



Beyond Fixations: Alexithymia Explains Atypical Spatiotemporal Dynamics of Emotional Gaze in Autism

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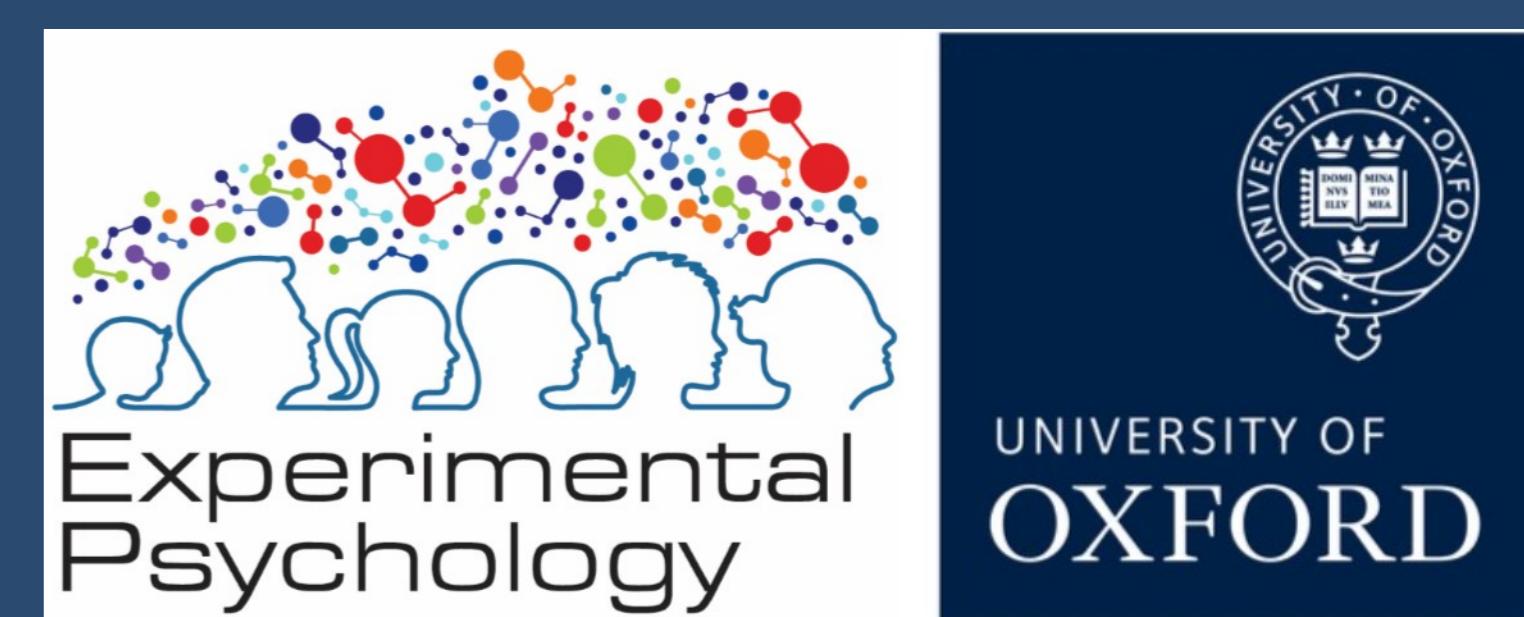
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BACKGROUND

Outstanding issues in emotional face processing in ASD:

- Are deficits central to Autism? (Quattroki & Friston, 2015, *Neur & Biob Rev*);
- Consequence of co-occurring Alexithymia? (Brewer et al., 2015, *Neur & Biob Rev*);
- Methodological limitations (e.g. non-robust AOIs, static metrics);
- Reduced priors? Task modulation? (Pellicano & Burr, 2012).

STUDY: Design and Methods

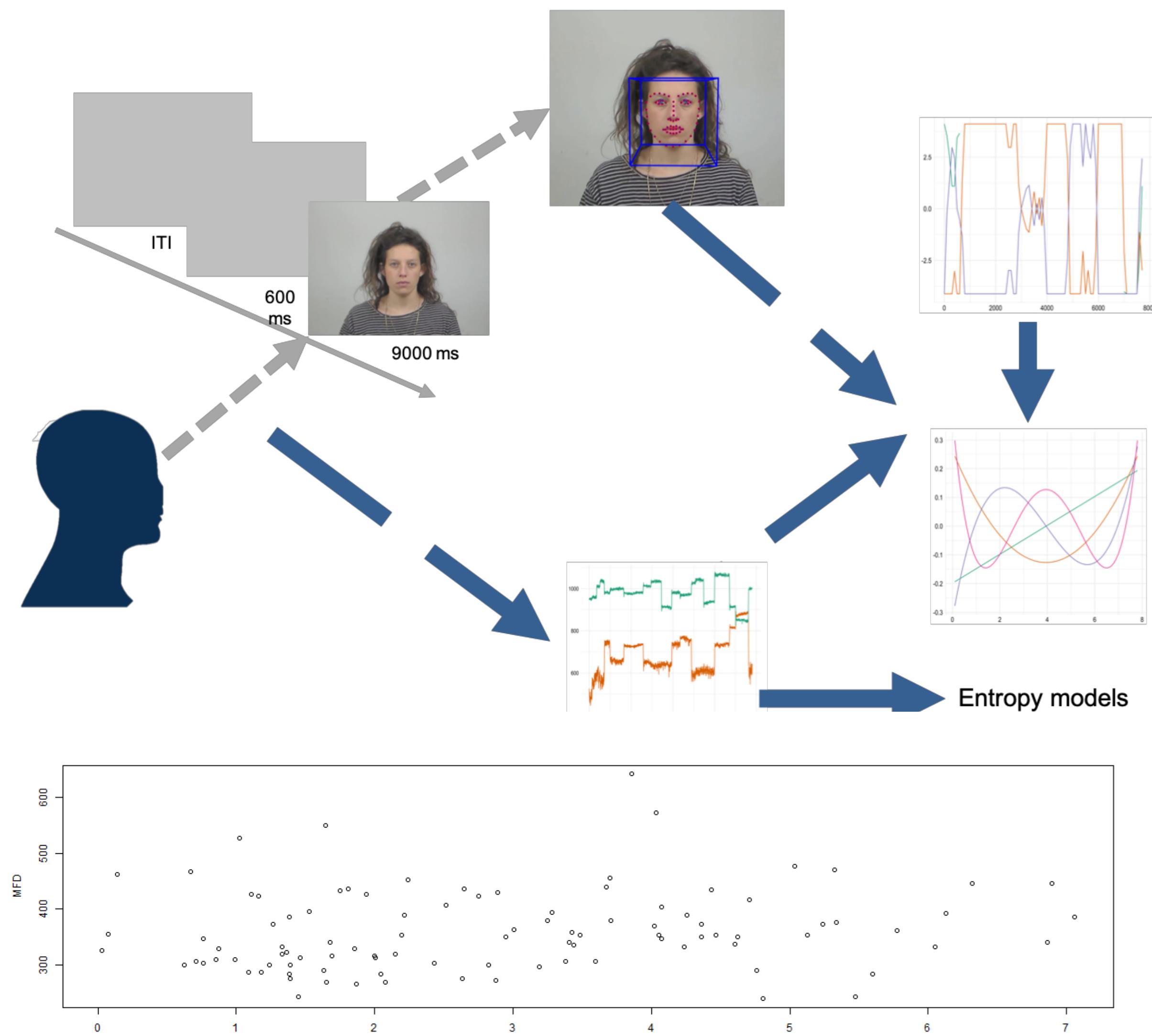


Fig 1. Design and workflow.

Participants: N = 70, IQ matched Autistic (n = 25, $M_{age} = 37.68$, SD = 11.86) and Controls (n = 47, $M_{age} = 26.13$, SD = 6.66).

Emotion Viewing Task: 42 emotional faces presented in 4 conditions: Free Gaze, Recognition, Cued, Intensity Rating.

Eye tracking: Tobii TX 300, sampling at 300hz, 61cm, interfaced with Python.

Data Processing and Analysis

Multilevel orthogonal polynomial time modelling and entropy analysis implemented in R.

Entropy

Application of information theory to measure gaze and transition complexity.

$$H(x) = - \sum_{i=1}^n p_i \sum_{j=1}^n p(i,j) \log_2 p(i,j)$$

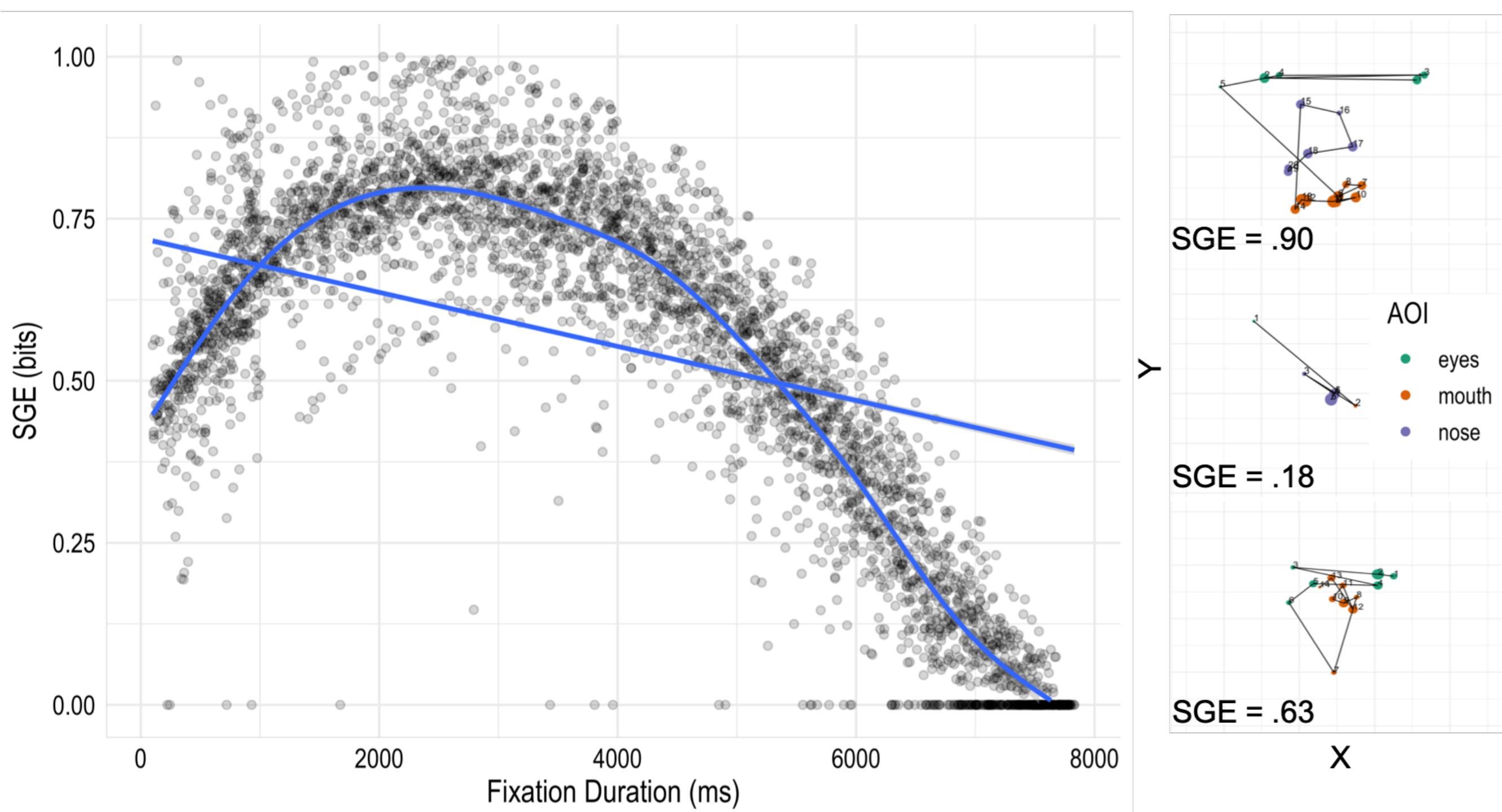


Fig. 2. Manipulation check - Scatterplot and scanpath samples for the association between duration weighted stationary entropy (SGE) and fixation metrics.

RESULTS

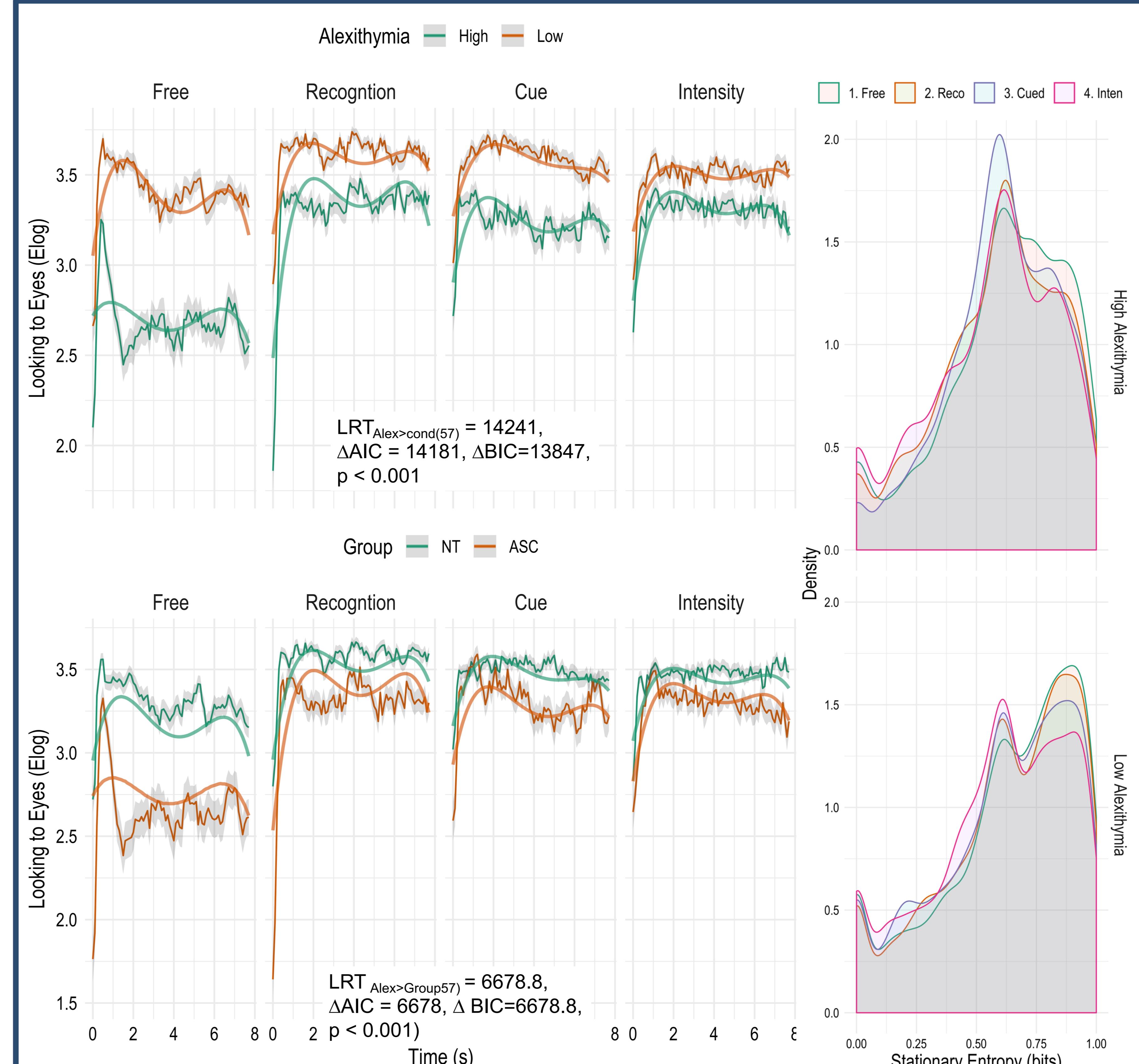


Fig. 3. GCA models including alexithymia (top) and diagnosis (bottom). On the right, density plots for duration weighted normalised stationary entropy split by alexithymia

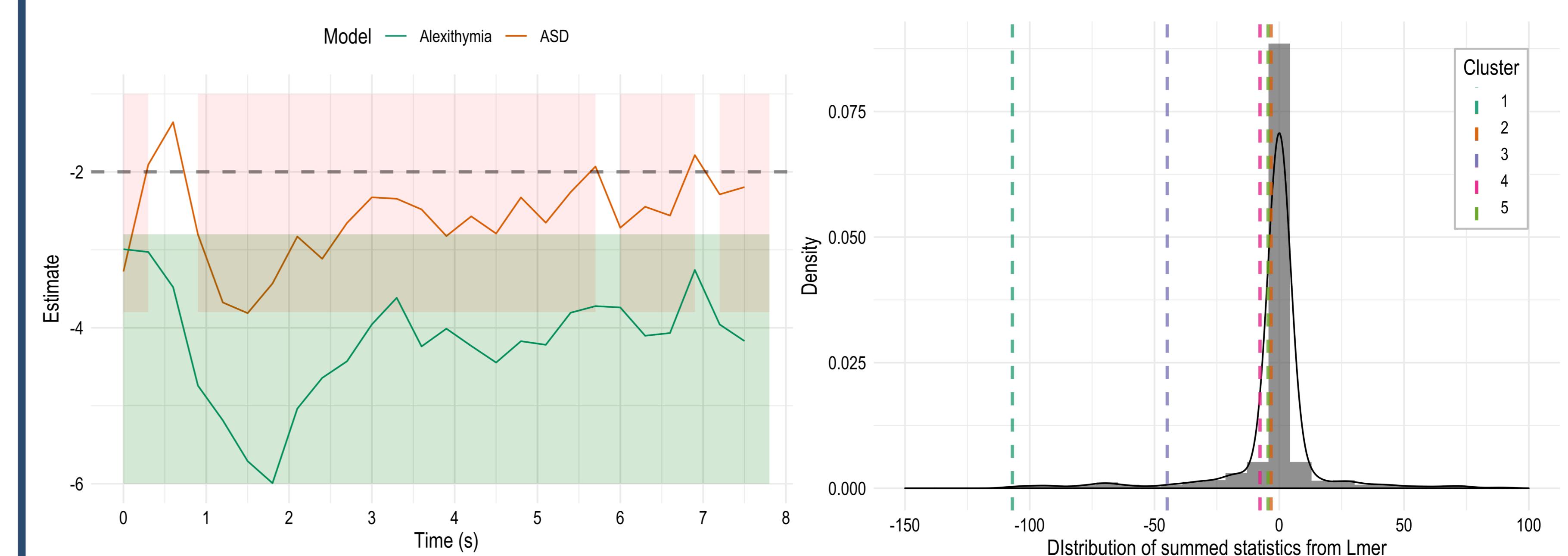


Fig. 4. Shaded bin clusters show significant divergence for Alexithymia and diagnosis models $p < .05$.

Fig. 5. Distribution of summed statistics from obtained from the nonparametric bootstrap clustering for alexithymia and diagnosis models ($i = 2000$ iterations).

CONCLUSION

- Temporal divergences in emotional gaze are best explained by alexithymia, even when accounting for IQ, age and symptom severity.

But

- eye modulation is not absent in autism or high alexithymia.

High alexithymia is related to reduced modulation to priors = less predictable and more disperse fixations.

- Temporal dynamics, complexity of gaze behavior and alexithymia may underlie emotion processing deficits in ASD

Selected References

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5. Quattroki, E., & Friston, K. (2014). *NeuroBioRev*.
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