ENTWICKLUNGS-
NEUROPSYCHOLOGIE
Ruhr-Universität Bochum

Viability of webcam-based online eye tracking

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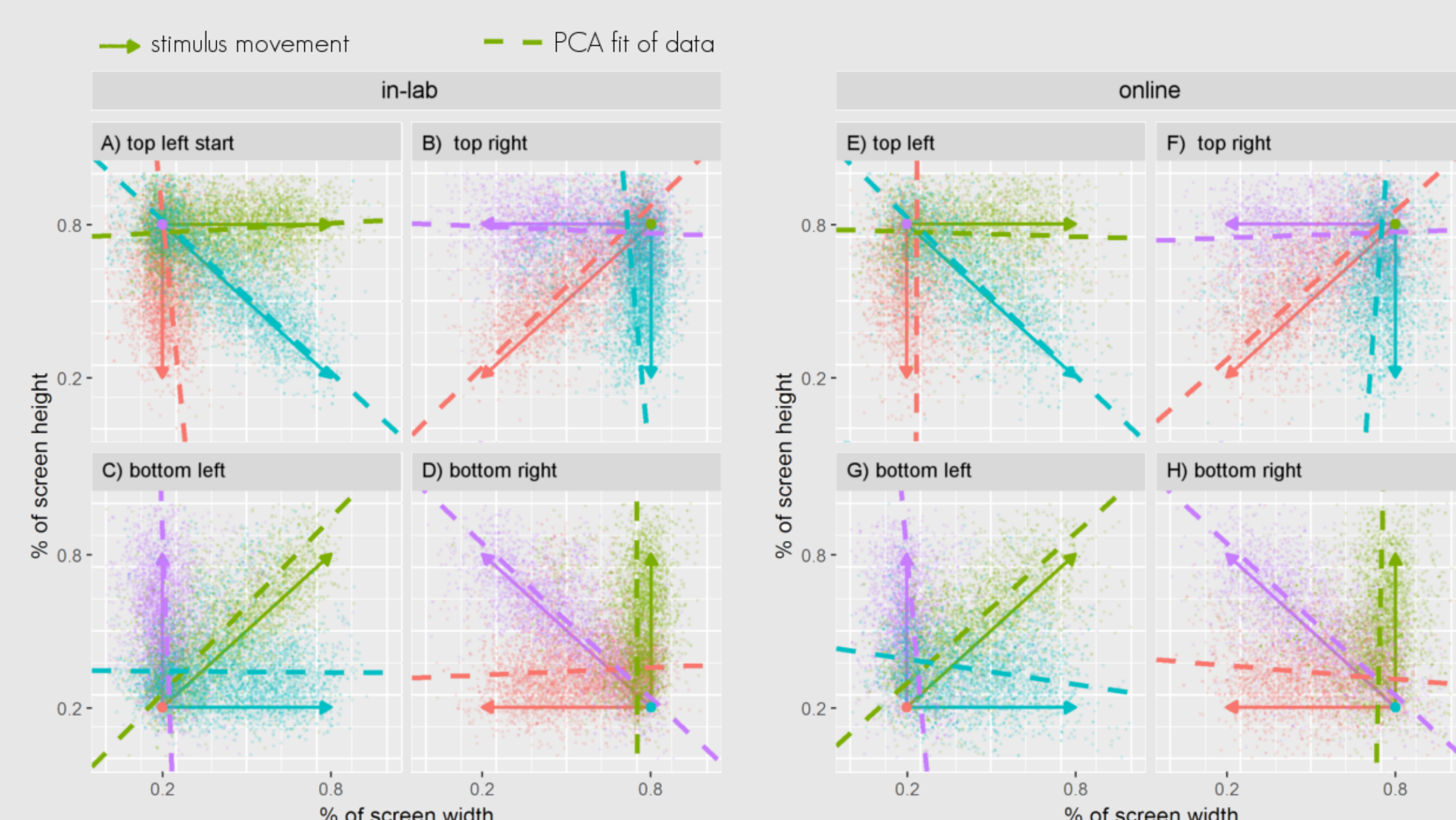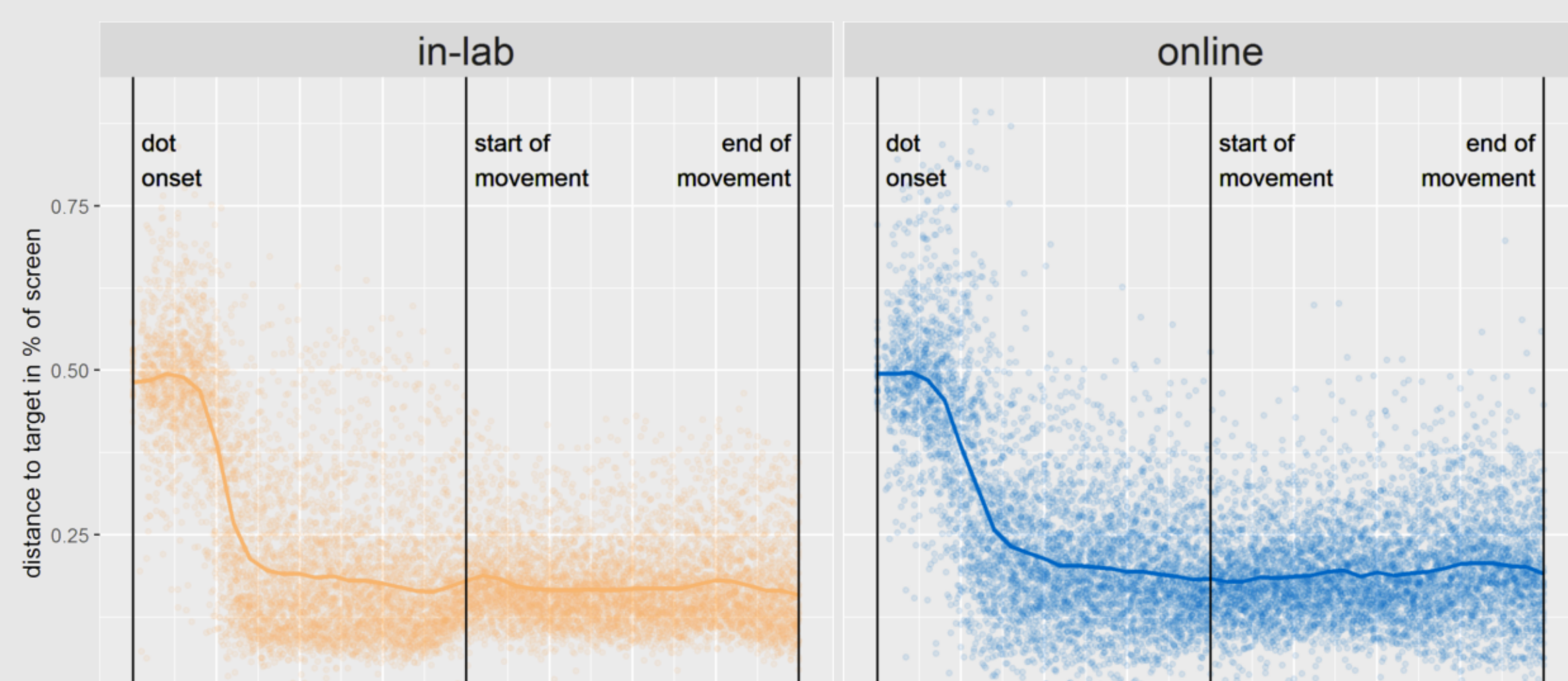Developmental Neuropsychology, Department of Psychology, Ruhr-Universität Bochum

RESEARCH RATIONALE & DESIGN

Psychophysical online experiments are becoming a common occurrence in Psychology. To extend the available tools for web-based research, here we investigate the accuracy and potential of consumer-grade webcam-based online eye tracking in three main paradigms (fixation task, pursuit, free viewing) and compare the results from 30 participants per setting (in-lab and online).
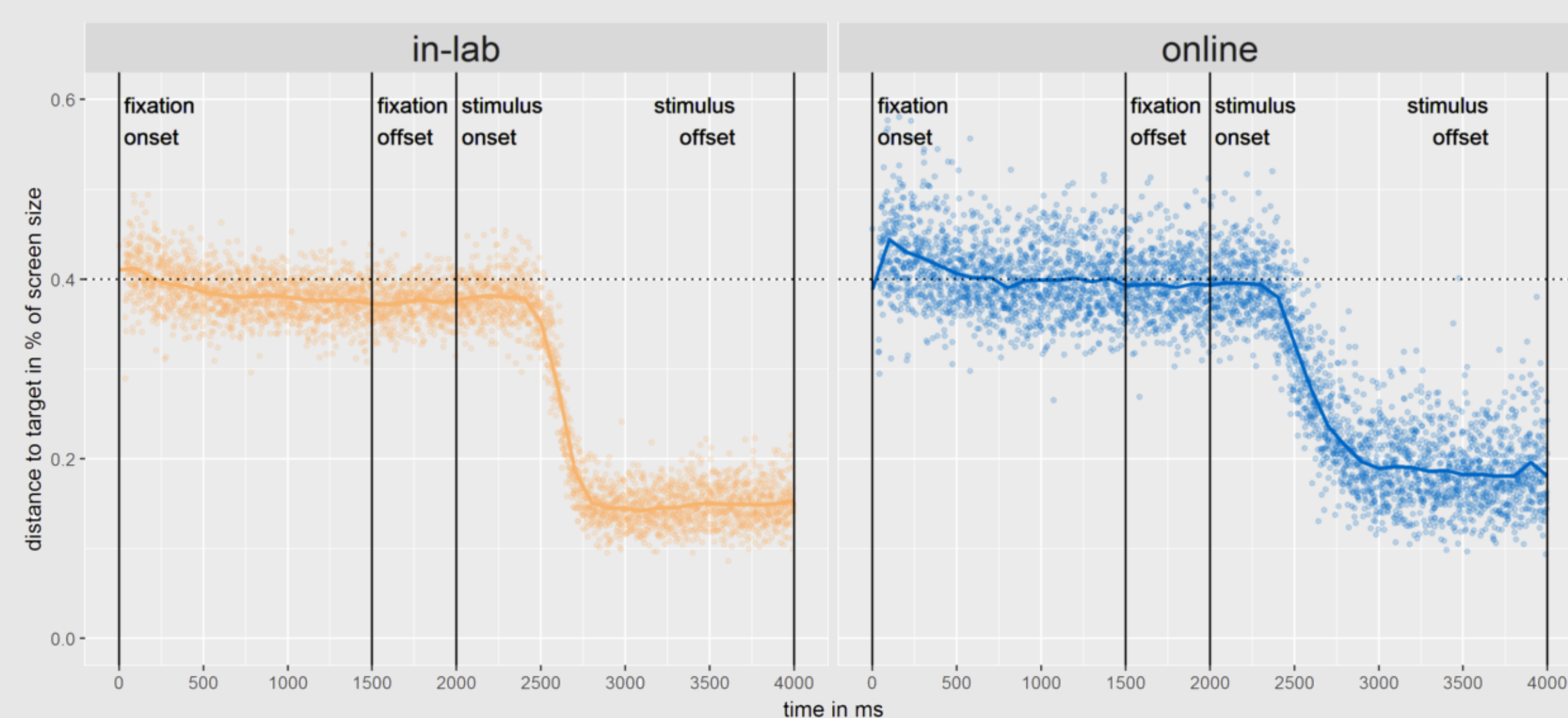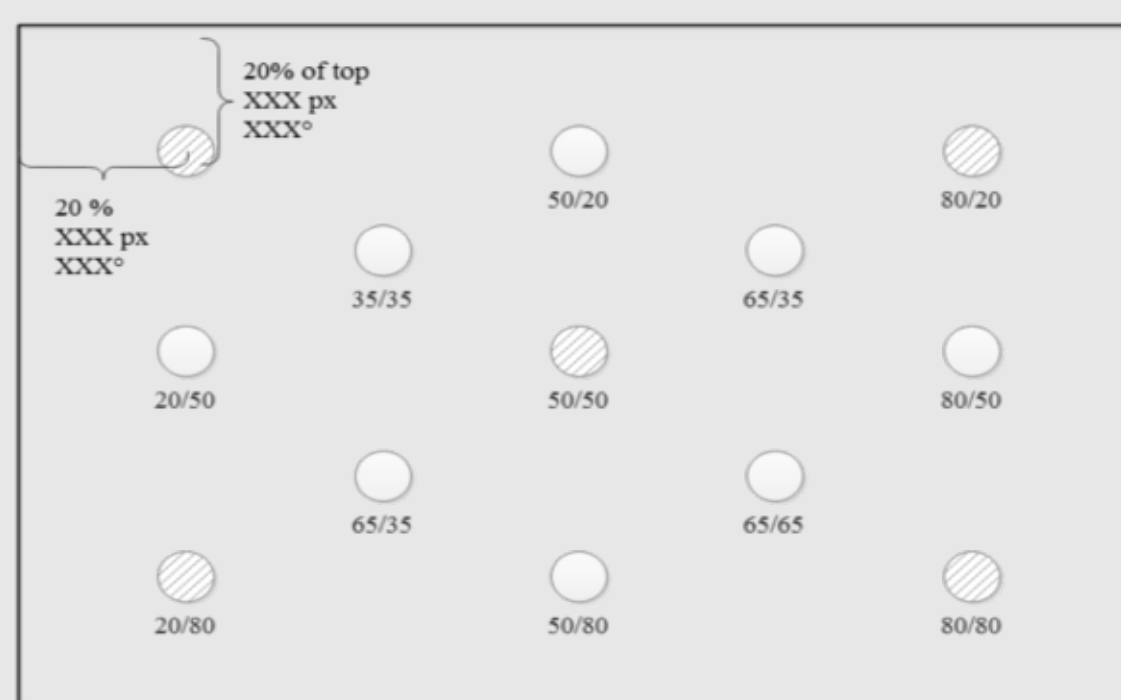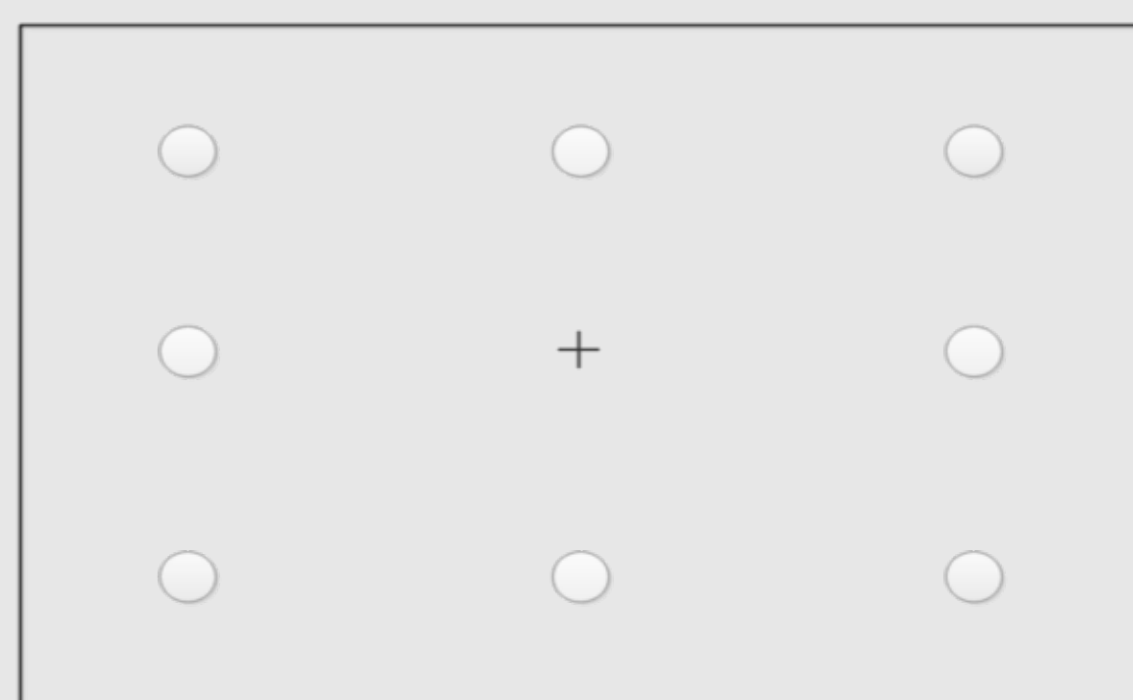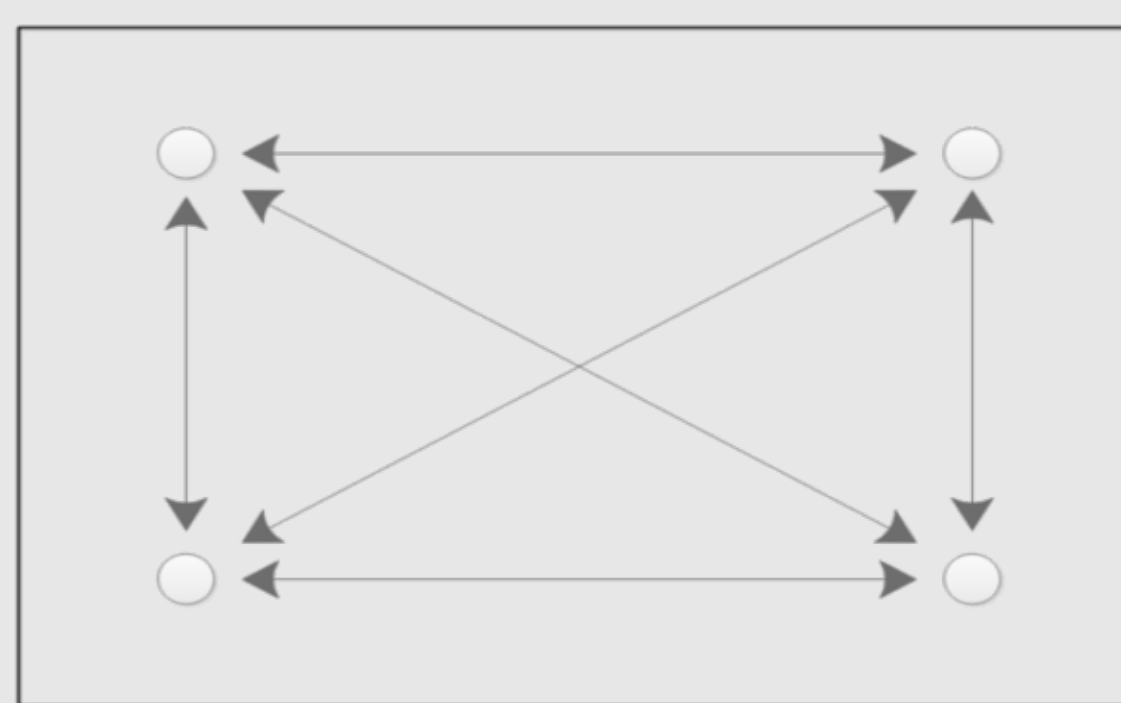
Calibration / Validation

Fixation Task

Pursuit Task

Free Viewing Task

FIXATION TASK: RESULTS
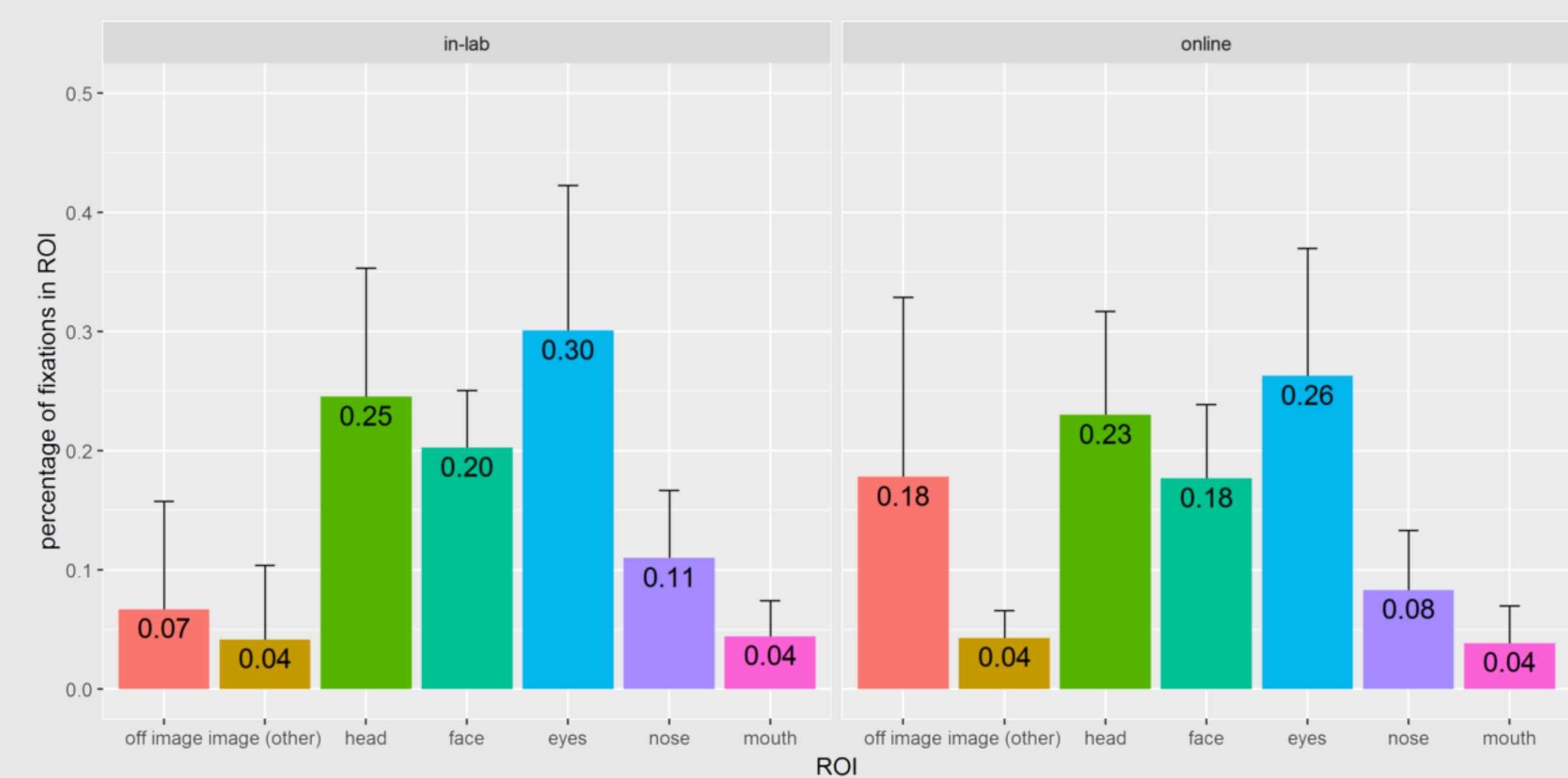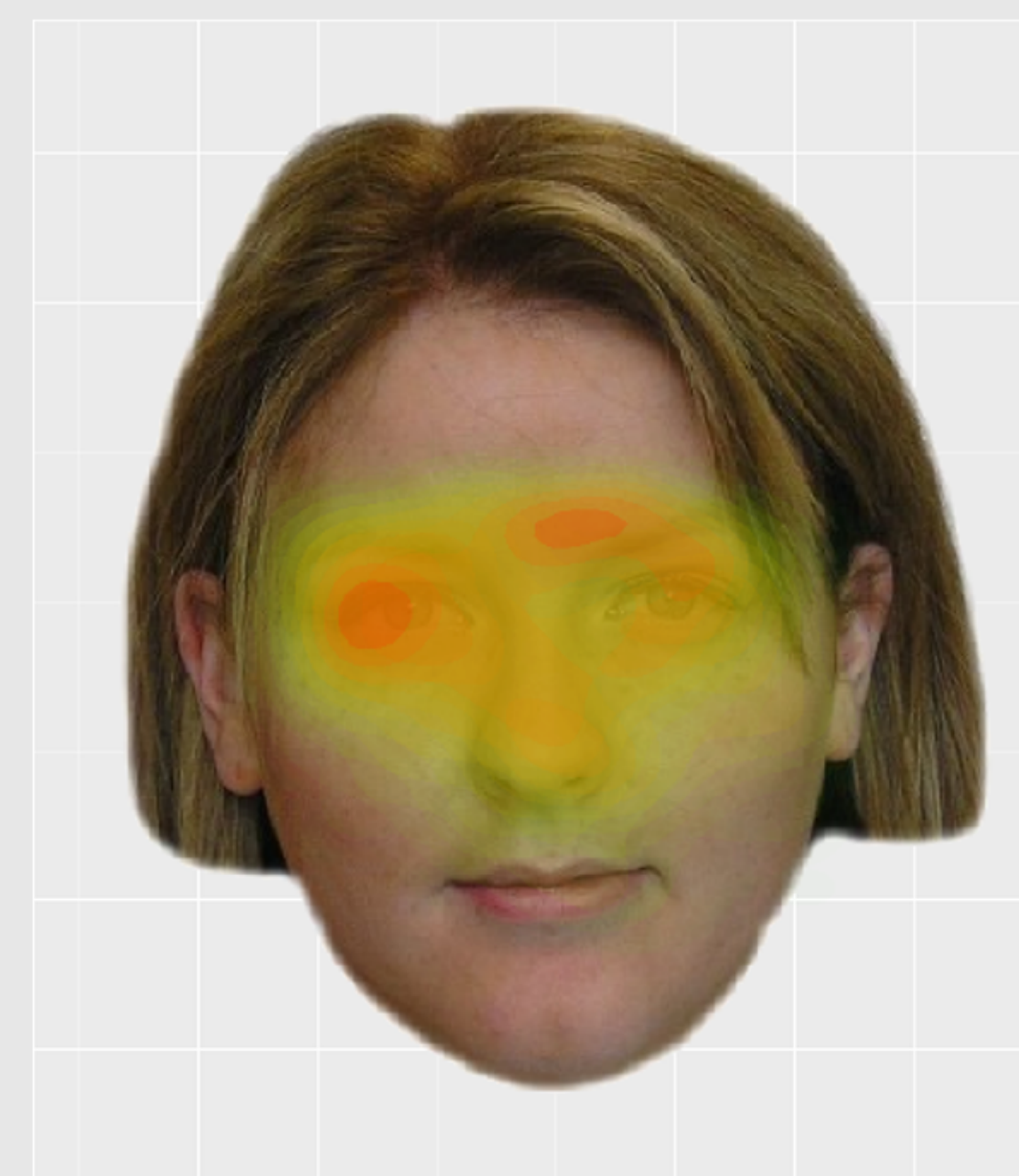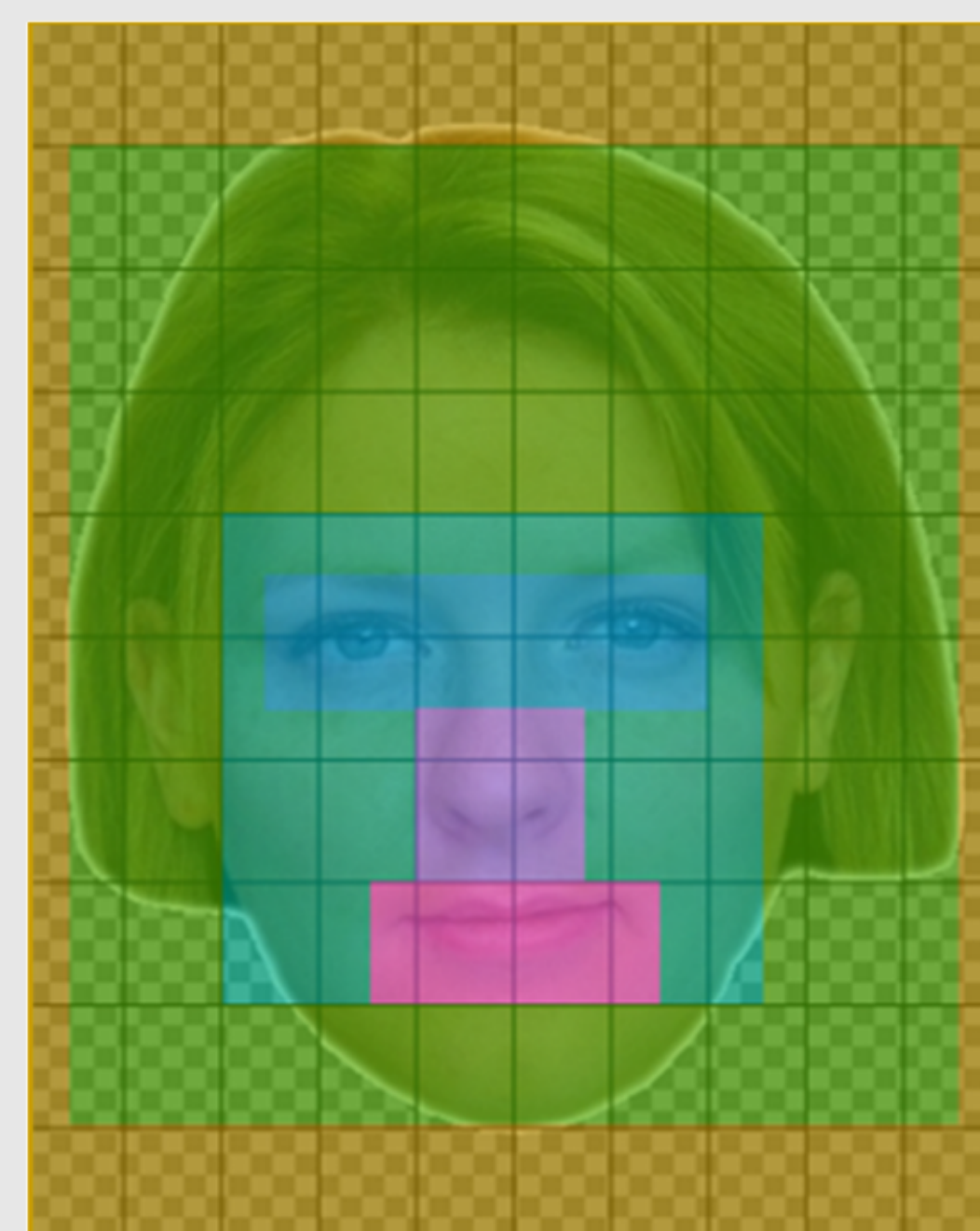

PURSUIT TASK: RESULTS

→ stimulus movement   — — PCA fit of data
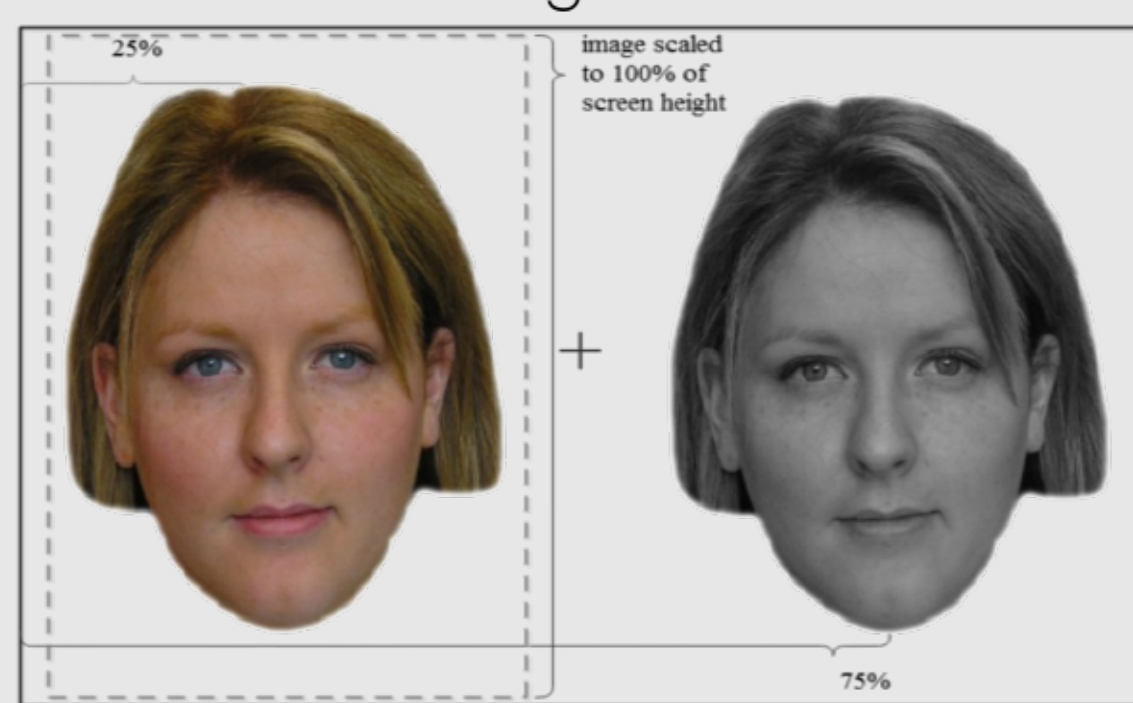
FREE VIEWING: RESULTS

CONCLUSION

We found the expected viewing patterns (fixations, saccades and regions of interest) consistently matching our paradigms, with an offset of about 191 px (4.38° visual angle) in-lab, whereas online data was found to exhibit a higher variance, lower sampling rate, and longer experimental sessions, but not showing a significant difference in accuracy (offset 211 px, $p = .06$, but: $BF_{10} = 1.259$).

In short: We do think webcam-based online eye tracking is already viable for many tasks, yet further research is advised to increase accuracy and define standards for this new approach.

Literature:
Semmelmann, K. & Weigelt, S. (2017). Online webcam-based eye tracking in cognitive science: a first look. Behavior Research Methods. [under review]
Papoutsaki, A., Sangkloy, P., Laskey, J., Daskalova, N., Huang, J., & Hays, J. (2016). WebGazer: Scalable Webcam Eye Tracking Using User Interactions. International Joint Conference on Artificial Intelligence.

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