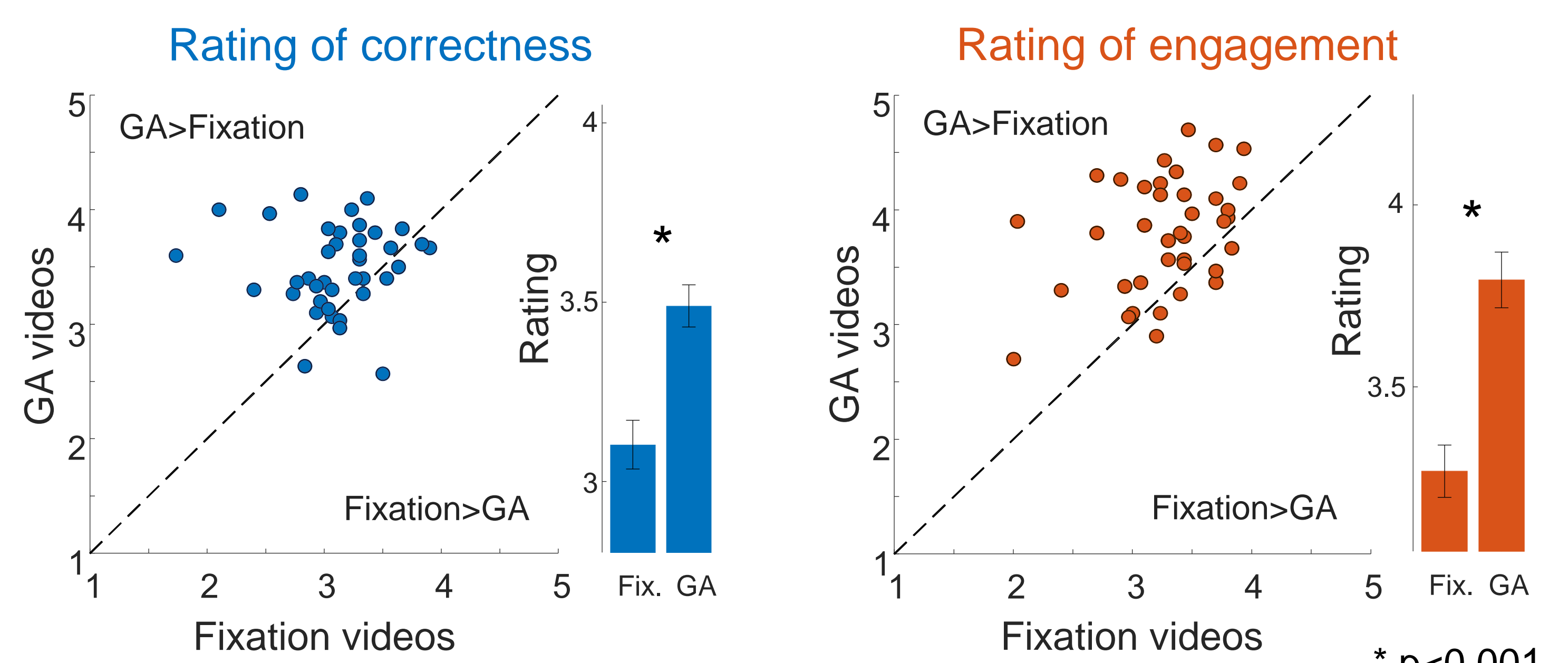
Experiment 2

Methods

- 60 "thinking" videos: 30 with GA and 30 without GA (fixation videos)
- Participants (N=40) watched the videos and rated the probability for a correct response and the level of engagement of the depicted individual.



Results



- Individuals depicted in GA videos were rated as more engaged and more likely to provide a correct response, than those in fixation videos.

Conclusions

- Cognitive state can be interpreted based on visual signals
- Gaze aversions serve as social cues conveying to observers information about mental processing of the performers.

References

- [1] Glenberg, A. M., Schroeder, J. L., & Robertson, D. A. (1998). Averting the gaze disengages the environment and facilitates remembering. *Memory & cognition*.
- [2] Abeles, D., & Yuval-Greenberg, S. (2017). Just look away: Gaze aversions as an overt attentional disengagement mechanism. *Cognition*, 168, 99-109.
- [3] Ablavatski, A., Vakunov, A., Grishchenko, I., Raveendran, K., & Zhdanovich, M. (2020). Real-time Pupil Tracking from Monocular Video for Digital Puppetry. *arXiv preprint arXiv:2006.11341*.