Gaze versus arrows: Referential intent and word learning in children with autism spectrum disorders and typical development

Janet Bang1, 2, Corentin Montiel1, and Aparna Nadig1, 2
1School of Communication Sciences and Disorders, McGill University, 2Center for Research on Brain, Language, and Music

Background and Aims

When learning new words, it is unclear whether children with ASD and typically-developing children (TYP) attribute intent to a speaker’s referential gaze (i.e., eye gaze directed to an object) or are simply guided by attentional salience (e.g., Baron-Cohen et al., 1995, Bari Hars et al., 2012). Few studies have examined the long-term retention of information about new words (e.g., recalling semantic features; Norbury et al., 2010).

- Is attention to referential gaze greater than attention to a moving arrow (control for attentional salience)?
- Do children learn more semantic features about a novel object with referential gaze versus a moving arrow?
- What information do they retain one week later?

Participants

<table>
<thead>
<tr>
<th></th>
<th>ASD (n = 13)</th>
<th>TYP (n = 25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>(years; months, M [SD], range)</td>
<td>(years; months, M [SD], range)</td>
</tr>
<tr>
<td>Gender (M : F)</td>
<td>10 : 3</td>
<td>17 : 8</td>
</tr>
<tr>
<td>Nonverbal IQ (Stanford-Binet, M [SD], range)</td>
<td>110.54 (12.41)</td>
<td>113.64 (13.55)</td>
</tr>
<tr>
<td>Language ( (CELF-4 Word Classes - Total Standard Score, M [SD], range) )</td>
<td>10.17 (3.97)</td>
<td>12.36 (3.2)</td>
</tr>
<tr>
<td>Socioeconomic status (Maternal education)</td>
<td>54% university or higher</td>
<td>80% university or higher</td>
</tr>
<tr>
<td>Social Communication Questionnaire</td>
<td>21.31 (5.82)</td>
<td>3.66 (2.65)</td>
</tr>
</tbody>
</table>

Procedure and Results

On-line attention to cue (ASD n = 13, TYP n = 25)

- **Attention to cue**:
  - Both groups of children attend significantly more to referential gaze versus an arrow when the cue is directed at the target object, but typically-developing children also make more contingent looks between (referential gaze – target) versus (arrow – target). This suggests that children with ASD may not be using the cue in the same way as typically-developing children (Norbury et al., 2010).

- **Learning**: Whereas children did not differ between cues in their on-line learning (e.g., latency to target), differences were seen in the off-line measure of recollection of semantic features. For both groups, learning from either cue had similar effects immediately after the video. However, one week later, typically-developing children produced significantly more semantic features for objects taught with referential gaze versus an arrow, whereas children with ASD showed no difference.

These findings suggest that typically-developing children treat referential gaze cues differently than an arrow, and they retain more semantic features about a target object one week later in the gaze condition. Children with ASD show subtle differences in their processing of gaze which may reduce their retention of semantic features.

References


Acknowledgements

This work was partially supported by The Autism Research Training program funded through the CBRRI Strategic Initiative in Health Research, with supplemental funding from the Simons Family Foundation and McGill University, support from the Center for Research on Brain, Language, and Music, as well as a Travel Award to J.B. from the Drs Alfred & Mark-Alston Travel Fund in Medicine. We also thank Lisa Bissett, Hida Caliskan, Nowrin Hoque, Nicole Khammar, Verona Soliman, Helen Valkanas, and Milva Venditti for their help with testing and coding. Finally, we thank the families in Montreal who gave their time to participate in this study.