

Bayesian models of atypical sensory perception in the autism spectrum

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Background

Atypical sensory perception such as AAA is estimated to occur in as many as 90% of autistic individuals (REF). Evidence suggests that this may occur from an over reliance on new sensory information (REF).

Several Bayesian theories have been proposed remain unresolved as to whether such disruptions are caused at the sensory level (likelihood) or in forming a weak model of the sensory environment (priors).

Research Questions

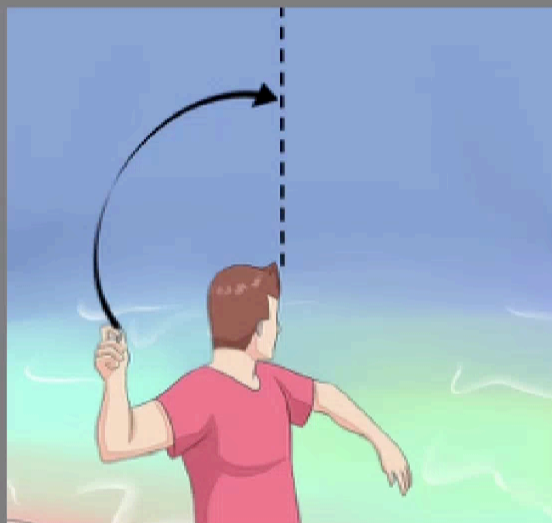
1. Do individuals with a diagnosis of autism spectrum disorder (ASD) rely more on new information i.e. likelihood vs model of the world (i.e. priors) compared to neurotypical (NT) individuals?
2. Do participants show differences in their prior and likelihood representations?

Methods

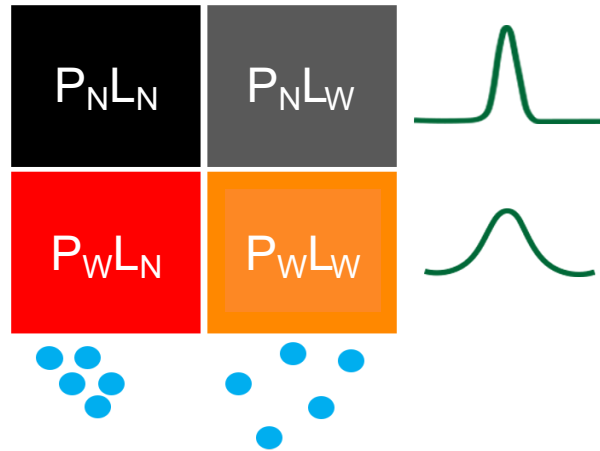


Coin Task (REF)

Thrower "A" will now throw the coin to the center



Statistical Analysis



The task resulted in 2 (Prior) x 2 (Likelihood) design

1. Likelihood Only Task

We conducted separate multivariate analysis of covariance (ANCOVA) with the following independent variables

- a. standard deviation of estimates
 - b. Mean reward error on the task
- wrepeated measures ANCOVA with
Analysis of covariance

Recruitment

NT = 48 and ASD = 32



Participant completed demographic, autism trait, sensory sensitivities, anxiety and depression **questionnaires** (~30mins)



Practice Task (~10mins)



Main experimental session (<1 hr)

- Participants completed the Coin-Task (REF) described in previous slide
- Participants completed the task while undergoing a magnetic resonance imaging (MRI) scan or outside of the scanner at a computer



'No Prior' Task (~15mins)

- Participants were asked to estimate the middle of the five blue dots (i.e. splashes).
 - completed a task outside of the MRI.

Results

Demographic profile of participants

- ASD group showed significantly more Anxiety () and Depression () and were older () than the NT group, thus these were included as covariates in all analyses

Results from the 'No-Prior' Task

The NT group showed more variability in their estimates compared to the ASD group in both types of likelihood.

Narrow

$$F = 13.711, p = <0.001^{**}$$

Wide

$$F = 6.697, p = 0.012^*$$

The ASD group showed more accuracy (less errors) in their estimation of the centre of the splashes (i.e. likelihood)

$$F = 6.841, p = 0.011^*$$

$$F = 5.458, p = 0.022^*$$

Results from the Main Experimental Task

- We found no differences in likelihood reliance between groups



Summary

Conclusion