Speech and gesture coordination in Autism Spectrum Disorders

Anna Lambrechts, Kielan Yarrow, Katie Maras and Sebastian Gaigg
City University London

Introduction

- Individuals with Autism Spectrum Disorders (ASD) experience difficulties with social interaction and communication.
- Recent studies suggest that abnormalities in timing and time perception may contribute to these difficulties (Allman et al., 2011).
- Individuals with ASD show atypical coordination and integration between iconic gestures and related speech and diminished quality of communication (de Marchena and Eigsti, 2010; Silverman et al., 2010).

Do individuals with ASD show atypical temporal coordination of speech and gesture in general?

Do temporal characteristics of speech-gesture coordination relate to the quality of speech as perceived by a typically developing (TD) listener?

Materials & Methods

- Participants

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<tr>
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<th>ASD (n=18)</th>
<th></th>
<th>TD (n=17)</th>
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<tbody>
<tr>
<td></td>
<td>mean</td>
<td>SD</td>
<td>range</td>
<td>mean</td>
</tr>
<tr>
<td>age</td>
<td>41.1 ± 13.0</td>
<td>25-62</td>
<td>47.6 ± 12.7</td>
<td>26-61</td>
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<tr>
<td>VIQ</td>
<td>111 ± 11</td>
<td>81-123</td>
<td>111 ± 13</td>
<td>82-128</td>
</tr>
<tr>
<td>PIQ</td>
<td>107 ± 13</td>
<td>84-128</td>
<td>109 ± 14</td>
<td>75-136</td>
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<tr>
<td>FIQ</td>
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<td>111 ± 14</td>
<td>77-135</td>
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- Task: Participants took part in a live event scenario in which they helped an experimenter perform first aid manipulations on a manikin. A number of actions were performed by the experimenter and others by the participant following a script. Later on, participants were interviewed by a different experimenter on what they recalled of the event, first in a free recall procedure and then by answering questions.

- Materials: Interviews were videotaped for transcription and further analysis (Maras et al., 2012). The present study analyses the free recall segment of the interview. These recordings represent a record of naturalistic production of speech and gestures in a standardised context.

Preliminary results

- Quantity of movement was extracted from each participant’s video as the number of pixels that changed in luminance by more than 30dB from frame n to frame n+1.
  → No difference in overall quantity of movement between groups.

- Intensity of speech was extracted using the software Praat, in dB.
  → Overall, speech intensity was significantly higher in the ASD than in the TD group (p<.005).

- Normalised cross-correlation coefficients were computed between the temporal discourses of quantity of movement and speech intensity.
  → main effect of lag
  → No main effect or interaction involving the factor group.

Next steps

(1) Quantification/Characterisation of gestures: two raters blind to participant diagnosis will segment the gestures (onset, stroke, offset) and categorise them (iconic, metaphoric, deictic, beat).

(2) Subjective quality of communication: two groups of observers blind to the experimental design will either watch the videos or listen to the speech alone (counterbalanced) and evaluate the quality of communication via a questionnaire. We predict the quality of communication to be rated higher for videos than for speech alone in both groups, with a more marked difference in the TD than in the ASD group.

(3) Time-lock between each type of gesture and speech intensity: we expect that cross-correlation scores will show a diminished time-lock between the onset of gestures and variations in speech intensity in ASD as compared to the TD group.

(4) Link between time-lock and quality of communication: we predict that the level of time-locking between speech and gesture characteristics will correlate positively with the quality of communication as perceived by TD individuals.

References


