Monolingual and Bilingual Children’s Use of Gestures and Grammatical Agreement in Pronoun Interpretation

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AMBIGUOUS PRONOUNS

• Context-sensitive words, e.g. he and she

• Ambiguous

“He is really cute!”
AMBIGUOUS PRONOUNS FOR ADULTS

- Adults use various cues:
  - Gender (Arnold et al., 2000)
  - Grammatical function (Gorden et al., 1993)
  - Order-of-mention (first-mentioned bias) (Arnold et al., 2004)
  - “Obama goes to the gym with Romney. He is really cute!”

HOW ABOUT CHILDREN?

- Children show successful pronoun resolution based on gender but NOT order-of-mention (e.g., Brener, 1983; Song & Fisher, 2005; Arnold et al., 2007).

<table>
<thead>
<tr>
<th>Condition</th>
<th>Stimulus sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIFFERENT/First-mention</td>
<td>Puppy is having lunch with Froggy. He wants some milk.</td>
</tr>
<tr>
<td>DIFFERENT/Second-mention</td>
<td>Puppy is having lunch with Froggy. She wants some milk.</td>
</tr>
<tr>
<td>SAME GENDER</td>
<td>Puppy is having lunch with Panda Bear. He wants some milk.</td>
</tr>
</tbody>
</table>

Notes: Puppy and Panda Bear are male; Froggy is female.
Arnold et al. (2007) Results

Percentage of times participants selected **1st-Mentioned** character

<table>
<thead>
<tr>
<th></th>
<th>Adults</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diff Gender-1st Mentioned</td>
<td>100</td>
<td>80</td>
</tr>
<tr>
<td>Diff Gender-2nd Mentioned</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td>Same Gender</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* p < 0.05

GESTURES

- Gestures may provide additional information that help disambiguate conceptual reference in speech (Barr et al., 1999; Thompson & Massaro, 1994)
- Co-referential localizing gestures (Kendon, 2004; McNeill, 1992)

Figure 1. Examples of (A) localizing gesture 1, (B) localizing gesture 2, and (C) coreferential gesture.

(source: Goodrich & Hudson Kam, 2012)
Goodrich & Hudson Kam (2012) Results

- Adults are less likely to interpret an ambiguous pronoun as the first-mentioned character when gestured to the second-mentioned character.

RESEARCH QUESTION

- How do children use communicative cues (gesture & speech cues) when interpreting ambiguous words, such as pronouns?
- Do bilingual children show a different pattern of development compared to monolingual children?
WHY BILINGUAL CHILDREN?

- Children growing up bilingual face unique communicative challenges
- Bilingual children need to monitor the dynamic communicative situation to:
  - determine what language a given speaker is using
  - respond appropriately

COMMUNICATIVE EFFECTIVENESS

- Appropriate use of:
  - two languages (Genesee et al., 1995; Comeau, Genesee, & Lapaquette, 2003)
  - different strategies to repair communication breakdown (Comeau, Genesee, & Mendelson, 2007)
- More effective use of:
  - verbal cues (hints & prompts) (Ben-Zeev, 1977; Cummins & Mulcahy, 1978)
  - Gricean conversation maxims (Siegal et al., 2009)
  - Others’ perspectives in communication difficulties (Genesee, Tucker, & Lambert, 1975)
  - nonverbal cues (referential cues and tone of voice) (Yow & Markman, 2009, 2011)
COMMUNICATING IN 2 LANGUAGES

• Such efforts to maintain communicative effectiveness may lead bilingual children to
  • have greater awareness of social, pragmatic and communicative contexts (Lanza, 1992)
  • be more skilled in understanding a speaker’s intent (Siegal & Surian, 2007)

RESEARCH QUESTION

• How do children use communicative cues (gesture & speech cues) when interpreting ambiguous words, such as pronouns?

• Do bilingual children show a different pattern of development compared to monolingual children given their sensitivity to communicative demands?
PARTICIPANTS

• 32 English monolingual and bilingual 4-year-olds
  • 16 monolinguals (9 males, mean age=4.58)
  • 16 bilinguals (9 males, mean age=4.45)
  • Languages: Spanish, Mandarin, Russian, French, Italian, Thai, Japanese, German

• 22 adults participated to obtain an adult comparison

SES & COGNITIVE ABILITIES

• Socio-economic status (SES) – property valuation
• Receptive vocabulary - PPVT
• Working memory – Digit Span
• Inhibitory control – Day/Night
SES & COGNITIVE ABILITIES

<table>
<thead>
<tr>
<th>Mean Age</th>
<th>Language Status</th>
<th>SES: Ratio of Median Property Valuation</th>
<th>Receptive Vocab.: PPVT</th>
<th>Working Memory: Digit-Span</th>
<th>Inhibitory Control: Day-Night</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.58</td>
<td>Monolingual</td>
<td>1.00</td>
<td>122.73 (10.68)</td>
<td>6.47 (1.19)</td>
<td>12.00 (2.70)</td>
</tr>
<tr>
<td>4.45</td>
<td>Bilingual</td>
<td>1.02</td>
<td>115.19 (14.12)</td>
<td>6.13 (1.89)</td>
<td>12.13 (2.68)</td>
</tr>
</tbody>
</table>

PROCEDURE

- Pictures of same-gender characters were shown in pairs
- 1st sentence: two characters doing some reciprocal action
  “Miss Owl is going out with Miss Ducky”
- 2nd sentence: one character wanted a particular item
  Miss Owl/She wants her bag”
- Presented paper object to child:
  “Can you give it to him/her?”
CONCLUSIONS

- No gesture used in neutral condition
- Gesture-1st: gesture with 1st-mentioned character
- Gesture-2nd: gesture with 2nd-mentioned character

RESULTS

Patterns of responses to 1st-Mentioned Character

![Graph showing patterns of responses to 1st-Mentioned Character]

Avg. no. of times 1st-mentioned character selected (out of 4)
CONCLUSION

- Adults showed a strong order-of-mention bias but also sensitivity to gesture
- For children, gesture works with order-of-mention bias to identify first-mentioned when both cues are consistent
- Monolingual children did not use order-of-mention for pronoun resolution
- Bilingual children showed an adult-like pattern: greater level of order-of-mention bias and sensitivity to gesture

CONCLUSION

- Growing up bilingual -> greater demands on communication
- Positive impact on children’s development in:
  - Understanding gestures
  - Internal-speech cues
THANK YOU

- Ellen Markman
- Whitney Goodrich
- Hannah Jaycox
- The Markman Lab
- The Bing Nursery School, Stanford University
- Parents and children who participated in the research