Joint Attention Cues and Children with Autism Spectrum Disorders, Developmental Delay, and Typical Development

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Abstract

It has been established that children with autism have more difficulty responding to multi-modal cues to shift their visual attention than children without autism of equivalent language and developmental level. Deficits associated with autism in using a cue to direct attention may be affected by several different factors, including difficulties in interpreting social cues, rapid shifting of attention, and disengaging from a complex visual stimulus (i.e. Chapman, 1998; Courchesne et al., 1994; Minshew et al. 1993). This poster reports a study of the use of visual cues and non-social stimuli and the relationship to other areas of development, including language and social skills. By studying young children in relatively natural circumstances, we address information processing and social cues of variance in orientation of gaze and shifting of attention.

Our sample consisted of 162 children, 110 male and 52 female, with a mean chronological age of 55 months (SD=22). Diagnostic groups included children with autism (N=74), Pervasive Developmental Disorders Not Otherwise Specified (PDD-NOS; N=25), non-autism spectrum developmental delay (N=17), and typical development (N=46), matched on Verbal Mental Age. These groups were compared on 10 tasks that systematically varied methodological factors, such as timing and type of cue that might affect response to social stimuli.

Children with autism and children with PDD-NOS were less consistent in gaze establishment than both the developmentally delayed and typically developing children. Both children with autism and PDD-NOS had difficulty disengaging from the target toy after it was activated. Implications of findings for diagnosis and intervention will be discussed.

Methods

Participants

Children with autism or PDD-NOS were recruited through the Developmental Disorders Clinic of the University of Chicago Hospitals. The children comprising the other developmental delay group and the typically developing children were recruited primarily through advertisements sent to local day care centers and preschools.

Each child was assessed at the Developmental Disorders Clinic and was administered the Autism Diagnostic Observation Schedule (ADOS; Lord et al. 2000) in addition to the following: typically the Differential Ability Scale (DAS, Elliott, 1990) or the Mullen Scales of Early Learning (Mullen, 1985). As the final part of the assessment, each child completed the tasks comprising this study.

Four diagnostic groups of children were included: children with autism, Pervasive Developmental Disorders Not Otherwise Specified (PDD-NOS), other non-ASD developmental delays, and typical development.

Experimental groups were matched based on verbal mental age (VMA). The sample of children with autism was divided into less and more advanced groups, defined by VMA (>15), and the higher VMA (>21) sample was matched to the other three diagnostic groups.

Table 1 for a breakdown, by diagnostic group, of race, gender, verbal and nonverbal mental ages (VMA), verbal and nonverbal IQ, and chronological age in months.

Procedures

• All tasks took place in a small room that contained a table and chairs (for the same as TYP and HAUT).
• Set number of opportunities for each goal.
• If a goal is met on 1st or 2nd opportunity, the following opportunities were skipped.

Results

In order to test the effect of order on each type of goal, data were divided into groups based on the order of tasks administered:

- Percent of participants who met the goal was tested using Fisher’s Exact Test, and no significant effects were established for the order of task administration.
- Data were also divided into sets administered during the 1st or 2nd half, and there were no significant differences between the 1st half and the 2nd half.
- ANOVAs were conducted to test for between group differences on each type of goal.
- Differences were found on: establishing attention on the first trial (F(4, 156)=16.67, p<.001), establishing attention to the examiner collapsed across opportunities (F(4, 156)=4.19, p=.001). Short shift to the target collapsed across 3 opportunities (F(4, 156)=1.25, p=.27). Long shift to target collapsed across 3 opportunities (F(4, 157)=.765, p>.05). Disengage from target on first trial (F(4, 156)=3.62, p=.01). Disengage from target collapsed across 3 opportunities (F(4, 156)=.027, p>.01).

Only shifts with 5 attempts to establish attention prior to the shift were analyzed here.

- Table 2 for a complete breakdown of means, standard deviations, and ranges by goal and group.

Discussion

These findings suggest that children with ASDs have significant difficulties establishing attention initially when compared to children who do not have an ASD.

- Establishing attention seems to be the clearest difference between ASD and non-ASD groups.
- Supports the validity of establishing attention as a diagnostic feature of autism.
- Differences with children with an ASD and a high VMA will shift their attention at similar rates to children with other ASDs and non-ASD delays.
- The findings that children with PDD-NOS shifted at similar rates to children without an ASD, but had more difficulty establishing attention and disengaging from the target children than children without an ASD may inform diagnosis and treatment.
- When examining disengaging as a diagnostic factor, it is important to note that the 1st trial only about half of the non-ASD children successfully disengaged from the toy that was moving and making noise.
- Analysis of the aspects of joint attention tasks that seem to affect the performance of children in life will help us understand the development of diagnostic measures as well as intervention and program planning.
- Furthering understanding of joint attention as a phenomenon can inform research on early language development.

Table 2. Descriptions by Goal and Group

<table>
<thead>
<tr>
<th>Goal</th>
<th>Setting</th>
<th>TYP</th>
<th>OTH/DD</th>
<th>PDD</th>
<th>HAUT</th>
<th>LAUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Establish Attention to the Examiner</td>
<td>Oral Cue, &quot;Child’s Name&quot;</td>
<td>1 or 3 opportunities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Shift to the Target</td>
<td>Gaze or Point</td>
<td>Target activates</td>
<td>1 or 3 opportunities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Disengage from Target</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1, Item and Goal Hierarchy

- General Points about Each Item
  - set number of opportunities for each goal
  - if a goal is met on 1st or 2nd opportunity, the following opportunities were skipped

Selected References


Table 1. Participant Characteristics

<table>
<thead>
<tr>
<th>Participant</th>
<th>Gender</th>
<th>Age (months)</th>
<th>VMA</th>
<th>Nonverbal IQ</th>
<th>Chronological Age</th>
<th>Mental Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYP</td>
<td>Male</td>
<td>38.4</td>
<td>94.9</td>
<td>73.9</td>
<td>78.7</td>
<td>73.0</td>
</tr>
<tr>
<td>OTH/DD</td>
<td>Female</td>
<td>39.0</td>
<td>90.0</td>
<td>63.4</td>
<td>76.3</td>
<td>75.0</td>
</tr>
<tr>
<td>PDD</td>
<td>Male</td>
<td>36.4</td>
<td>89.5</td>
<td>61.2</td>
<td>75.0</td>
<td>71.7</td>
</tr>
<tr>
<td>HAUT</td>
<td>Male</td>
<td>35.8</td>
<td>88.9</td>
<td>60.2</td>
<td>72.0</td>
<td>67.0</td>
</tr>
<tr>
<td>LAUT</td>
<td>Female</td>
<td>33.6</td>
<td>83.6</td>
<td>57.5</td>
<td>69.9</td>
<td>62.8</td>
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</tbody>
</table>