**Linguistic Differences in the Production of Narratives by Adolescents with and without Autism Spectrum Disorder**

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**Background**

- Autism spectrum disorder (ASD) is characterized by difficulties with social communication and interaction as well as repetitive behaviors and restricted interests (American Psychiatric Association, 2013).
- ASD entails deficits in understanding the mental states of others (Baron-Cohen, et al., 1985).
- Children with ASD produce fewer words referring to mental states (Tager-Flusberg, 1993).
- Certain language impairments, such as difficulties with personal pronouns, are characteristic of ASD:
  - Individuals with ASD produce fewer pronouns in narratives (Coffe et al., 2008).
- Speech errors or disfluencies increase under conditions of stress (Carroll, 1986).

**Research Question**

Do fluent children and adolescents with ASD differ from typical children and adolescents in their production of pronouns, mental state expressions, and disfluencies when telling stories under stressful conditions?

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**Method**

- Data collected at Emerson College.
- Used the Trier Social Stress Test, a laboratory procedure used to induce stress and measure its effects (Kirschbaum, Pinke, & Hellhammer, 1993).
- Adapted the original narrative prompt for children with ASD: children were asked to complete a story about going to visit an old man in a big spooky house.
- In order to induce stress, children were asked to recite the ending of the story in front of a panel of judges viewed on a screen through a fake Skype call (see picture below).
- Participants had 3 minutes to tell their story.

**Participants**

- 20 typically-developing (TD) children and adolescents (8 females) and 20 children and adolescents with mild ASD (3 females) and fluent language.
- Matched for chronological age, English ability on the Kaufman Brief Intelligence Test (KBIT).

**Data**

- Data coded at Miami University.
- Audio files were recorded and imported into ELAN multimodal coding software.
- Stories were coded for speech, personal pronouns, mental state terms, and speech disfluencies.
- Disfluencies included: stutters, filler words, false starts, corrections, repetitions, phonological processes, prolonged syllables, tongue clicks, neologisms, and pronoun number mismatches.
- Reliability was performed by each member of the team checking each other’s work and discussion coding at weekly meetings.

**Results**

- Children with ASD produced more stutters (M = 4.5) and repetitions (M = 6.48) than TD children (M=1.47, 3.63, p = 0.05).
- TD children produced more prolonged syllables (M = 3.95) than children with ASD (M=1.6), p = 0.05.
- The groups did not differ on any other category.

**Discussion**

- When language ability is controlled for, linguistic differences between adolescents with and without ASD are quite small. However, we found that:
  - Fluent children with ASD showed evidence of increased stutters and repetitions under stressful conditions.
  - Children with ASD produce fewer mental state terms -- especially cognitive (e.g., think, know) and affective (e.g., scared, happy) terms -- than TD children.
  - Children with ASD produced more ambiguous 3rd person pronouns than TD children, which may reflect differences in theory of mind.

**Limitations:** sample size, data quality, and lack of a control (low-stress) condition.

**Future Directions:** analysis of prepositions, temporal terms, and spatial terms.

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- When language ability is controlled for, linguistic differences between adolescents with and without ASD are quite small. However, we found that:
  - Fluent children with ASD showed evidence of increased stutters and repetitions under stressful conditions.
  - Children with ASD may pay more attention to suprasegmental aspects of speech, thus resulting in more prolonged syllables than children with ASD.
  - Children with ASD produced fewer mental state terms -- especially cognitive (e.g., think, know) and affective (e.g., scared, happy) terms -- than TD children.
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**Table**

<table>
<thead>
<tr>
<th>Participants (n=44)</th>
<th>Mean Age (Years)</th>
<th>Mean CEFI</th>
<th>Mean KBIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD Participants (n=20)</td>
<td>13.0 (SD = 2.34)</td>
<td>105.0 (SD = 10.7)</td>
<td>110.0 (SD = 11.0)</td>
</tr>
<tr>
<td>Participants with ASD (n=20)</td>
<td>13.7 (SD = 2.21)</td>
<td>105.0 (SD = 13.9)</td>
<td>109.5 (SD = 20.8)</td>
</tr>
</tbody>
</table>

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**Diagram**

- Mental state terms:
  - TD children produced nominally more mental state terms (M=10.55, SD=5.94, range 4-23) than children with ASD (M=8.75, SD=5.02, range 0-20), p = .15, ns.
  - TD children produced a nominally higher number of different mental state terms (M=6.9, SD 3.68, range 3-18) than children with ASD (M=6.65, SD 3.69, range 0-16), p = .15, ns.
  - TD children produced more cognition and affect terms than children with ASD.

- Pronouns:
  - TD children produced nominally more pronouns (M=62.9, SD=16.1, range 35-94) than children with ASD (M=52.85, SD=23.76, range 13-95), however, this difference was not significant, p = 0.13.
  - The two groups did not differ in the overall proportion of pronouns that had clear antecedents (TD: 56.3%; ASD: 58.8%) versus ambiguous antecedents (TD: 43.6%; ASD: 41.1%).
  - TD children produced more 3rd person pronouns with clear referents (M=18.4, SD=11.34) than children with ASD (M=12.45, SD=8.94), p < .05.
  - Children with ASD produced more 3rd person pronouns with ambiguous referents (M=11.2, SD=10.68) than TD children (M=8.1, SD 8.83), p < .05.

**Ohio Speech-Language Hearing Association Convention, March 24, 2018**