Background

- Recognition of biological motion is an early developing aspect of social brain development. Individuals with ASD show reduced visual preference for biological motion versus non-biological motion and attenuated brain response to biological motion.
- Electrophysiological investigations of biological motion have revealed a right lateralized N200 sensitive to biological vs. scrambled motion and atypical patterns of lateralization in ASD.
- Although previous research has identified attenuated brain response to social information in females with ASD, sex differences in electrophysiological response to biological motion in ASD remain unexplored.
- We predicted that individuals with ASD would display attenuated brain response to biological and atypical patterns of lateralization. We predicted that females with ASD, relative to males, would show attenuated brain response to biological motion.

Method

Participant Demographics

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Preliminary Results

- **P100**
  - Amplitude: A main effect of sex indicated that females in both groups had smaller P100s [F(1, 63) = 14.64, p < .01].
  - Latency: A condition by group interaction indicated that individuals with ASD had faster P100s to biological motion [F(1, 63) = 5.59, p = .02].

- **N200**
  - Amplitude: A main effect of condition indicated that biological motion was more negative than scrambled motion [F(1, 63) = 6.79, p < .01].
  - A condition by hemisphere by group interaction revealed greater differentiation between biological and scrambled motion in the right hemisphere in TD [F(1, 63) = 3.70, p = 0.07; Figure 4]. This was observed as a significant hemisphere by condition interaction in the TD group [F(1, 30) = 5.89, p = .045]. This effect was not observed in the ASD group [F(1, 33) = .57, p = .48].
  - Planned comparisons indicated a main effect of condition in TD [F(1, 30) = 4.02, p = .05] but not ASD [F(1, 33) = .02, p = .90].
  - In ASD, a gender by hemisphere interaction indicated left lateralization for males and right lateralization for females [F(1, 33) = 3.00, p = .08].
  - Latency: A main effect of condition indicated that the N200 peaked later for biological than scrambled motion [F(1, 63) = 23.48, p < .01].

- **Slow Wave**
  - Amplitude: A main effect of condition indicated more negative amplitude for biological motion [F(1, 63) = 15.49, p < .01]. A main effect of hemisphere indicated more negative amplitude in the left hemisphere [F(1, 63) = 7.87, p < .01]. A group by hemisphere by condition interaction indicated greater differentiation of biological motion in the left hemisphere in ASD and the right hemisphere in TD [F(1, 63) = 3.11, p = .06; Figure 5].

Conclusions

- Distinct neural responses differentiated biological motion from scrambled motion at both the N200 and a subsequent slow wave.
- Individuals with ASD did not show differentiation of biological and scrambled motion at an early index of social perception (N200). However, differentiation was observed at the subsequent slow wave (400-900ms).
- TD individuals, but not those with ASD, displayed expected right lateralization at the N200. At the subsequent slow wave, TD individuals displayed right lateralization, while those with ASD showed increased differentiation of biological motion over time.
- These results suggest a disruption in the early time course of social perception that may influence the later differences in lateralization in ASD.
- Across groups, females displayed smaller amplitudes at an early sensory component (P100).
- Atypical left-lateralized patterns of brain activity were more pronounced in males with ASD, while females with ASD displayed a more normative right-lateralized pattern of activity at the N200.
- Future analyses will include a sample of unaffected siblings of individuals with ASD.
- We will also incorporate individuals with a wider range of cognitive and adaptive ability to explore the relationship between clinical characteristics, sex, and brain activity.

References


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Figure 1: Trial structure depicting biological and scrambled motion

Figure 2: Left and right lateralized waveforms depicting brain response to biological and scrambled motion

Figure 3: Electrode recording sites

Figure 4: Right hemisphere N200 Amplitude

Figure 5: Difference between biological and scrambled motion across the slow wave by group and hemisphere