Asymmetries in grammar

Day 2: More asymmetries in child language

Petra Hendriks, LOT Winter School 2009

More asymmetries in child language

- Delay of Principle B Effect
- Bidirectional Optimality Theory
- More asymmetries: Scrambled objects in Dutch & Anaphoric subjects in Dutch
- Discourse influences DPBE
- Implications for theories of grammar

Here you see an elephant and an alligator

- The elephant is hitting himself.
  Children: NO
- The elephant is hitting him.
  Children: YES
- The elephant is hitting himself.
  Children: YES
- The elephant is hitting him.
  Children: YES

DPBE: Children’s pattern

<table>
<thead>
<tr>
<th></th>
<th>Production</th>
<th>Comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflexives</td>
<td>✓</td>
<td>✓ (adult-like)</td>
</tr>
<tr>
<td>Pronouns</td>
<td>✓</td>
<td>❌ (guessing pattern)</td>
</tr>
</tbody>
</table>

Constraints on referring objects

Faithfulness constraint:
- Principle A: Avoid reflexives with a disjoint meaning
  (= Reflexives must be locally bound)

Markedness constraint:
- Referential Economy: Avoid full NPs >> Avoid pronouns >> Avoid reflexives


Children’s production

Tableau 1:
Production of coreferential meaning

Tableau 2:
Production of disjoint meaning
Children's comprehension

Tableau 3:
Comprehension of reflexive

Tableau 4:
Comprehension of (object) pronoun

Communication

Speaker:
Intention \rightarrow Utterance

Hearer:
Utterance \rightarrow Interpretation

Bidirectional optimization

- Speaker's utterance = hearer's utterance
- Hearers are also speakers (and vice versa):

Bidirectional optimization

Bidirectional optimization = Optimization over form-meaning pairs, such that intended meaning of speaker corresponds to actual interpretation by hearer, and vice versa.

Bidirectional OT

A form-meaning pair \( <f,m> \) is bidirectionally optimal (Blutner, 2000) iff:

a. there is no other bidirectionally optimal pair \( <f',m> \) such that \( <f',m> \) is more harmonic than \( <f,m> \).

b. there is no other bidirectionally optimal pair \( <f,m'> \) such that \( <f,m'> \) is more harmonic than \( <f,m> \).

(Blutner, 2000: Weak bidirectional optimization)

Arrow diagram
(Dekker & van Rooy, 2000)
Arrow diagram (Dekker & van Rooy, 2000)

Unmarked form with unmarked meaning

Step 1

Unmarked form with unmarked meaning

Step 2

Unmarked form with unmarked meaning

Step 3

Marked form with marked meaning

Adults’ pattern for referring objects

<table>
<thead>
<tr>
<th></th>
<th>FAITH</th>
<th>MARK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Princ. A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ref. Econ.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tableau 5: Production and comprehension of referring expressions in object position.

Hearers take into account the perspective of the speaker

Ambiguous pronouns

- For children, object pronouns are ambiguous.
- For adults, object pronouns are disambiguated because adult hearers take into account the speaker’s perspective.
- Are asymmetries restricted to pronouns?
Are asymmetries restricted to pronouns?

- Je mag een knikker twee keer laten rollen. 'you may roll a marble twice'

Object scrambling in Dutch

- Je mag *een knikker twee keer* laten rollen. 'you may roll a marble twice'
  - Adults: referential reading
  - Children below 7 years old: non-referential reading (Krämer, 2000)
- Je mag *twee keer een knikker* laten rollen. 'you may roll a marble twice'
  - Adults + children: non-referential reading

Production of scrambled objects

- Dutch children exploit these two syntactic positions in a systematic way in production at age 3 (Schaeffer, 1995).
- Dutch children display the adult pattern in production from age 4 (Schaeffer, 2000).
- So why don’t 4-year-olds use this information in comprehension too?

De Hoop & Krämer (2005/6)

- Children’s pattern ➔ unidirectional optimization
- Adults’ pattern ➔ bidirectional optimization

- Children deviate from the adult pattern when they have to assign a marked meaning to a marked form.

Horn’s division of pragmatic labor

Horn (1984):

Unmarked forms go with unmarked meanings, and marked forms go with marked meanings.

Weak bidirectional OT gives rise to Horn’s division of pragmatic labor.

Adults’ pattern for indefinite objects

| C1: Objects get a non-referential interpretation. | MARK | MARK | MARK |
| C2: Indefinite NPs get a non-referential interpretation. |  |  |  |
| C3: Indefinite objects do not scramble. |  |  |  |

Tableau 6: Production and comprehension of scrambled and non-scrambled indefinite objects
### Children
For children:
- Unmarked forms and unmarked meanings are optimal, and therefore easy.
- Marked meanings and marked forms are always suboptimal, and therefore difficult.

### Children’s pattern

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MARK</td>
<td>MARK</td>
<td>MARK</td>
<td>MARK</td>
</tr>
</tbody>
</table>

Tableau 7: Production/comprehension of indefinite objects

### Puzzle
- If pronouns and reflexives also conform to Horn’s division of pragmatic labor, then pronouns are the marked forms.
- But pronouns are structurally less complex than reflexives!
- Perhaps pronouns are marked because they carry a weaker (less specific) meaning than reflexives.

### Acquisition delays
- Reinhart (2006): Acquisition delays only occur in comprehension, because in production a speaker already knows what she wants to say.
- Bidirectional OT: Acquisition delays may occur in comprehension as well as in production (depending on the constraints).

### Referring expressions
- Often, several forms could be used to refer to the same thing.
- Choice depends on topicality (Givón, 1993), accessibility (Ariel, 1990) or givenness (Gundel et al., 1993) of the intended referent.
- Speakers will generally use the form that is just informative enough on a scale of informativity (Gundel et al., 1993).

### Pronouns
Pronoun Rule (Centering Theory: Grosz, Joshi & Weinstein, 1995):
- If any Cf in an utterance is represented by a pronoun, then theCb must be represented by a pronoun.

➔ Pronouns are felicitously used to refer to discourse-salient entities, in particular the discourse topic.
Constraints on referring subjects

Markedness constraint:
• Referential Economy:
  Avoid full NPs >> Avoid pronouns >> Avoid reflexives

Faithfulness constraint:
• Pronouns refer to topics.

(Wubs, Hendriks, Hoeks & Koster, in press).

Adults’ pattern for subjects

<table>
<thead>
<tr>
<th>MARK</th>
<th>Ref. Econ.</th>
<th>FAITH</th>
<th>Pro.</th>
<th>Top.</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;pronoun, +topic&gt;</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;pronoun, -topic&gt;</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;full NP, +topic&gt;</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;full NP, -topic&gt;</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tableau 8:
Production and comprehension of referring expressions in subject position.

Children’s production

<table>
<thead>
<tr>
<th>Input:</th>
<th>MARK</th>
<th>Ref. Econ.</th>
<th>FAITH</th>
<th>Pro.</th>
<th>Top.</th>
</tr>
</thead>
<tbody>
<tr>
<td>+topic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pronoun</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>full NP</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tableau 9:
Production of topic

<table>
<thead>
<tr>
<th>Input:</th>
<th>MARK</th>
<th>Ref. Econ.</th>
<th>FAITH</th>
<th>Pro.</th>
<th>Top.</th>
</tr>
</thead>
<tbody>
<tr>
<td>-topic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tableau 10:
Production of non-topic

Predicting delays in production

Delays are predicted when the output of unidirectional optimization is different from the output of bidirectional optimization:

• As speakers, children are predicted to produce unrecoverable pronouns after topic shift.
• As hearers, children are predicted to fail to interpret full NPs as signaling a topic shift.

Wubs, Hendriks, Hoeks & Koster
(in press)

Experiment:
• Production of 4 stories based on series of pictures
• Comprehension of 8 pre-recorded stories
• Auditory memory task (see Thursday)

Participants:
• 31 Dutch children (4;3-6;5, mean: 5;6)
• 23 Dutch adults (20;7-30;9, mean: 24;7)
A pirate is walking with a ball. He kicks away the ball. But then the ball falls into the water and he starts to cry.

A knight arrives with a fishing net. He scoops the ball out of the water. And then the pirate has his ball back again.

Children’s production of topic shift

<table>
<thead>
<tr>
<th>Children (4- to 6-year-olds)</th>
<th>Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pronouns</td>
<td>Full NPs</td>
</tr>
<tr>
<td>95</td>
<td>34</td>
</tr>
</tbody>
</table>

Coding of production stories

Scoring by 2 independent annotators (96.8% agreement on topic shift, 95.8% agreement on target item):

1) Determine topic:
   - Topic is mentioned in previous utterance.
   - Topic is pronominalized.
   - Topic is subject.
2) Determine topic shift.
3) Target picture: Pronoun, full NP or other?

Design comprehension experiment

Participants heard 8 stories about 2 characters:
- 4 stories with topic shift
- 4 stories without topic shift

Final sentence of story included an in principle ambiguous pronoun.
Example of topic shift story

1. The cleaning-lady wants to go feed the ducks.
2. She gets the old bread out of the breadbox.
3. She asks a teacher (fem.) to come along.
4. The teacher (fem.) tears the cleaning-lady’s bread in pieces.
5. And then the teacher (fem.) gives the cleaning-lady’s bread to the ducks.
6. She thinks ducks are very sweet little animals.

Question: Who thinks ducks are very sweet little animals?

Example of non-topic shift story

1. A clown has just painted his own face.
2. He wants to paint someone else.
3. He comes across a cook (masc.) in the kitchen.
4. The clown decides to paint the cook (masc.).
5. And then the clown paints a real tough face on the cook (masc.).
6. He thinks it turned out great.

Question: Who thinks it turned out great?

Results comprehension

No significant differences between conditions
Conditions differ significantly

Discussion results Wubs et al.

Production:
• Children produce significantly more unrecoverable pronouns than adults do (63% vs. 3%).

Comprehension:
• Children seem to fail to interpret full NP as marking topic shift.
• Alternatively: Children do not know that pronouns refer to topics.

Combining the two analyses

• Object pronouns: interaction between Princ. A and Ref.Econ.
• Subject pronouns: interaction between Ref.Econ. and Pro.Top.
• Prediction: If object pronouns are in principle ambiguous for children, Pro.Top. should result in preference for topic.

Children’s comprehension

Tableau 4: Comprehension of (object) pronoun
Tableau 13: Comprehension of (object) pronoun
Spenader, Smits & Hendriks (2009)

- Classic condition:
  - Here you see an elephant and an alligator.
  - The elephant is hitting him/himself.
- Single topic condition:
  - Here you see an alligator.
  - The elephant is hitting him/himself.
- Embedded condition:
  - The alligator says that the elephant is hitting him/himself.

Today’s conclusions

- Children as speakers do not seem to take into account the hearer, resulting in unrecoverable subject pronouns.
- Children as hearers do not seem to take into account the speaker, resulting in a guessing pattern with object pronouns and a non-adult interpretation of scrambled objects.
- This suggests that children are unable to optimize bidirectionally.