Neural response to dynamic and static faces in adults with autism spectrum disorder and typical development

Kathryn McNaughton, Adam Nacles, Takumi McAllister, Dylan Stahl, Simone Hasselmo, Talena Day, Tatiana Winkelman, Lena Chan, James McPartland
McPartland Lab, Yale Child Study Center, New Haven, CT

Background

- Autism spectrum disorder (ASD) is characterized by difficulties in social interaction.
- Electroencephalography (EEG) can be used to study social perception, with the N170 event-related potential (ERP) marking face-sensitive processing.
- Adults with ASD have slower N170 latencies in response to static social stimuli (McPartland et al., 2004).
- While dynamic social stimuli provide a more ecologically valid means of assessing social perception, no study has directly compared neural response to dynamic and static social stimuli in ASD and typical development (TD).
- The objective of this study was to identify differences in neural processing of dynamic faces and static faces in individuals with ASD and TD.

Method

Participants

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>n</th>
<th>Mean Age (Range)</th>
<th>Mean nonverbal IQ (Range)</th>
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<tbody>
<tr>
<td>ASD</td>
<td>16</td>
<td>24.1 (18-35)</td>
<td>102 (74-123)</td>
</tr>
<tr>
<td>TD</td>
<td>29</td>
<td>26.3 (19-39)</td>
<td>113 (85-134)</td>
</tr>
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EEG and Eye-tracking Data Acquisition:

- EEG was recorded at 250 Hz (static paradigm) or 1000 Hz (dynamic paradigm) with a 128-channel Hydrocel Geodesic Sensor net.
- Eye-tracking data were collected using an Eyelink-1000 remote camera system for the dynamic faces paradigm.

Figure 1. Selection of electrodes for analysis.

ERP Analysis

- N170 (120-270ms) ERPs were extracted from electrodes over left and right occipitotemporal regions (electrodes 58, 64, 68, 59, 65, 69, and electrodes 89, 90, 91, 94, 95, 96 respectively, see Fig. 1). Data were filtered at 0.1 Hz to 30Hz and segmented from -100 to 500ms.
- For the dynamic face paradigm, ERPs were segmented relative to the eyes or mouth opening. For the static face paradigm, ERPs were segmented relative to the appearance of the face.
- Peak latency was analyzed in repeated measures ANOVAs (with diagnostic group as a between-subject factor and face condition and hemisphere as within-subject factors) for each paradigm.

Results

Conclusions

- This work replicates previous findings of delayed N170 latencies to static faces but not houses in individuals with ASD.
- Interestingly, similar N170 latency delays were not seen in response to gaze-contingent dynamic faces.
- These discrepant findings could also be a relic of data loss in the dynamic faces paradigm, as individuals who had a longer N170 latency to static faces contributed fewer artifact-free trials to data analysis of dynamic stimuli, and were therefore more likely to be excluded.
- This work highlights the importance of considering data loss in dynamic paradigms. Missing data can provide meaningful information but can also limit the generalizability of findings.
- Ongoing work will make gaze-contingent paradigms more accessible to all participants by incorporating motion-responsive technology to paradigm administration to maximize data collection during moments of attention and stimulus.

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References:


McPartland Lab
mcp.lab@yale.edu
mcp-lab.org