

No evidence for a relationship between autistic-like traits and use of prior information in perceptual decision making

Catherine Manning ^a, Udo Boehm ^b, Chris Retzler ^c

^a University of Oxford, ^b University of Amsterdam, ^c University of Huddersfield. Email: catherine.manning@psy.ox.ac.uk  @CManningPhD

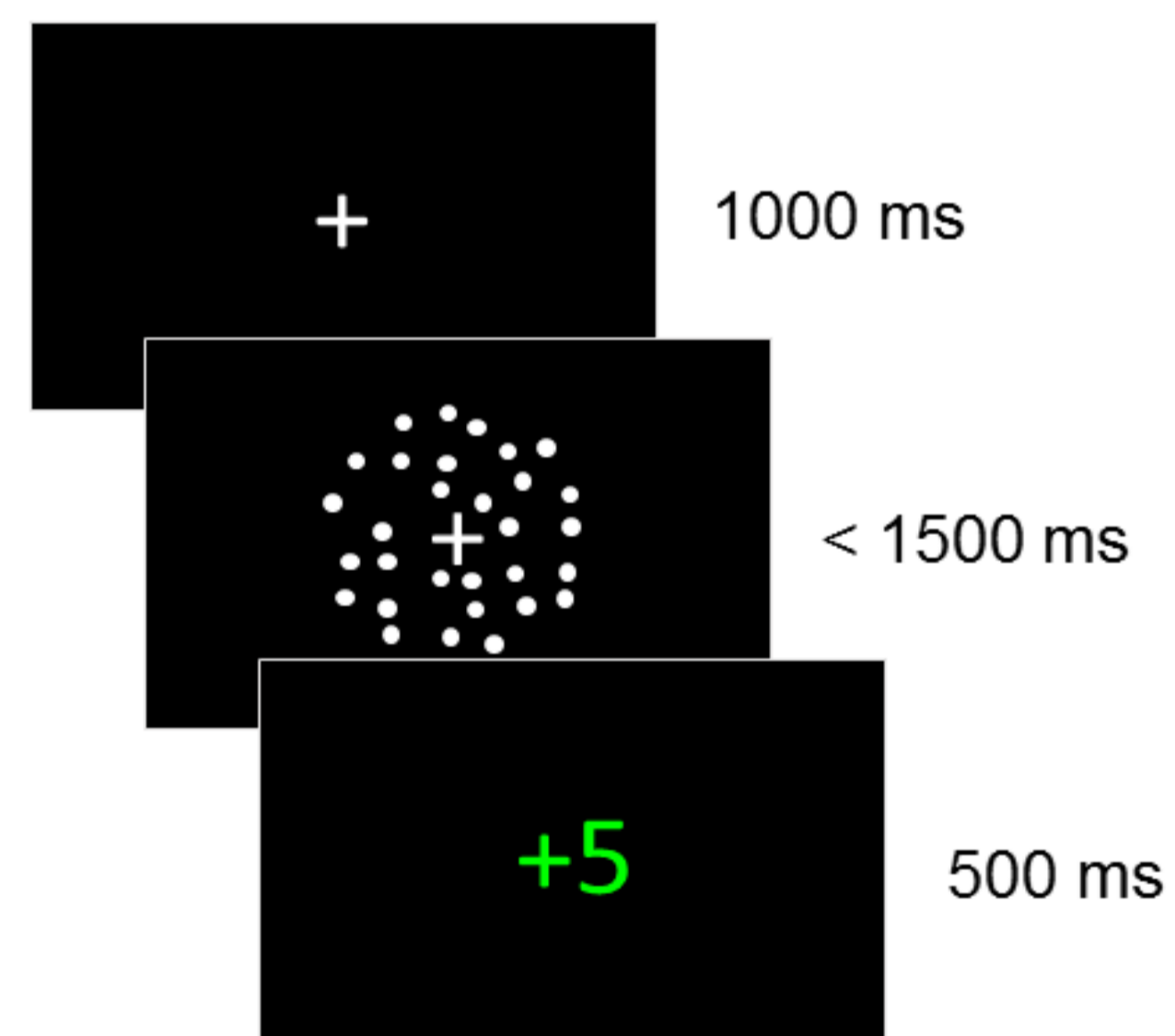
Background

- It has been proposed that autistic individuals rely less on prior information (and more on incoming sensory signals) than non-autistic individuals¹
- Autistic traits are thought to vary on a continuum², so reduced use of prior information might extend to individuals who have high levels of autistic-like traits but no autism diagnosis
- Autistic individuals have also been shown to make more cautious responses – emphasising accuracy over speed³

- Do increased levels of autistic-like traits relate to reduced use of prior information in a perceptual decision-making task?
- Do increased levels of autistic-like traits relate to increased response caution?

Experimental task

222 adults completed the autism spectrum quotient² (AQ) and a motion direction discrimination (left or right) task⁴

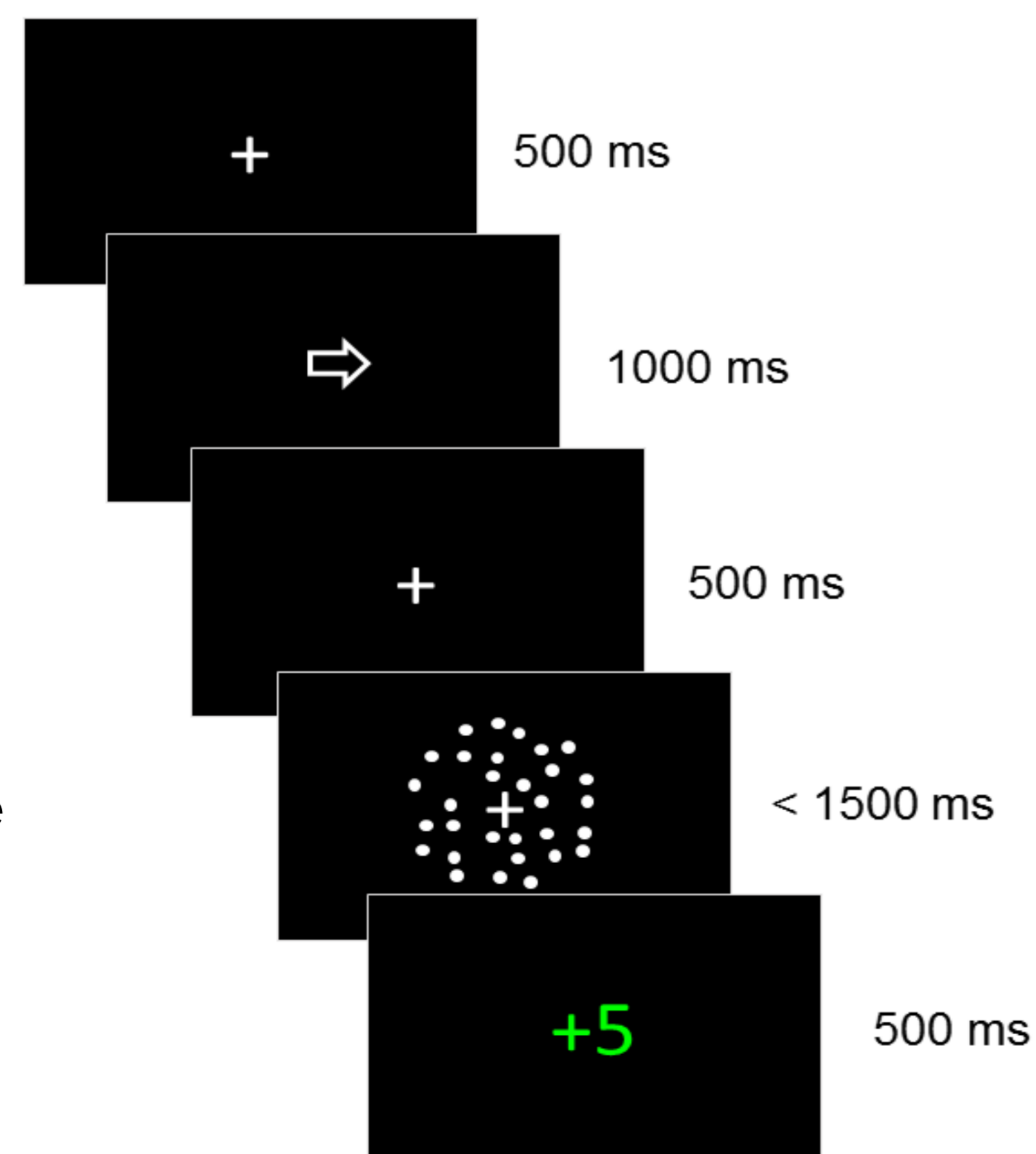


Stage 1: Staircase trials to find coherence level corresponding to 80% accuracy for each participant

Stage 2: All motion stimuli had the threshold coherence level estimated in Stage 1.

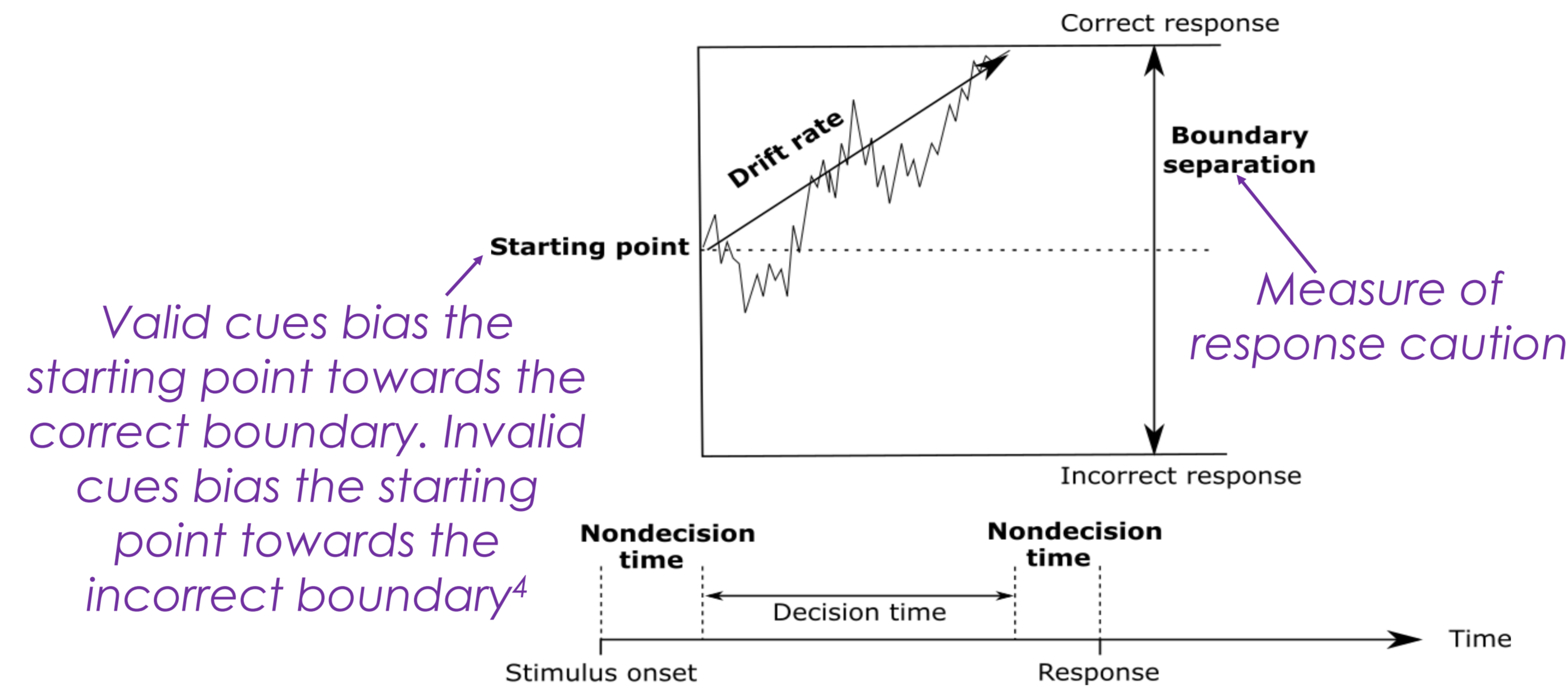
Cues were presented before motion stimuli:

- Directional (arrow) cue which **validly** (80%) or **invalidly** (20%) predicted the stimulus direction
- Neutral** (square) cue



Diffusion modelling

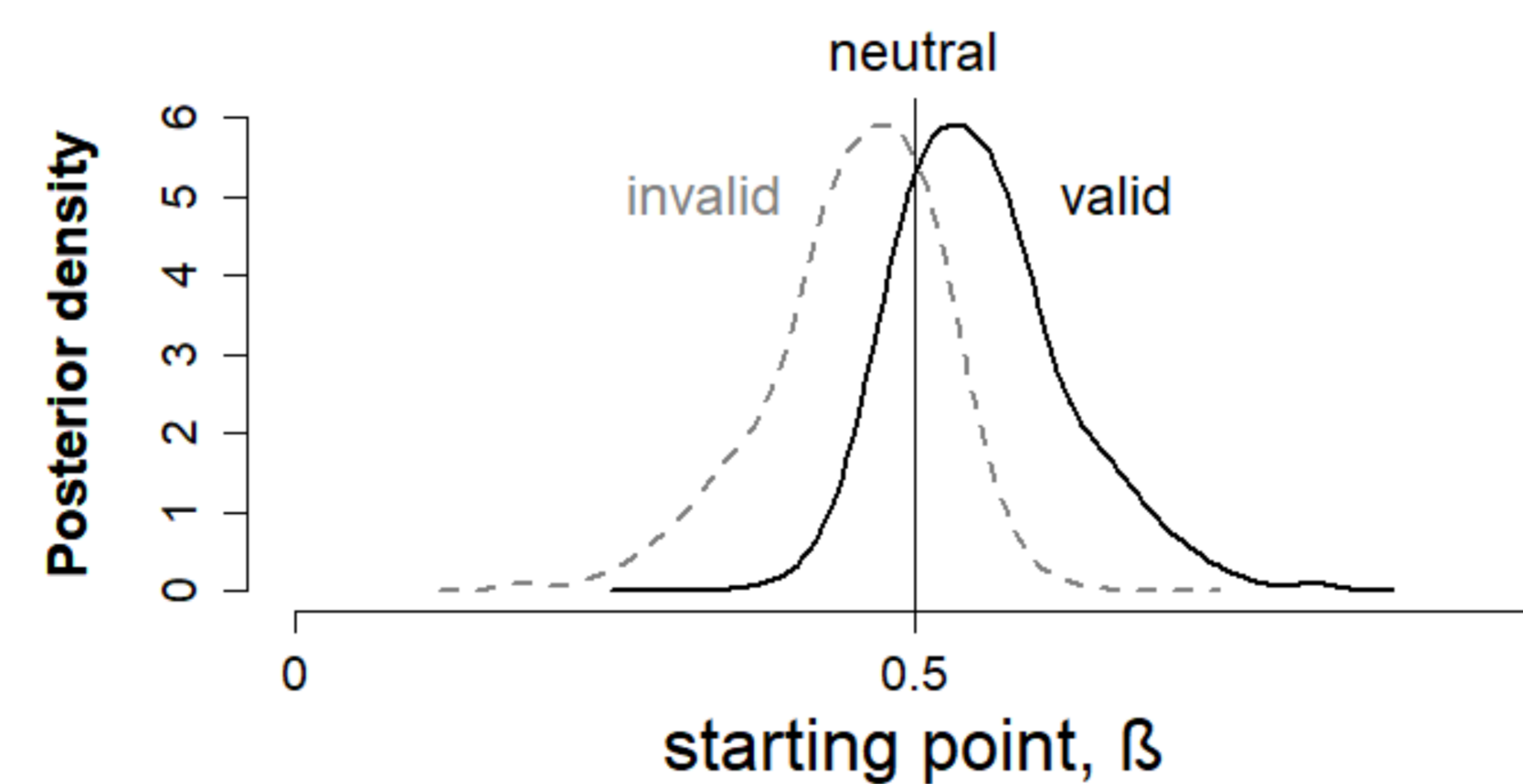
In the diffusion model, decisions are modelled as noisy processes accumulating evidence towards one of two decision bounds⁵:



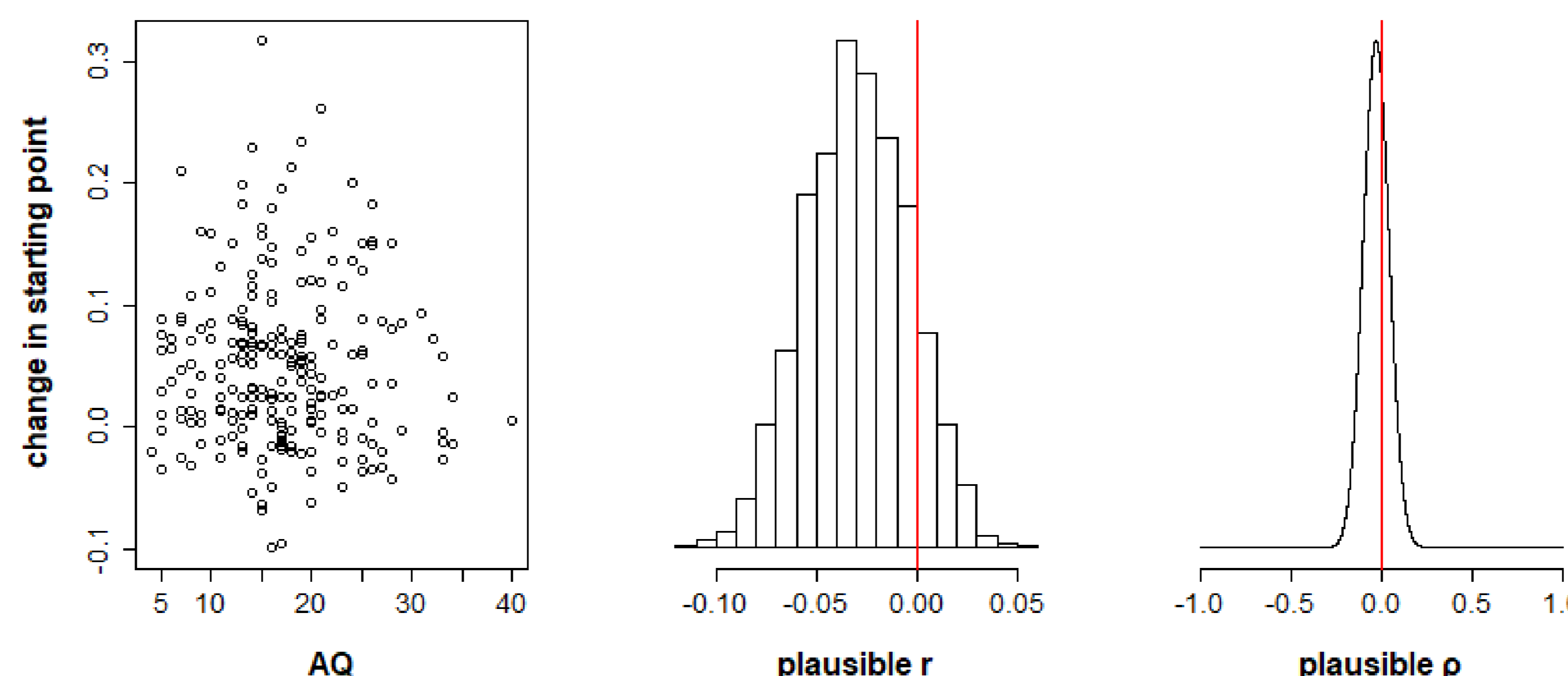
- We fit a hierarchical diffusion model to accuracy and RT data with a symmetric condition effect on starting point. Starting point was fixed at 0.5 in the neutral condition and estimated in the valid/invalid conditions.
- We used a plausible values approach⁶ to investigate the relationship between AQ and change in starting point, and between AQ and boundary separation

Model results (1)

Cue condition had the expected effect on starting point:

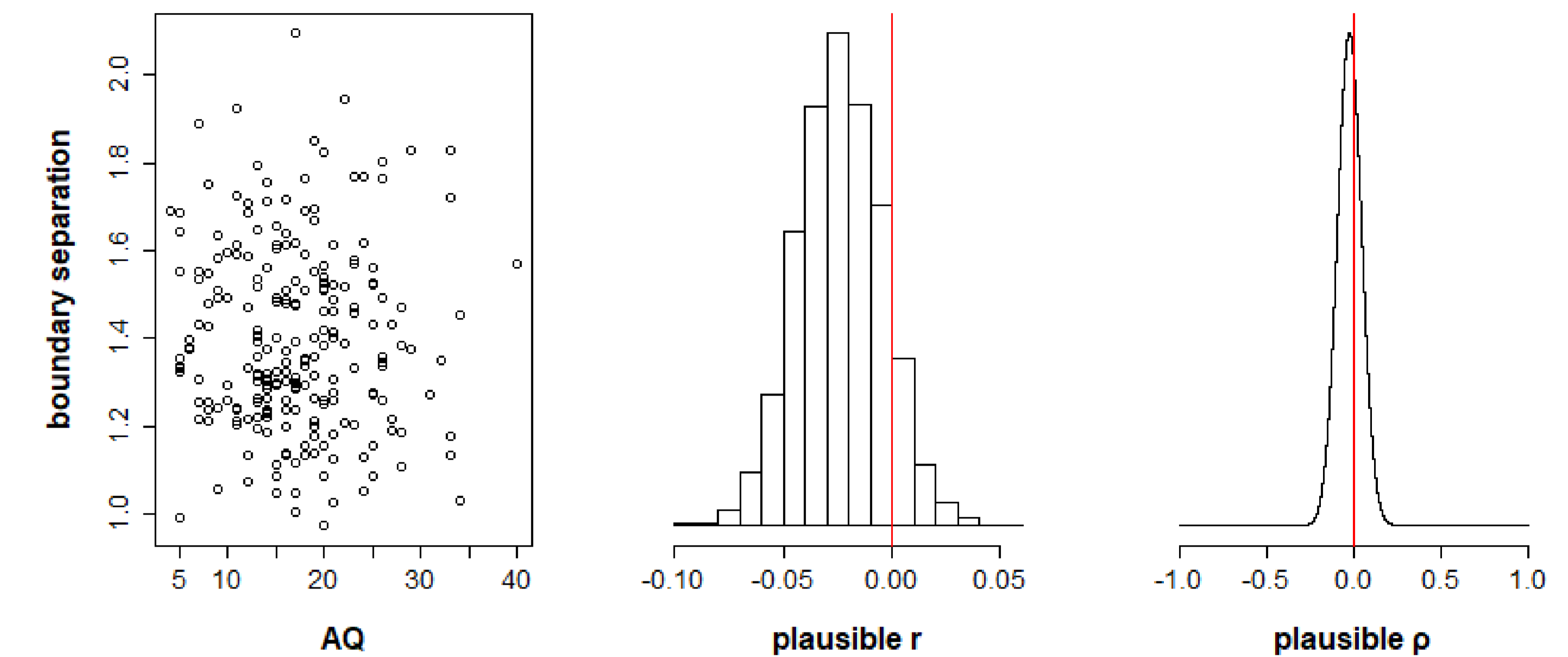


But we did not find evidence for our hypothesis that change in starting point correlates with autistic traits (AQ scores):



Model results (2)

We also did not find evidence for our hypothesis that boundary separation correlates with autistic traits (AQ scores):



Exploratory results

We fit 2 further models to see if these would better explain the data

- Model 2 with starting point fixed at 0.5 for all conditions and a condition effect on drift rate
- Model 3 with a condition effect on starting point AND a condition effect on drift rate

Using bridge sampling, we found that Model 3 provided the best account of the data – i.e., probabilistic cues led both to a change in starting point and a change in drift rate (cf. 4).

However, using this model we still found no evidence for our hypotheses.

Conclusions

- Here, probabilistic cues led to both a change in starting point and a change in rate of sensory evidence accumulation

We found no evidence that autistic-like traits in the general population are related to prior information use in a perceptual decision-making task

- We also found no evidence that response caution was related to autistic-like traits
- Next, this task could be applied to individuals with an autism diagnosis to see if they use prior information less and respond more cautiously than individuals without a diagnosis
- These findings will help us to understand more about individual differences in perceptual decision-making

References: 1. Pellicano & Burr, 2012, *TICS*. 2. Baron-Cohen et al., 2001, *J Autism Dev Disord*. 3. Pirrone et al., 2017, *Neuropsychology*. 4. Mulder et al., 2012, *J Neurosci*. 5. Ratcliff & Rouder, 1998, *Psych Sci*. 6. Ly et al., 2017, *Comp Models of Brain & Behaviour*.

Funding: This research was funded by a Sir Henry Wellcome Postdoctoral Fellowship to CM.