Quantifier Raising in 4-year-olds

Jeffrey Lidz
Erin McMahon, Kristen Syrett, Joshua Viau
Florence Anggoro, Jessica Peterson Hicks, Elisa Sneed,
Ann Bunger, Taki Flevaris, Anne Graham, Kristy Grohne
Yongeun Lee, Evar Strid

Northwestern University
BUCLD
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Issue

- Children fail to access both interpretations of scopally ambiguous sentences.
  (Musolino, Crain and Thornton 2000, Lidz and Musolino 2001)

The smurf didn’t catch two birds.
Every horse didn’t jump over the fence.

- Why?

Scope Ambiguity

The smurf didn’t catch two birds.
  i. Not > two
     surface scope interpretation
  ii. Two > not
     inverse scope interpretation

Adults vs. Children

<table>
<thead>
<tr>
<th></th>
<th>Adults</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface scope</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Inverse scope</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

Isomorphism Effect

- Children are different from adults.
- They interpret sentences with negation and quantified NP’s (QNP’s) based on the position of these elements in the surface structure.
  (Musolino, Crain and Thornton 2000, Lidz and Musolino 2001)

C-command

```
NP
  the smurf
  I
  didn’t
  VP
  V
  catch
  NP
  two birds

C-COMMAND
DOMAIN
```
Possible explanations

Competence vs. Performance
- Children lack the grammatical operation that inverts the scope of quantificational elements. (QR)
- Prediction: Children should fail to have adult-like interpretations of any sentence that requires QR, not just ambiguous sentences involving negation.

Possible explanations

Competence vs. Performance
- Children have pragmatic/processing difficulties interpreting sentences involving quantification and negation. (Musolino and Litz 2002, Gualmini 2003)
- Prediction: Children should have adult-like interpretations of sentences that require QR but do not involve both quantification and negation.

Sentences requiring QR
Kermit kissed every dancer before she went on stage.

Quantifier-Variable Binding

Miss Red jumped over every frog that Miss Black did.

Antecedent-Contained Deletion (ACD)

Outline of talk
I. Introduction
II. Experiment 1: Quantifier-Variable Binding
III. Experiment 2: Antecedent-Contained Deletion
IV. Conclusion
Quantifier-Variable Binding

- Binding requires c-command.
- Every dancer must QR to c-command she.

Subject QNP Condition

Every dancer kissed Kermit before she went on stage.

- Co-referential interpretation does not require QR:
  Every dancer c-commands she in the surface structure

Experiment Design

Subjects
16 children (M 4;6), 20 adults (NU)

Method
Truth-Value Judgment Task

Sentences
Test: Every dancer kissed Kermit before she went on stage. (SQNP)
Kermit kissed every dancer before she went on stage. (OQNP)
“I know what happened…”

Every dancer kissed Kermit before she went on stage.

Predictions

<table>
<thead>
<tr>
<th>Test Sentences…</th>
<th>bind</th>
<th>No bind</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every dancer kissed Kermit before she went on stage.</td>
<td>T</td>
<td>F</td>
</tr>
</tbody>
</table>

T  she = every dancer
F  she = other girl

“No, every dancer kissed Kermit AFTER she went on stage.”

Object QNP Condition

Kermit kissed every dancer before she went on stage.

- Co-referential interpretation requires QR:
  Every dancer does not c-command she in the surface structure

“...”

Kermit kissed every dancer before she went on stage.

Predictions

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<th>No bind</th>
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T  she = every dancer
F  she = other girl

“No, Kermit kissed every dancer AFTER she went on stage.”

Predictions

Competence problem: Without QR, children should be non-adult-like in object QNP condition.

Performance problem: Without negation, performance problem avoided \(\Rightarrow\) children should be adult-like.
Results

<table>
<thead>
<tr>
<th>% YES Responses</th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
<th>90%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults</td>
<td>86%</td>
<td>81%</td>
<td>68%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td>85%</td>
<td>80%</td>
<td>65%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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Q-Variable Binding: Conclusions

- 4-year-olds allow object QPs to bind pronouns that they do not c-command on the surface.
- Therefore, they must have QR.
- Children’s grammars do not differ from adults’ in this respect.
- Supports performance account of Isomorphism effect

Outline of talk

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Antecedent-Contained Deletion

Miss Red jumped over every frog that Miss Black did.

Background: VP deletion requires an identical antecedent VP for interpretation.

Miss Red jumped over frogs, and Miss Black did, too.

Miss Red jumped over frogs, and Miss Black jumped over frogs, too.

Antecedent-Contained Deletion

Miss Red jumped over every frog that Miss Black did.

ACD: Because the antecedent VP contains the ellipsis site, the result is infinite regress.
Miss Red jumped over every frog that Miss Black jumped over every frog that Miss Black jumped over every frog that Miss Black did…

Antecedent-Contained Deletion

QR can resolve infinite regress problem and allow for interpretation of ACD
(Sag 1976, May 1985, Kennedy 1997)

[every frog that Miss Black jumped over t], Miss Red [jumped over [t] ].
Antecedent-Contained Deletion

Miss Black jumped over every frog that Miss Red did.

- QR required to resolve ACD
- Without QR, how might kids interpret ACD?

Children may treat infelicitous relative clauses as coordination. (Hamburger and Crain 1982)

Miss Red jumped over every frog, and Miss Black did, too.

Experimental Design

1 set condition:
relative clause reading = true
coordinate structure reading = false

2 set condition:
relative clause reading = false
coordinate structure reading = true

Experiment Design

Subjects
20 children (M 4;5), 20 adults (NU)

Method
Truth-Value Judgment Task

Sentences
Test: Miss Red jumped over every frog that Miss Black did
Filler: The rhino [made/didn’t make] friends with the hippo that kicked the rock into the water.

Predictions

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<th>If QR</th>
<th>No QR</th>
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<tbody>
<tr>
<td>Miss Red jumped over every frog that Miss Black did.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 set of frogs</td>
<td>T</td>
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“I know what happened…”

Miss Red jumped over every frog that Miss Black did.

“…”

Miss Red jumped over every frog that Miss Black did.
Predictions

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<td>T</td>
</tr>
<tr>
<td>2 sets of frogs</td>
<td>T</td>
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</tr>
</tbody>
</table>

Competence problem: Without QR, children may interpret ACD sentences as coordinate structures → children should be non-adult-like

Performance problem: Without negation, performance problem avoided → children should be adult-like

Results

ACD: Conclusions

- ACD requires QR.
- 4-year-olds can resolve ACD, so they must have QR.
- Children’s grammars do not differ from adults’ in this respect.
- Supports performance account of isomorphism effect

Outline of talk

I. Introduction
II. Experiment 1: Quantifier-Variable Binding
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Conclusions

- In sentences that lack negation but require QR, children are adult-like
  - Children have QR in their grammars
- The previously observed isomorphism effect must be due to performance factors