

# Investigation of the Bayesian view of perceptual decision making and meta-cognition in autism

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## Introduction

### Atypical perception is a core phenotype of Autism Spectrum Disorder<sup>3,4</sup>

#### A prevailing Bayesian view of ASD perception

- Atypical perception in ASD can be due to **attenuated priors or enhanced likelihood**<sup>5,6</sup>
- Predicts a reduced effect of prior knowledge in ASD

#### Still unknown

- Do individuals with ASD adjust their decision making criterion similarly to NTs ? Do they have metacognitive abilities similar to NTs ?

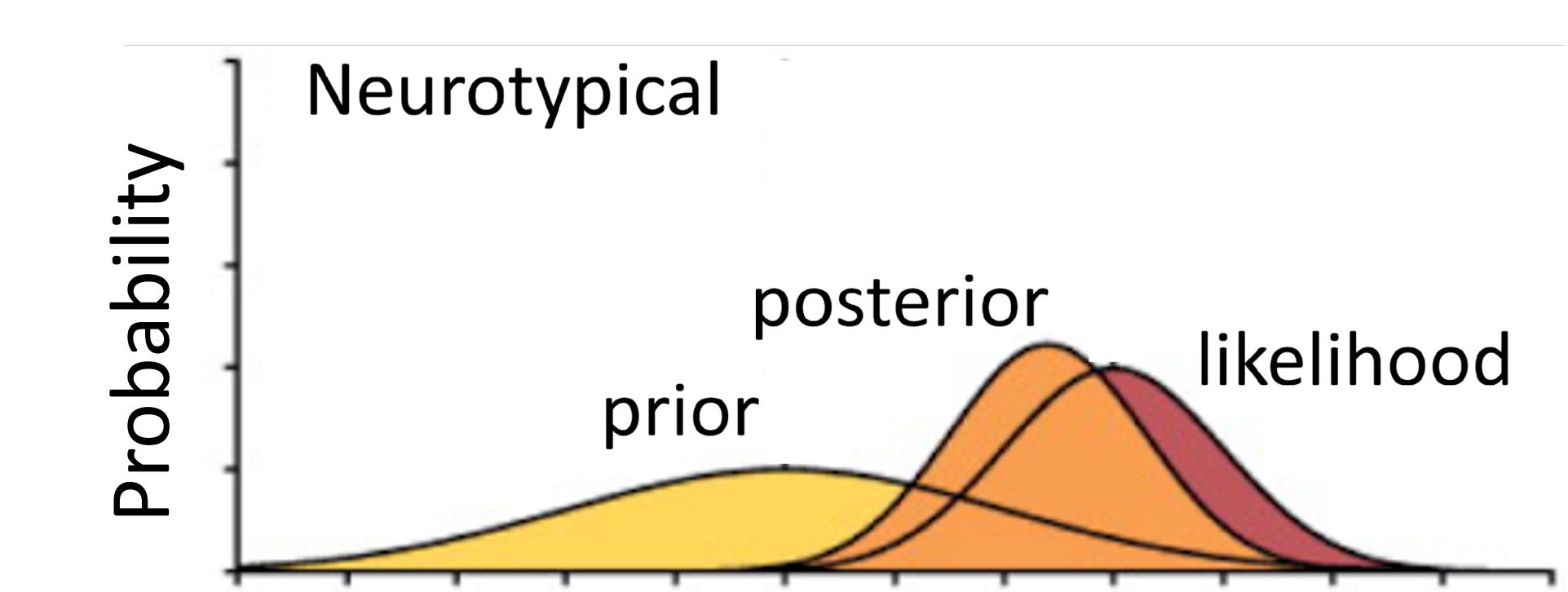
#### Aim of the study

- Whether and how individuals with ASD adjust their perceptual criterion in response to changes in prior knowledge, rewards and sensory evidence ?

### Bayesian theory of perception

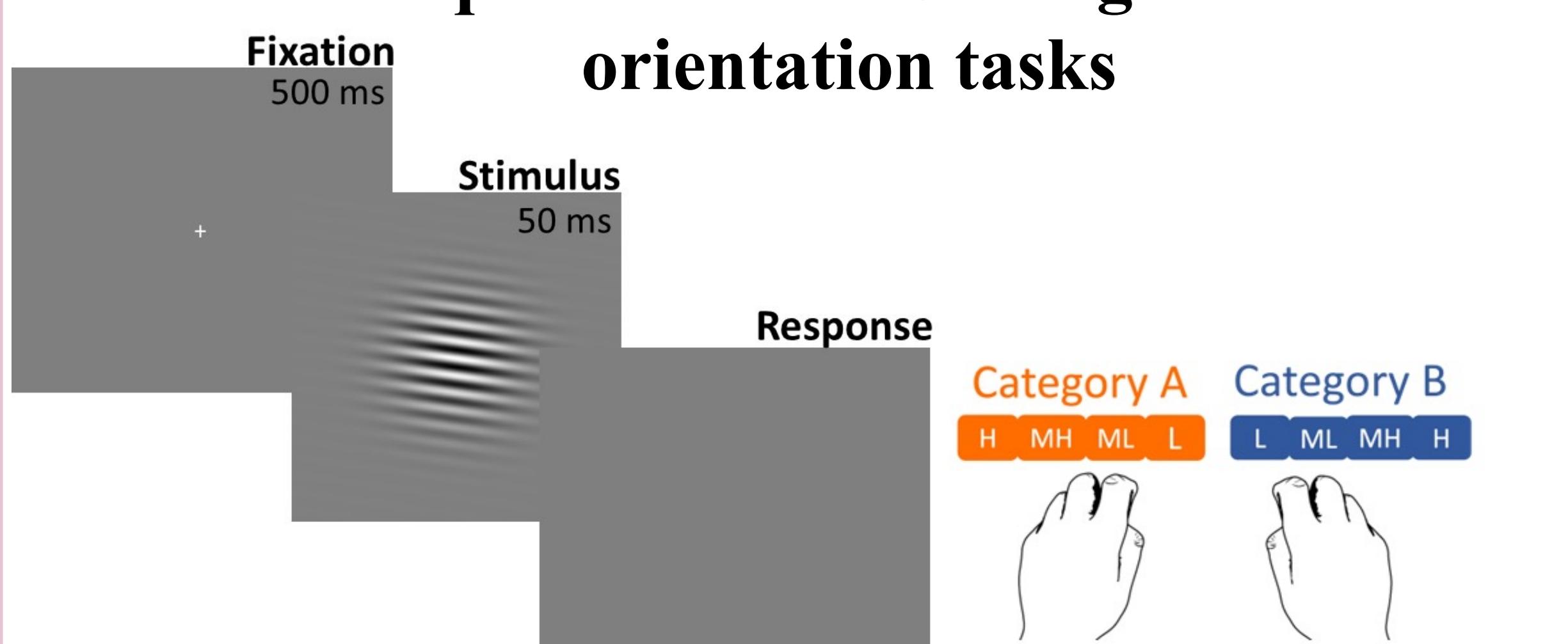
Perception combines<sup>1,2</sup> :

- Prior** (Initial probability for a given stimulus)
- Reward** (Cost associated with a decision)
- Likelihood** (Sensory uncertainty)



## Method

### Trial sequence for the 3 categorization of orientation tasks



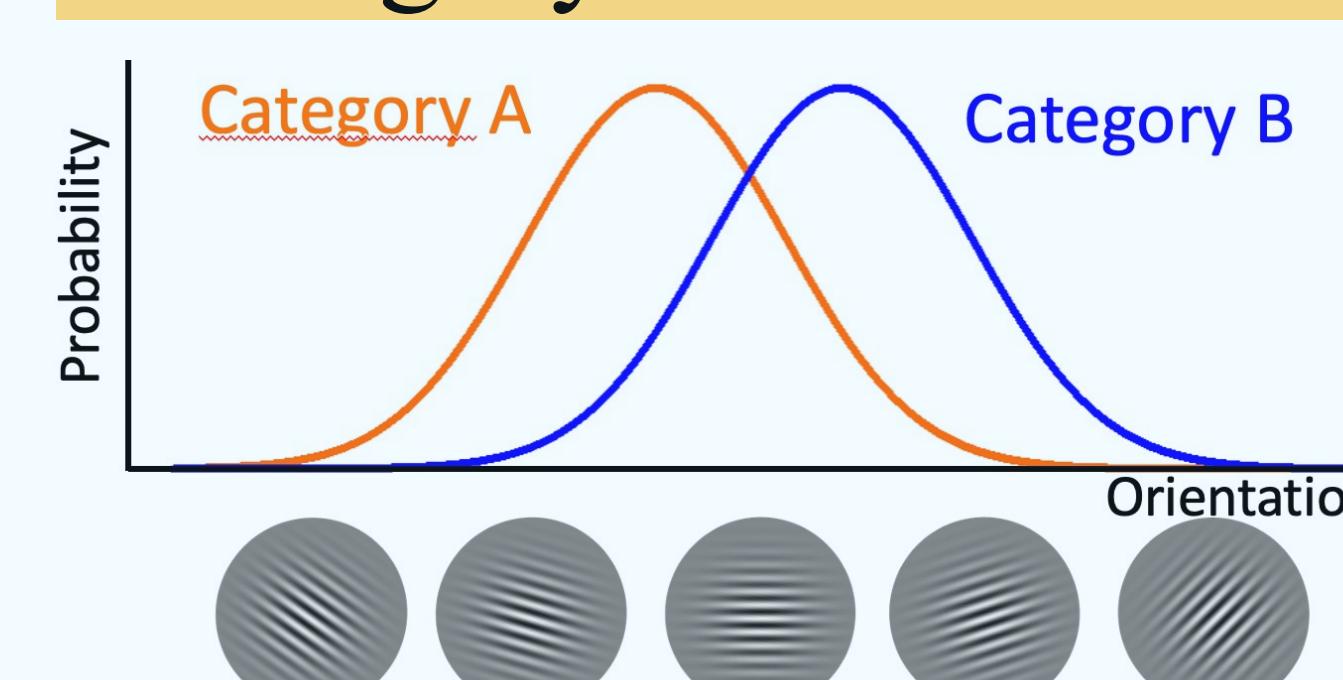
Each key corresponds to a category **and** a confidence level

#### Population

- 35 Participants with ASD
- 85 Neurotypical participants (NT)
- Measured variables : age, IQ (TONI score), AQ (Autistic quotient), CAPE.

### Prior and reward tasks

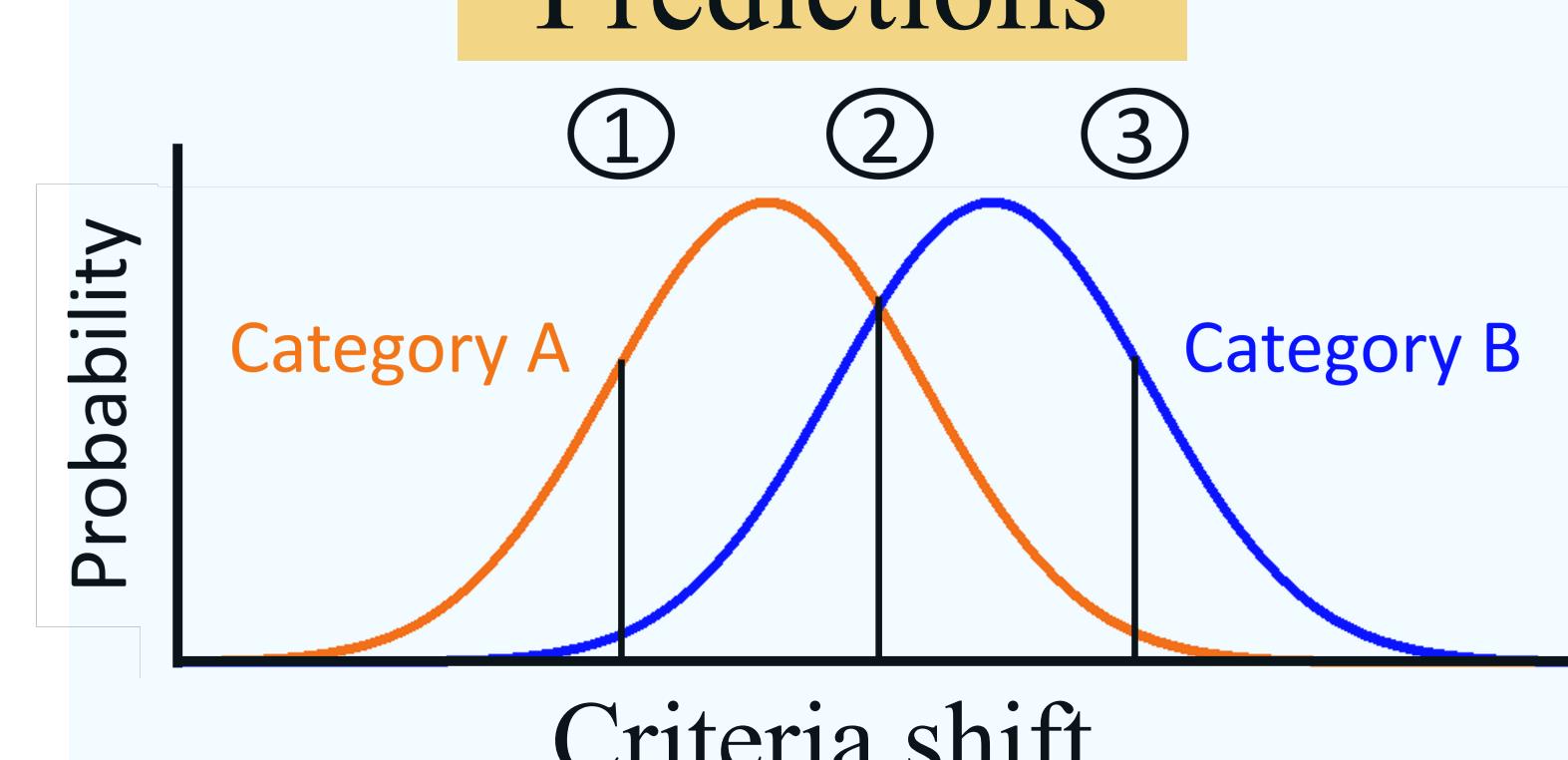
#### Category distributions



#### Blocked variables

- Prior : Category base rate  
① A = 25% ② A = 50% ③ A = 75%
- Reward : Points/correct answer  
① A = 1 pt ② A = 2 pts ③ A = 3 pts

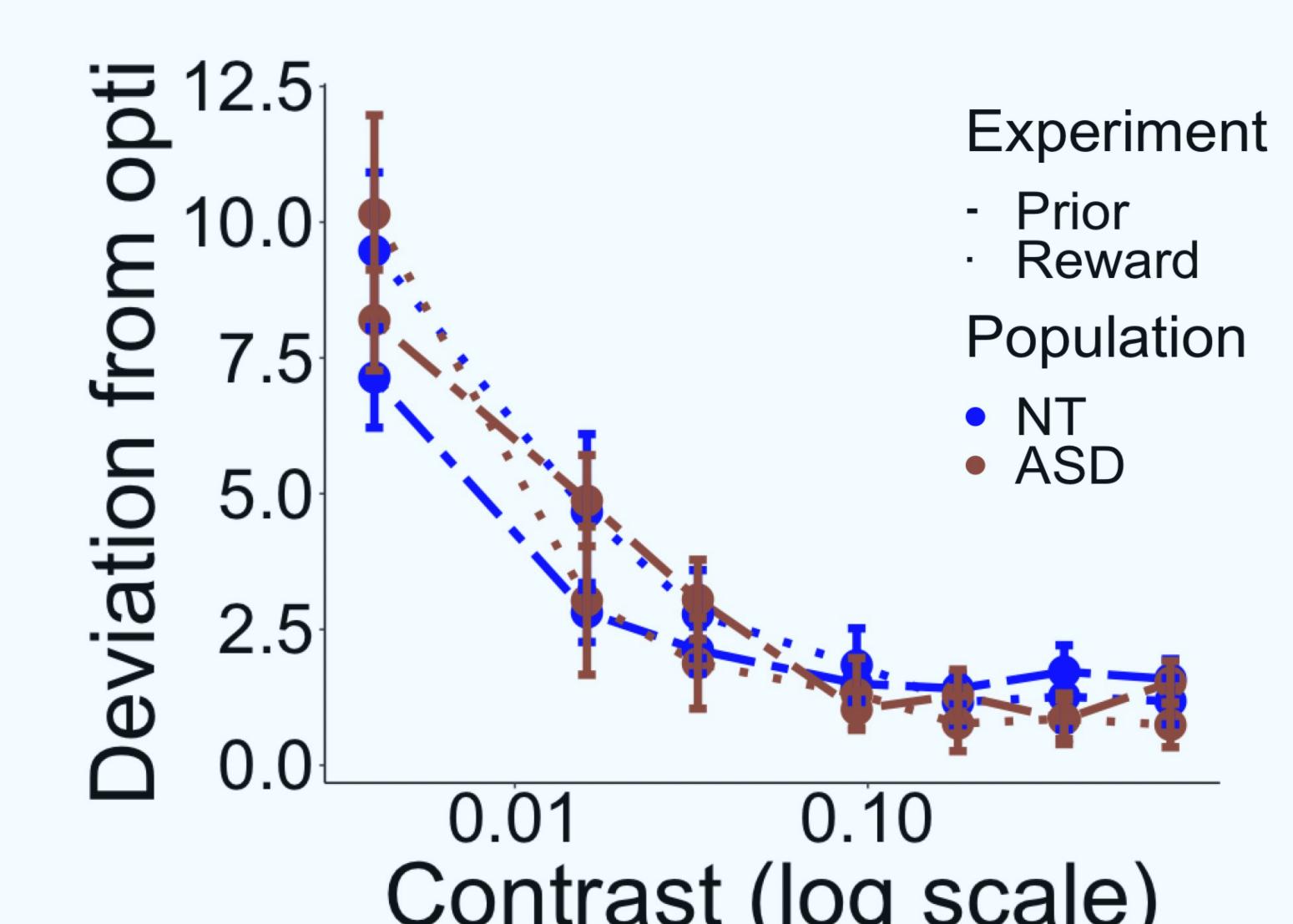
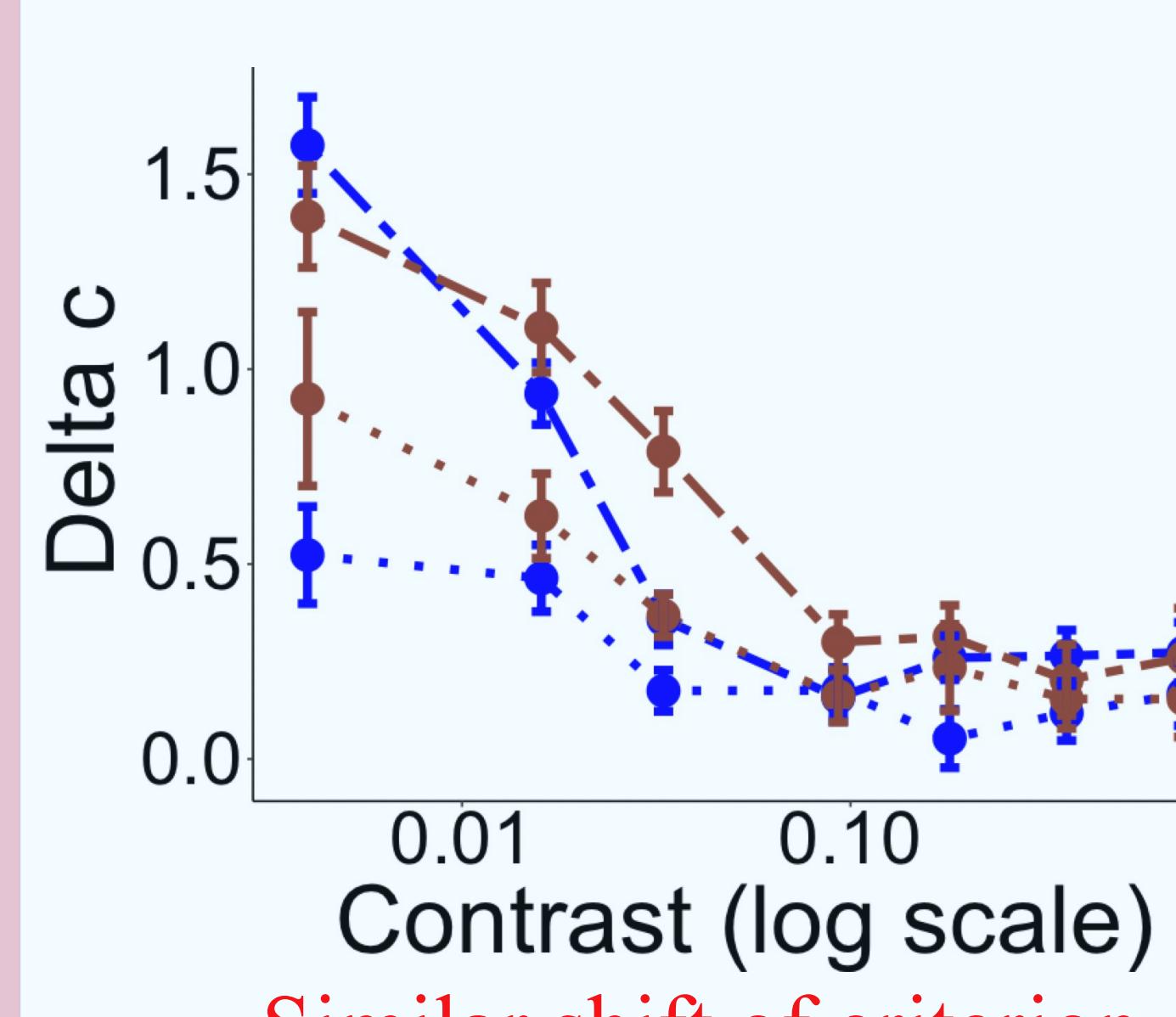
#### Predictions



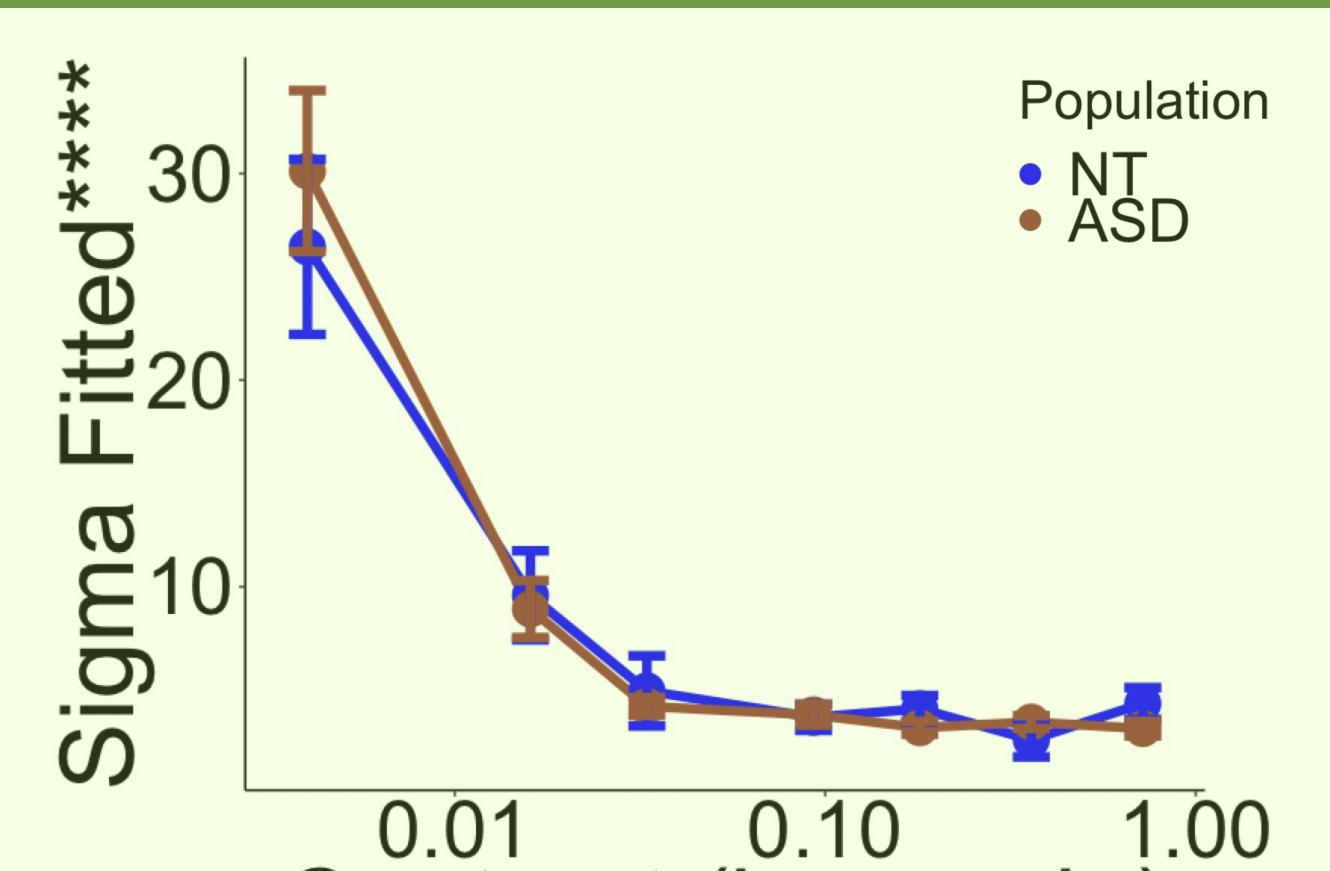
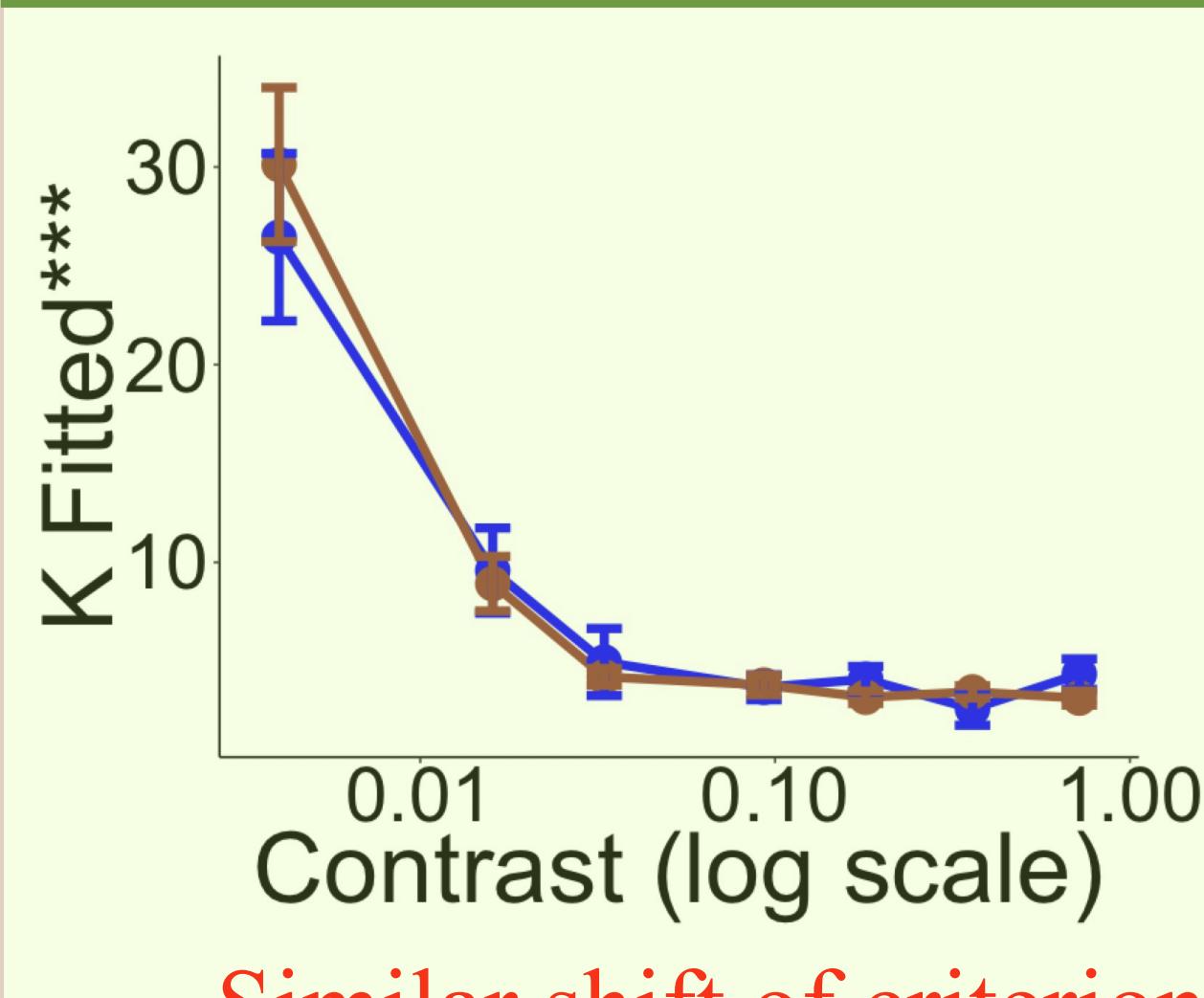
#### Likelihood



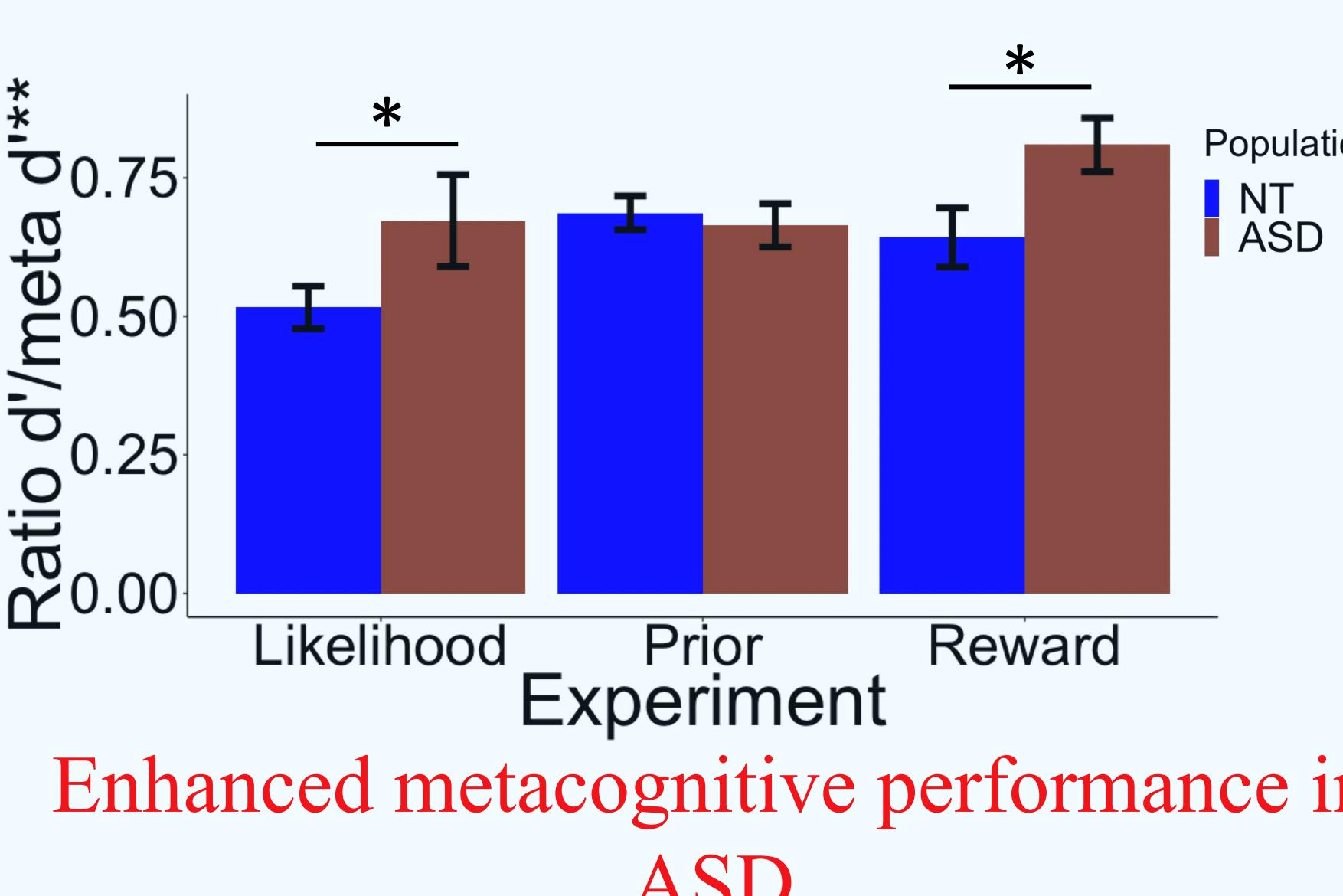
## Results



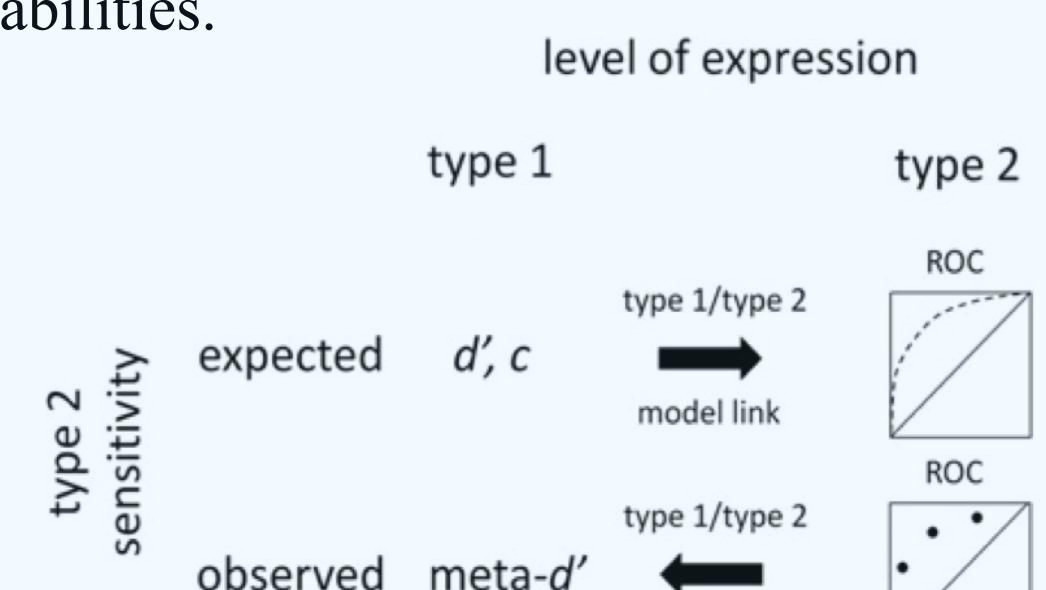
### Results



\*\*\*K fitted corresponds to the set of decision boundaries between the categories A and B.  
\*\*\*\*Sigma fitted is inversely proportional to d'.



\*\*Meta d' corresponds to a theoretically value of d' that a metacognitively optimal observer would have required to produce the empirically observed type 2 d' (See the following figure from Maniscalco & Lau, 2012). A ratio close to 1 means "ideal" metacognitive abilities.



## Conclusions

Individuals with ASD adjust their decision criteria similarly to NTs, and in a suboptimal manner.  
Surprisingly, individuals with ASD have better metacognitive abilities during perceptual decision making.

### References

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