

Whether and how individuals with ASD utilize prior belief during perceptual decision making : Evidence from an orientation categorization task

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1. Introduction

Atypical perception is a core phenotype of Autism Spectrum Disorder (ASD)^{3,4}

A prevailing Bayesian view of ASD perception

- Atypical perception in ASD is due to an **attenuated prior**^{5,6}.
- Predicts that individuals with ASD will rely less on prior knowledge when making perceptual decisions

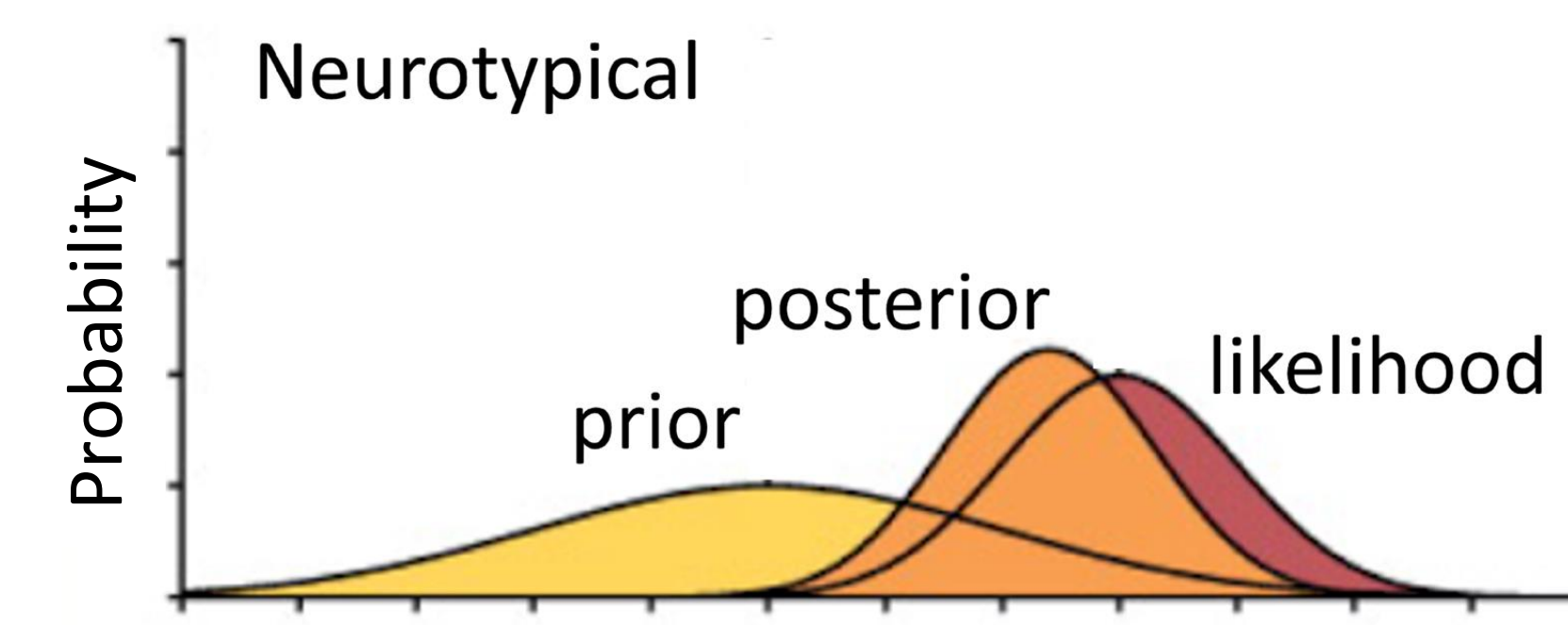
Aim of the study

- Testing the hypothesis with a **perceptual decision-making task** using the framework of **signal detection theory**
- Answering the question : To what extent does **ASD incorporate prior knowledge** in perceptual and metacognitive decision making ?

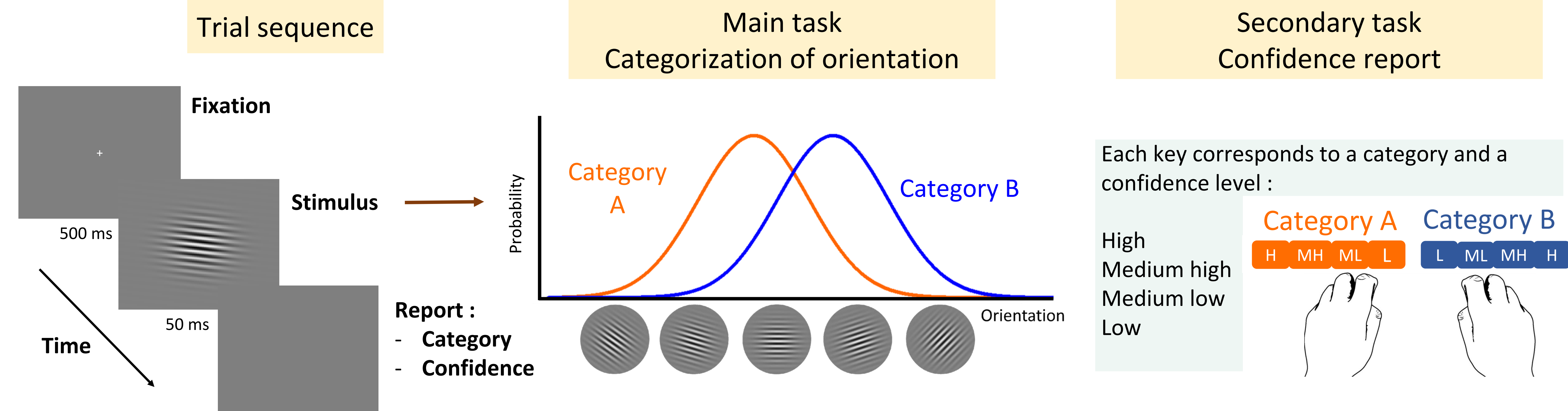
Bayesian theory of perception

Perception combines^{1,2} :

- Prior** (Initial probability for a given stimulus)
- Likelihood** (Sensory uncertainty)

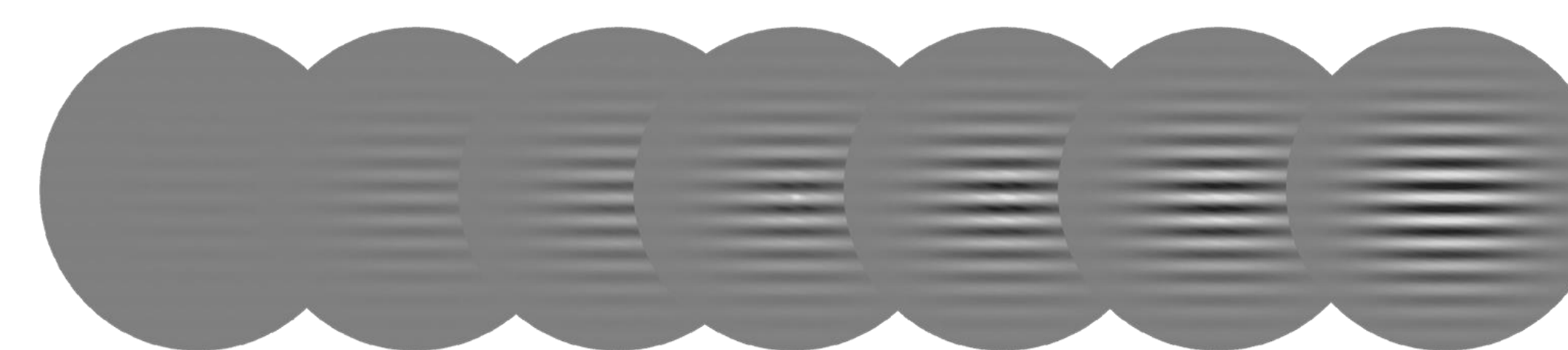


2. Method



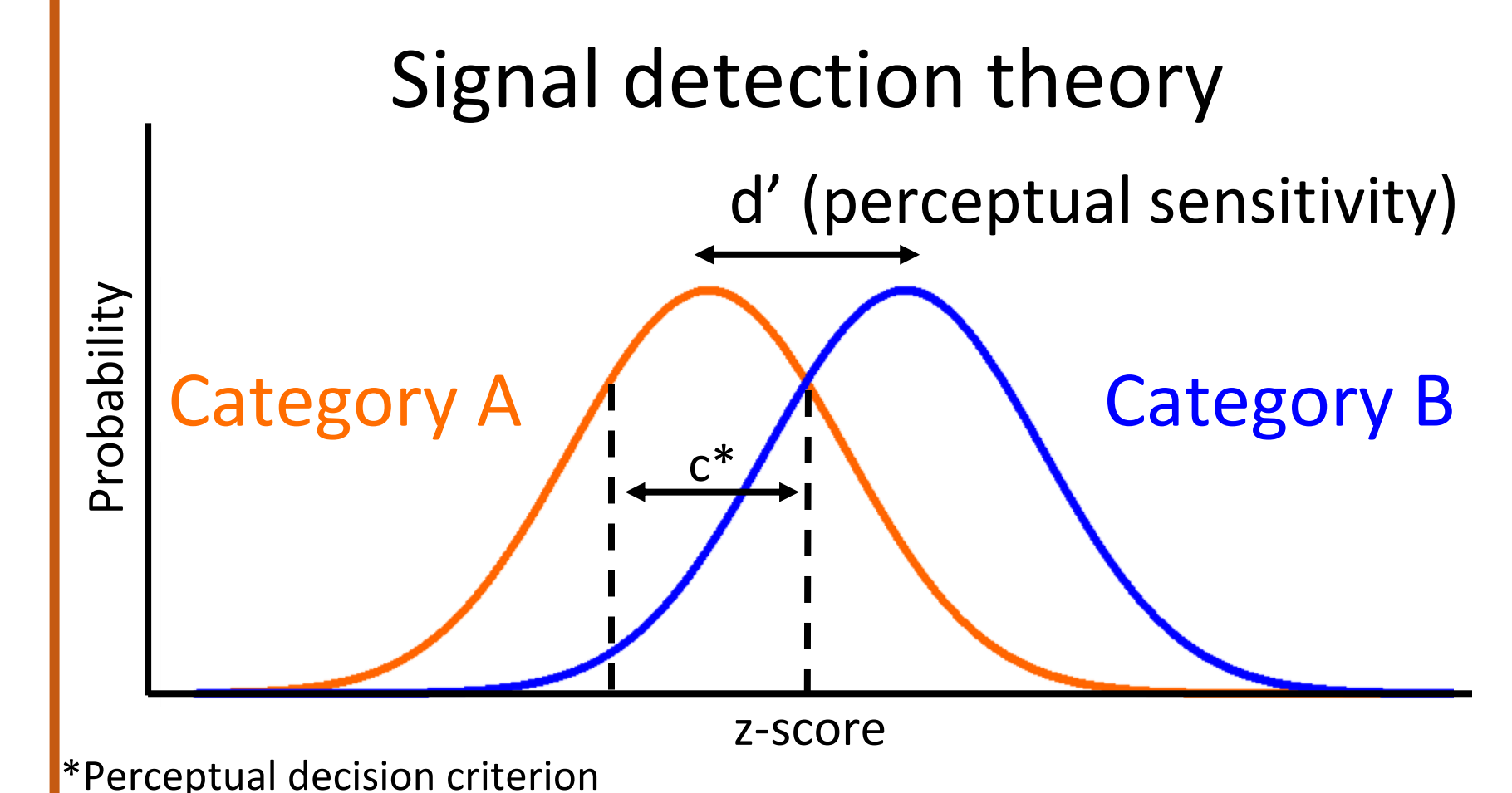
Likelihood Manipulation

With 7 levels of **contrast** to impact the d'



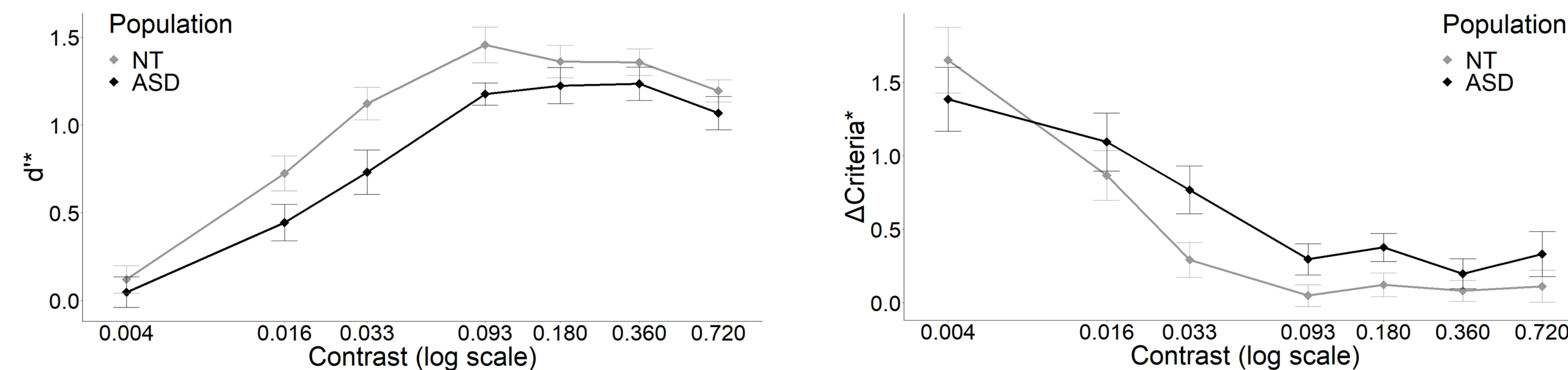
Population

- 21 ASD
- 26 Neurotypicals (NT)
- Measured variables : age, IQ (Toni score), AQ (Autistic quotient).

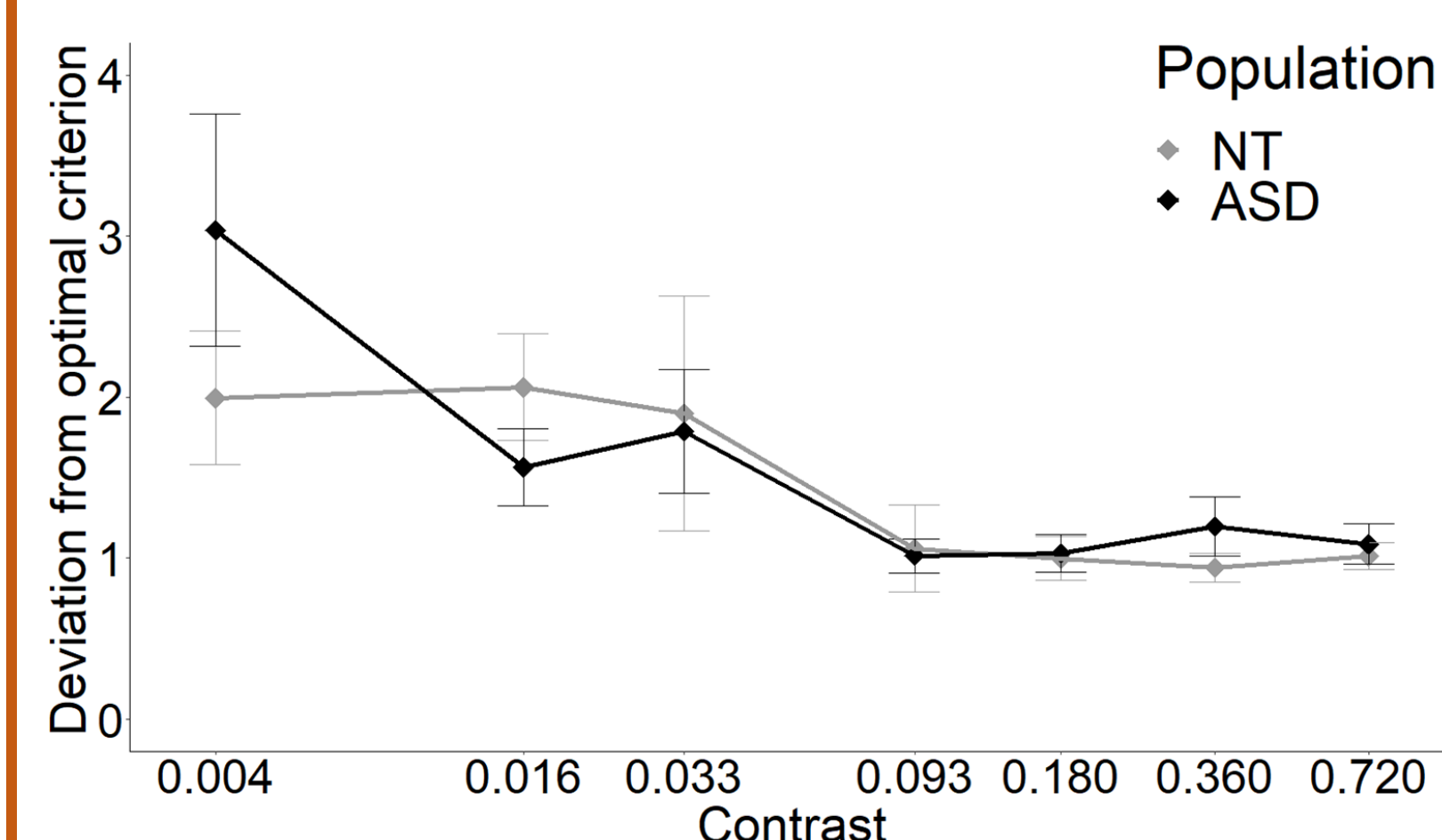


3. Results

Overall lower sensitivity for ASD but similar relation between contrast sensitivity and criteria shift



Similar sub-optimal performance



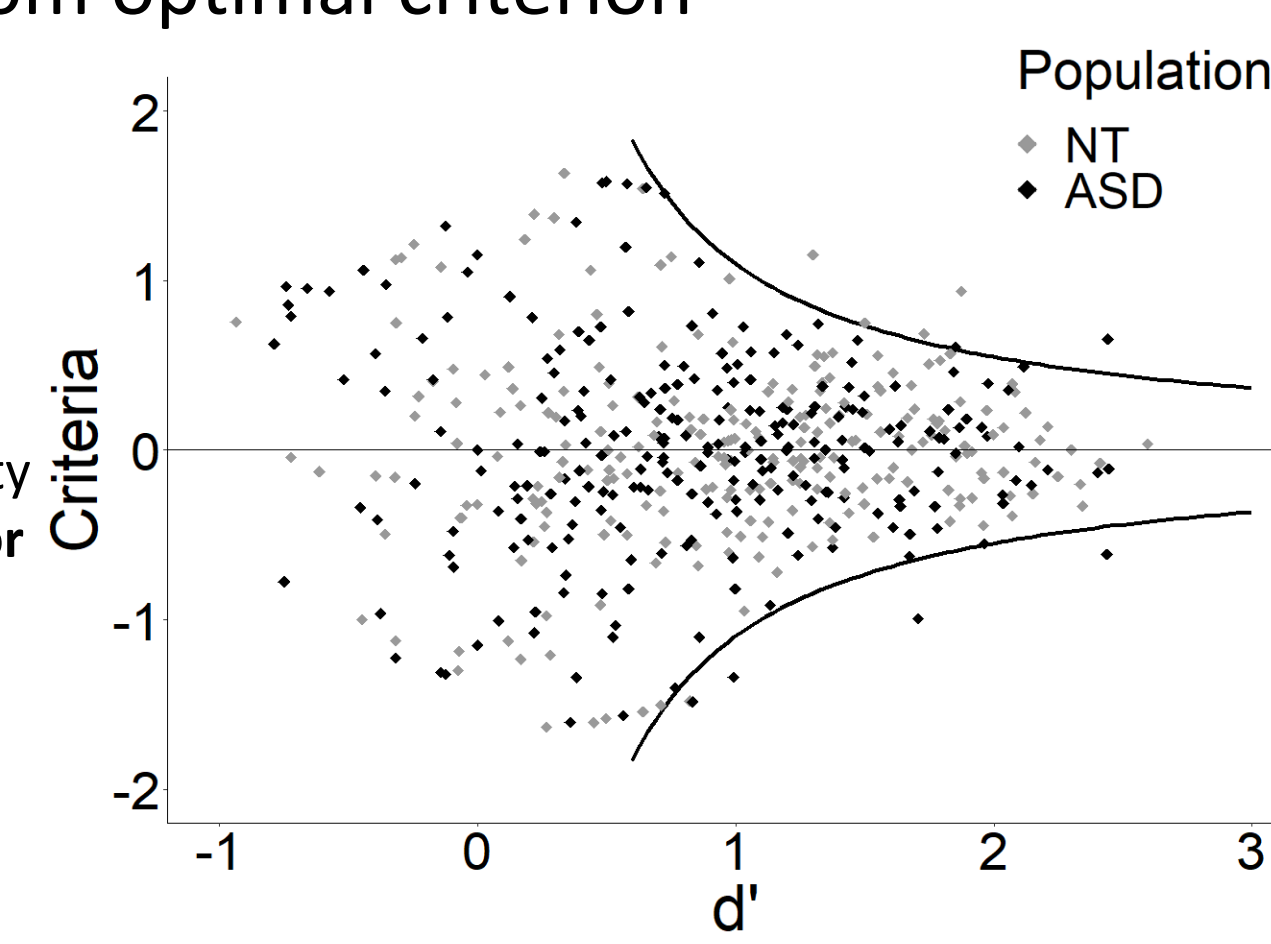
Calcul of deviation from optimal criterion

$$\beta_{\text{optimal}} = (1 - \text{base rate}) / (\text{base rate})$$

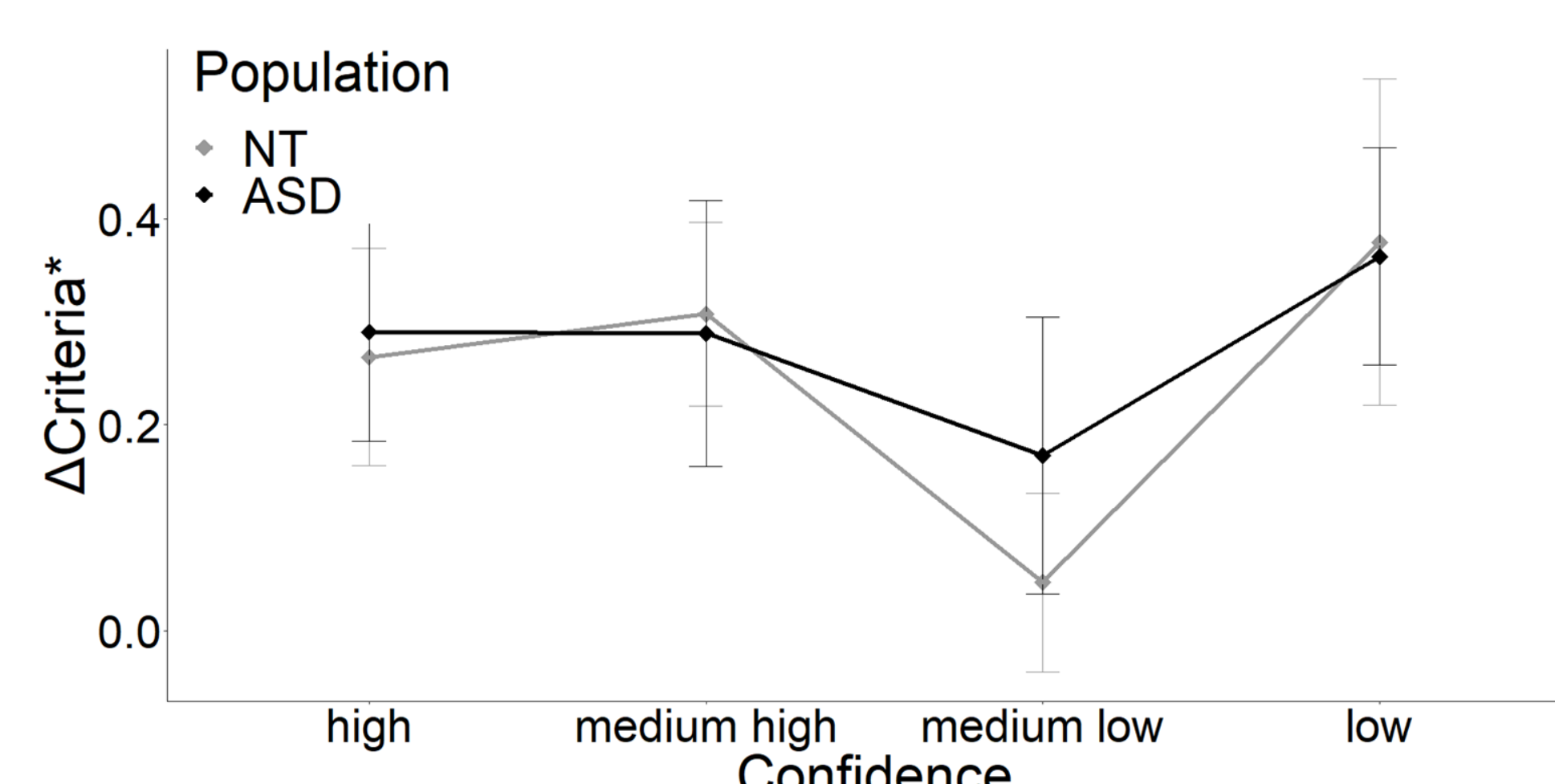
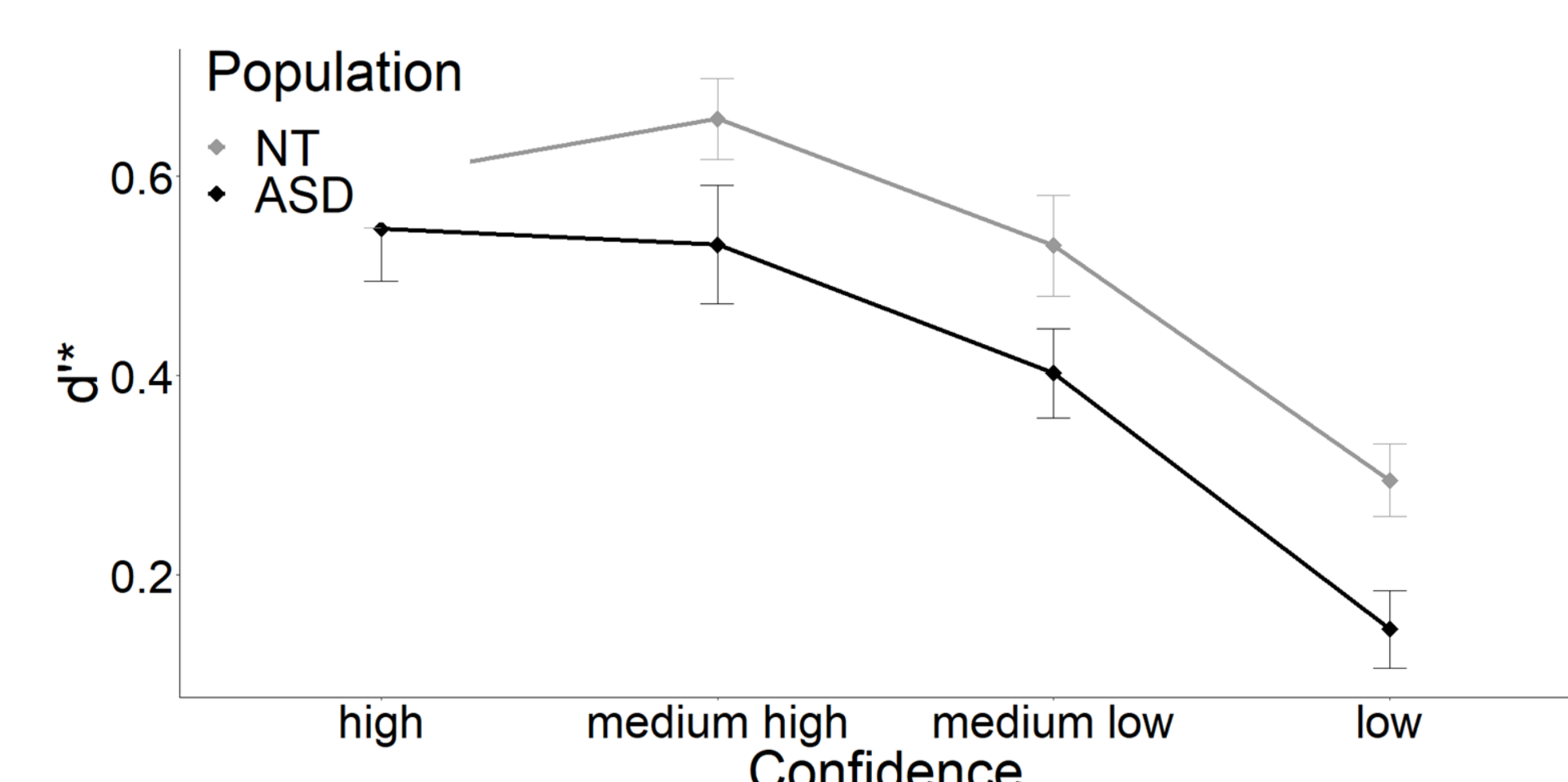
$$C_{\text{optimal}} = \log(\beta_{\text{optimal}}) / d'$$

Optimal criteria adjustment as a function of sensitivity for the **prior A = 25%** (line above criteria = 0) and **prior A = 75%** (line under criteria = 0)

◆ Individual criterion for NT
◆ Individual criterion for ASD

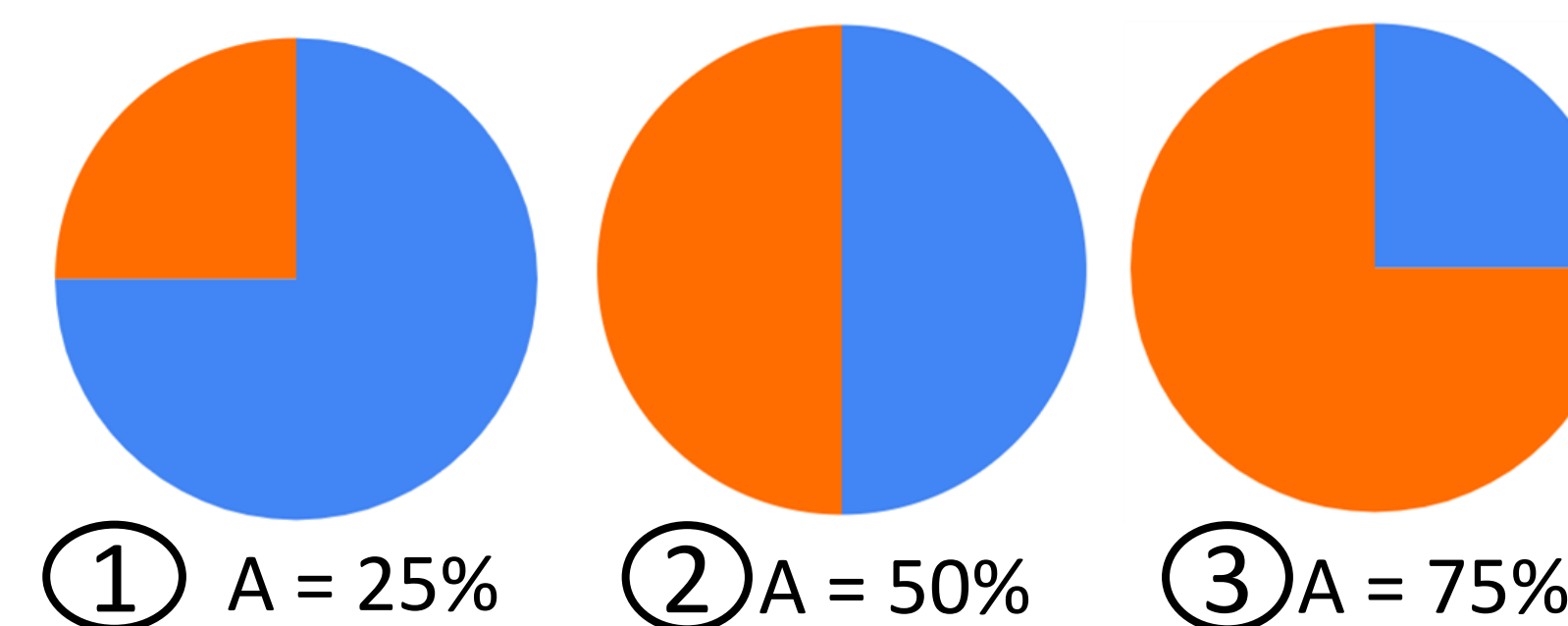


Similar pattern of confidence report

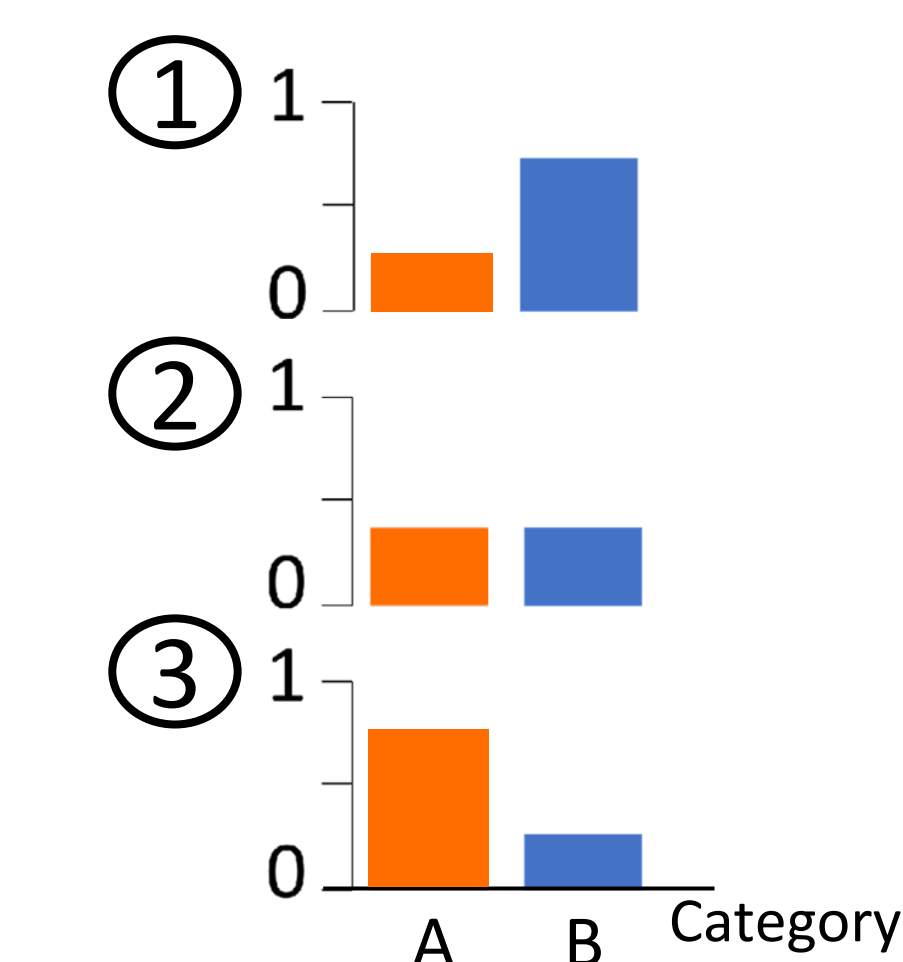


Prior manipulation

Different category **base rates** within a block

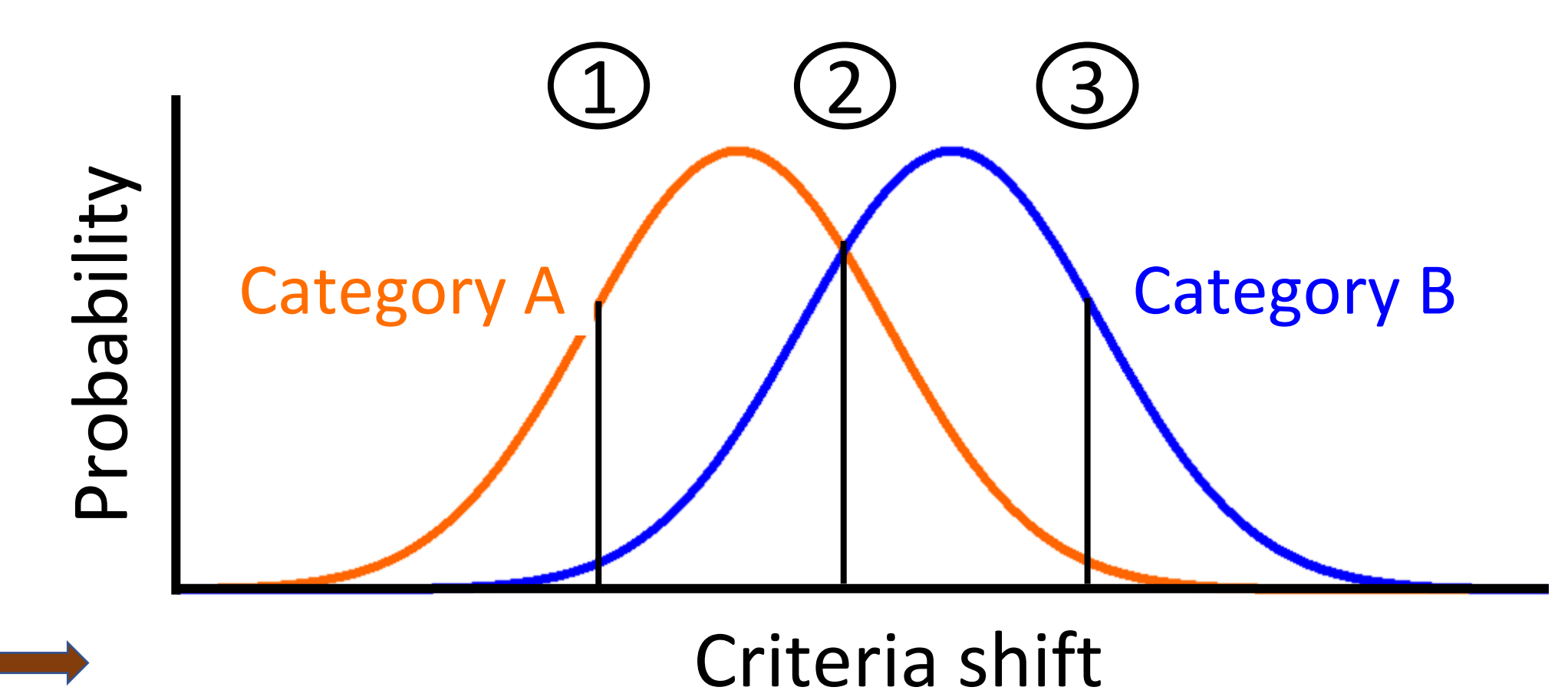


Change of base rate



Internal prior

Predictions



4. Conclusions

In both populations :

- Perceptual sensitivity increases with contrast
- Decision criteria shift to account for prior information, with larger shifts when sensory evidence is weaker
- Criterion shifts are suboptimal to a similar degree in both groups
- Confidence ratings track perceptual sensitivity but don't predict criterion shifts

Individuals with ASD use prior information similarly to NT in perceptual decision making

5. References

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