Comparing Eye Gaze Patterns of Autistic and Typically Developing Children in Naturalistic Social Conversation

Background. Research suggests that individuals with autism spectrum disorder (ASD) often avert their gaze from others' eye region during social interaction, as well as struggle to initiate and maintain eye contact (Greene et al., 2019; Frazier et al., 2017; Senju & Johnson, 2009). However, the bulk of this research has relied on the development of automated eye-tracking methodologies that follow the eye gaze of children with autism as they interact with robots or watch videos of social stimuli (Zhao et al., 2021; Liu et al., 2021). It is important, therefore, to study if autistic children demonstrate divergent eye gaze patterns in naturalistic social interaction with real individuals. By recording live conversations between children with and without ASD and a confederate, we can compare the degree to which divergent eye-region looking patterns differs across diagnostic cohorts and assess these frequencies in naturally-occurring, real-life scenarios.

Objectives. Manually annotate the frequency of looking patterns and eye contact established in live conversations between a child and a confederate. Compare these looking patterns of autistic children with those of typically developing children to study potential eye gaze divergence.

Methods. Children ages 12-17 were recruited and grouped into either an autistic cohort (ASD, n=57) or typically developing cohort (TDC, n=57), and these participants were matched across age, full-scale IQ, and sex. Each child was then randomly paired with a novel research assistant confederate to have a three-minute conversation using the Contextual Assessment of Social Skills (CASS) paradigm (Ratto, et al., 2010). The participant and confederate were seated on either side of a two-way camera that recorded the interaction. These recordings were then spliced into one-second-long clips. Manual annotations of these clips recorded whether each individual in the conversation was looking at the face of the other, and if both people engaged in looking behavior, this was coded as "eye contact."

Results. Statistical analysis compared looking behaviors between ASD and TDC participants. There were no significant differences in confederate looking patterns, regardless of whether the participant was in ASD or TDC cohort. Children in the ASD cohort demonstrated significantly less looking behavior in the direction of the confederate (r=0.53) than did the TDC cohort. Similarly, there was significantly less mutual eye contact established between confederate and ASD participants (r=0.56) than with TDC participants. Lastly, there was a greater frequency of neither confederate nor participant initiating looking behavior in the ASD cohort (r=0.52).

Conclusions. Extending the results of previous research to naturalistic conversation settings, these findings provide preliminary evidence that children with autism demonstrate significantly less eye contact initiation and maintenance in live, naturalistic conversations than do typically developing children.