Now You See It, Now You Don’t

The Advantages and Pitfalls of In-depth Analysis of Preferential-looking Data

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Investigating Language Acquisition

How do children map linguistic input onto a grammar?
A piece of the puzzle

What do children know and when?

What do they know before they begin speaking?
Preferential Looking

What do children look at when they hear linguistic stimuli?

Simple cases like lexical mapping are easy, but what about more complex syntactic dependencies?

How can we focus the lens that preferential looking gives us into children’s minds?
Example

Where’s the train? See the train?
Coding
Example: data from 1 trial

*Where’s the train?*
Example
What about more complex syntactic knowledge?

- Factors to consider
  - What does the task require of the child?
  - What might differ between children and influence their performance?
  - What do we know about the method that would allow us to effectively analyze our data?
Two Case Studies to Explore

Case Study 1: investigates infants’ ability to interpret filler-gap dependencies

Case Study 2: examines 30-month-olds’ interpretation of pronouns
Filler Gap Dependencies

Which monkey ___ kissed the goose?

Which monkey did the goose kiss ___?

Show me the monkey that ___ kissed the goose

Show me the monkey that the goose kissed ___
When do children acquire filler gap dependencies?

Children start producing wh-questions between 20 and 30 months (Stromswold, 1995).

When can they first comprehend them?

Possibly at 15 months (Seidl, Hollich & Jusczyk, 2003), but that experiment was problematic.
# Improved Experiment

<table>
<thead>
<tr>
<th>Seidl, Hollich &amp; Jusczyk</th>
<th>Gagliardi, Mease &amp; Lidz</th>
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</thead>
<tbody>
<tr>
<td><strong>Within subjects</strong></td>
<td><strong>Between subjects</strong></td>
</tr>
<tr>
<td>(confusion between question types)</td>
<td>(no confusion between question types)</td>
</tr>
<tr>
<td>2 trials per question type</td>
<td>6 trials per question type</td>
</tr>
<tr>
<td>(limited time to adjust to task)</td>
<td>(ample time to adjust to task)</td>
</tr>
<tr>
<td>1 event per trial (infelicitous questions)</td>
<td>2 events per trial (felicitous questions)</td>
</tr>
<tr>
<td>unengaging stimuli (potential loss of interest)</td>
<td>engaging stimuli (minimize loss of interest)</td>
</tr>
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</table>
Gagliardi, Mease & Lidz

- Subjects: children at 3 ages (13, 15, and 20 months)
- Method: assess *wh*-question and relative clause comprehension using the preferential looking paradigm
What we look for in the data

Which monkey kissed the goose?

Which monkey did the goose kiss?
What we look for in the data
Where we look in the data

1st Question
2nd Question
3rd Question

Mean Proportion Looks to Agent

Time (frames)

cond
Object
Subject
Where we look in the data

Time (frames)
2nd Question, 2nd Block

20-month-olds, *WH* Questions
Consistent Results

13 Months: n.s.
15 Months: * p < 0.04
20 Months: * p < 0.0005
# Summary

<table>
<thead>
<tr>
<th>Raw data</th>
<th>Lexical Access</th>
<th>WH</th>
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<tbody>
<tr>
<td>Windows (After questions, etc.)</td>
<td>✔️</td>
<td>?</td>
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<tr>
<td>Blocks (1st v. 2nd half of trials)</td>
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Principle C in Acquisition

- Principle C: r-expressions must not be bound (Chomsky, 1981)
  - She’s patting her head
  - She’s patting Katie
Principle C in Acquisition

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Principle C in Acquisition

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When do children acquire Principle C?

- Robust knowledge in 3-5 year olds (TVJT)

Questions:

- How early is Principle C active in child grammar?
- What factors affect young children’s ability to demonstrate their knowledge of Principle C?
Testing Knowledge of Principle C
Testing Knowledge of Principle C

- Subjects: children 28;0-32;0
  - Study 1: 32 children, within subjects
  - Study 2: 64 children, between subjects

- Method: assess interpretation of Principle C context sentences using preferential looking paradigm
Between- vs. within-subjects

Study 1 (within subjects)

Mean proportion look to non-reflexive event

Condition

- Principle C
- Reflexive

Time (frames)
Between- vs. within-subjects

[Diagram showing data analysis with two conditions: Principle C and Reflexive]
Effect of Vocabulary
Effect of Vocabulary

Study 2 (between subjects), Principle C condition

Mean proportion look to non-reflexive event

Time (frames)

Vocabulary

High Vocabulary

Low Vocabulary
Effect of Vocabulary

Distractor-Initial Trials, Principle C condition

Mean proportion look to non-reflexive event

Vocabulary
- High Vocabulary
- Low Vocabulary

Time (frames)
Switches at Disambiguation Point
Measuring Processing Speed

Lexical Processing

Where’s the train?

Syntactic Processing

Where’s the biggest train?

Processing speed = average response latency on distractor-initial trials
Effect of Processing Speed

Lexical Processing Speed

Syntactic Processing Speed
## Summary

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Factors to consider

- Task-specific
- Child-specific
- Methodological
Conclusion

- More nuanced problems require more nuanced analyses
- Methods of probing data must be reasonable, principled, and standardized

Find the balance between how to explore the data, and what are sensible analyses
Thank You

- Project on Children’s Language Learning Lab
  - Researchers
  - Participants (and parents)

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  Cognitive Neuroscience of Language Lab

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