Oblique Effect and Search Asymmetry in Autistic and Non-autistic Individuals

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Introduction

- Sensory symptoms are a core phenotype of autism.
- Altered perception in autism may stem from reduced sensitivity to the statistics (regularities) of the environment.
- Higher prevalence of cardinal orientations (0º, 90º) compared to oblique (45º):
  - Oblique effect: Higher sensitivity for cardinal orientations.
  - Orientation search asymmetry: Oblique targets are detected more easily among cardinal distractors, than vice versa..

- Objectives:
  - To investigate whether and how autistic individuals learn statistics of the environment.
  - Overall reduced performance across conditions ➡ reduced sensitivity in orientation judgment.
  - Reduced oblique effect and search asymmetry ➡ reduced sensitivity to environmental statistics.

Method

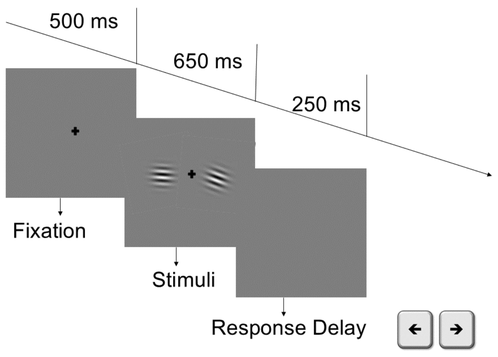
- To this aim, we tested two independent experiments.
  - Experiment 1: Orientation Discrimination (Autistic n=33, non-Autistic n=32)
  - Experiment 2: Visual Search (Autistic n=29, non-Autistic n=30)

- Prediction: Reduced sensitivity to the environmental statistics among autistic individuals.

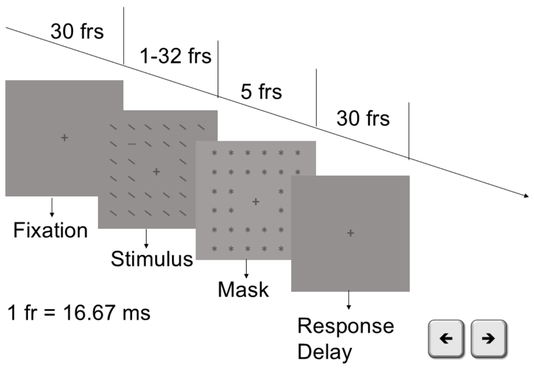
- Task:
  - Orientation Discrimination: Judging which Gabor is more clockwise.
  - Visual Search: Localizing the hemifield of a target, oriented at 50° (near oblique condition) among 80° oriented (near cardinal condition) distractors, and vice versa.

- Thresholds:
  - Orientation Discrimination: Vertical, Oblique and Horizontal conditions.
  - Visual Search: Thresholds are measured in terms of stimulus-onset asynchrony (SOA) for near-oblique target, and near-cardinal target conditions.

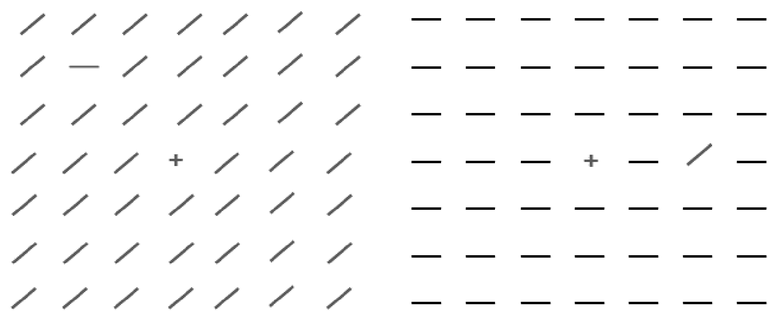
Experiment 1: Orientation Discrimination



Experiment 2: Visual Search



Stimuli: Visual Search



Near-cardinal target condition Near-oblique target condition

Discussion

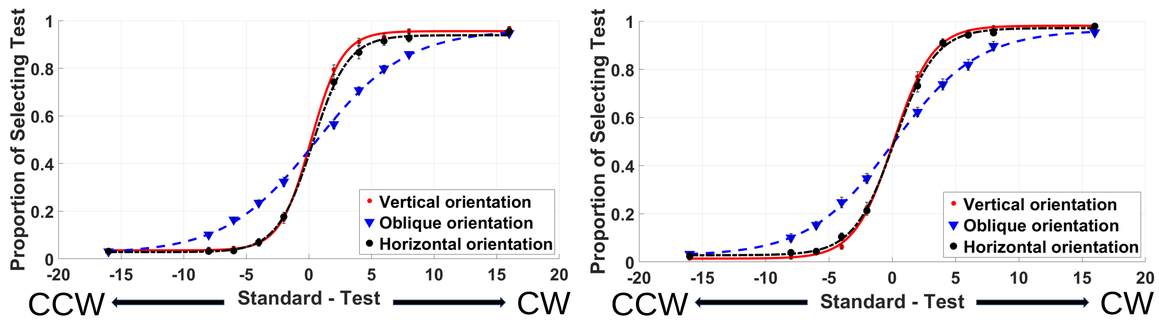
- Oblique effect :
  - Higher sensitivity to the cardinal orientations for both groups.
  - This suggests that autistic individuals show a similar amount of oblique effect as the non-autistic group.
- Search asymmetry:
  - Both groups showed better discrimination of near-oblique targets.
  - This shows that overall sensitivity to search asymmetry is not reduced in the autistic group.
- Conclusion:
  - Autistic group shows an advantage in processing cardinal orientations over oblique ones, in both discrimination and visual search tasks.
  - Autistic individuals learn statistics of the environment; their perceptual system is tuned to the more prevalent stimuli.

Results

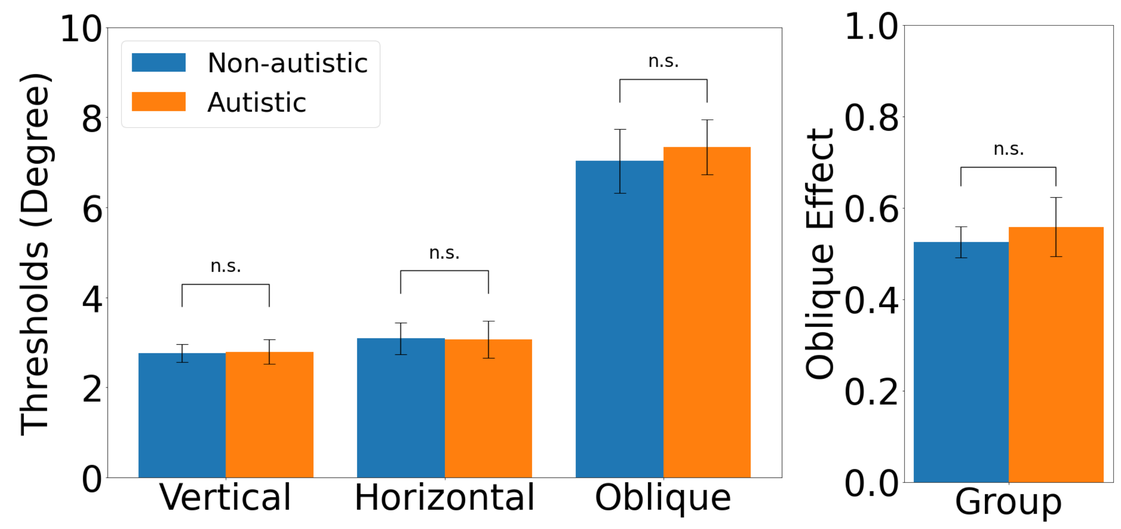
Main effect: Only tested conditions have main effect on thresholds in both experiments.
Groups-Conditions interaction: No interaction.

Experiment 1: Orientation Discrimination

Autistic Non-autistic

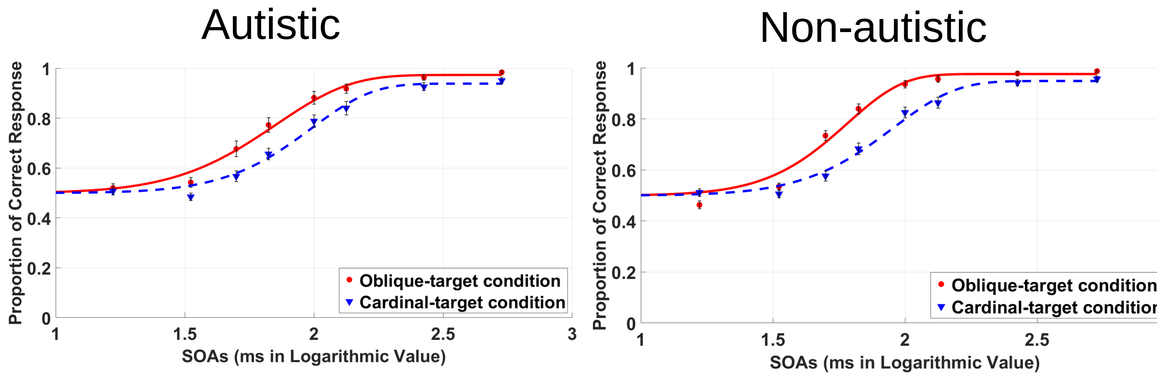


Autistic group shows a comparable oblique effect

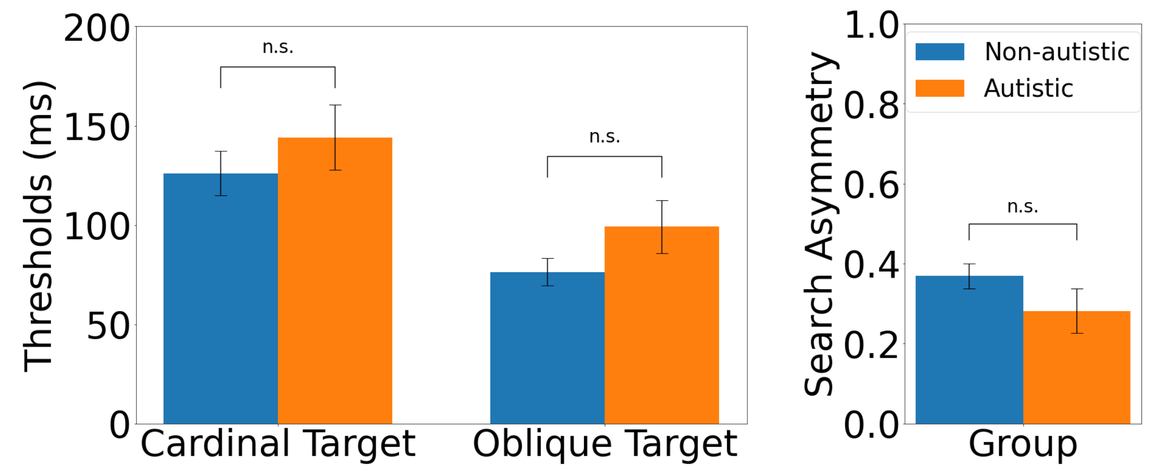


Experiment 2: Visual Search

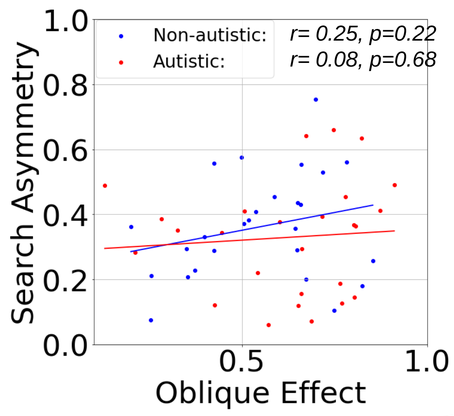
Autistic Non-autistic



Autistic group shows a comparable search asymmetry



Correlation: Oblique effect and search asymmetry



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