Incremental processing of *only*-sentences in adults and children

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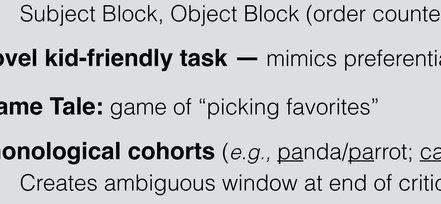
1. Introduction

Interpreting sentences containing *only* requires listeners to integrate syntactic, lexical semantic, and contextual information

(a) "Only *Jane* ate an apple" (subject-*only*)

(b) "Jane only ate *an apple*" (object-*only*)



Study Goal

Compare online processing of subject-*only* vs. object-*only* sentences to investigate time-course for integrating linguistically-encoded (syntactic, lexical) information with extra-linguistic information (discourse and event structure, visual cues, etc.) during language comprehension.

Prior Work

Adult processing asymmetry

- Recent evidence for online asymmetry in adults' processing of *only*-sentences, based on whether *only* associates with the subject or object argument.
- Adults correctly anticipate upcoming discourse referents with object-*only* sentences like (b) [Kim et al. 2015; Paul et al. 2016], but fail to do so with subject-*only* sentences (a) [Romoli et al. 2014; Paul et al. 2016].

Acquisition asymmetry

- Widely-cited delay in children's mastery of subject-*only* sentences compared to object-*only* sentences; conflicting accounts for basis of asymmetry [Crain et al. 1998; Paterson et al. 2003, 2006; Sugawara 2016]
- Prior developmental work used offline measures, but no *online* studies to date investigating putative asymmetry in English-speaking children.

2. Methods

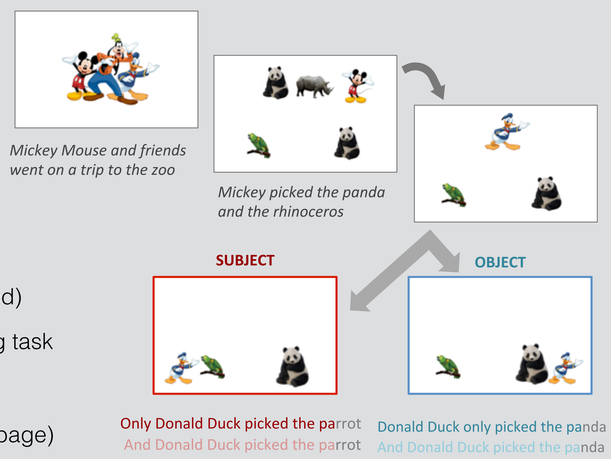
Visual World Eye-tracking Study

- **2 x 2 design** (Only/Position as within-subject factors)

Subject-*only*	Object-*only*
Subject-control	Object-control

- 24 test items (1:1 filler ratio), 12 per block
- **Blocked** by Position
  - Subject Block, Object Block (order counterbalanced)
- **Novel kid-friendly task —** mimics preferential looking task
- **Frame Tale:** game of "picking favorites"
- **Phonological cohorts** (*e.g.*, panda/parrot; carrot/cabbage)
  - Creates ambiguous window at end of critical sentence

Trial Structure



3. Results

DV: Proportion of looks to Target vs. Cohort in Critical Window (T/T+C)

Comparison: *greater looks to only-condition relative to its corresponding control?*

Experiment 1: Adults (n=16)

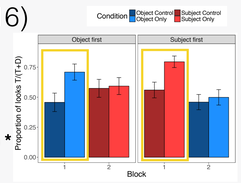
- ME of Position (p = 0.019) *
- ME of Only (p = 0.002) **
- Only/Block interaction (p = 0.029) *

2-way (Subject/Only)

- ME of (subject-)*only* (p = 0.032) *

2-way (Object/Only)

- Marginal effect of (object-)*only* (p = 0.07) .



Experiment 2: 6-8 year olds (n=40)

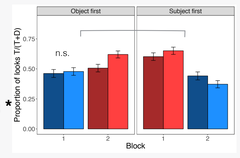
- ME of Position (p < .001) ***
- ME of Block (p = 0.048) *
- Posn/Only Interaction (p = 0.01) **
- 3-way interaction (p = 0.057) .

2-way (Subject/Only):

- ME of (subject-)*only* (p = 0.009) *

2-way (Object/Only):

- No effect of (object-)*only*



Adults

- Successful target prediction with both object-*only* and subject-*only* conditions, in block 1
  - Object-*only* pattern replication of prior work (Previous Mention effect — [2], [4])
  - Subject-*only* pattern novel result
- Interference in block 2

Kids

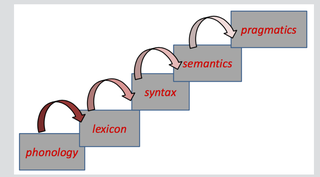
- 6-8 y.o. successfully predict target of subject-*only* sentences online
- However, they fail to show a Previous Mention effect with object-*only* sentences, despite robustness of effect in adults

4. Conclusions

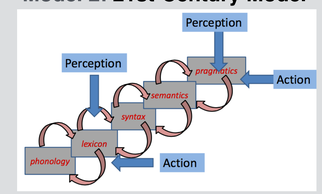
- **Exp 1** provides first evidence of incremental processing with both subject-*only* and object-*only* sentences in adults
  - Supports cognitive architecture that can facilitate rapid *online* integration of high-level semantic representations with extra-linguistic information — *i.e.*, **Model 2**
- **Exp 2** results provide novel evidence that even children can incrementally integrate high-level semantic representations with contextual information online
  - Moreover, our results argue against previous proposals attributing children's errors with subject-*only* sentences to general tendencies, such as a propensity to:
    - miss-assign scope of *only* [1]
    - ignore focus particle altogether [3]

  Instead, our results show kids to be highly sensitive to both presence of *only* as well as its syntactic position
  - Surprising absence of Previous Mention Effect in 6-8 year olds suggests late development of this pragmatic bias

Model 1: Classical Model



Model 2: 21st-Century Model



"No walls around language."
— J. Snedeker

Selected References

[1] Crain, S., W. Ni & L. Conway. (1998). Learning, Parsing and Modularity. In: *Perspectives on Sentence Processing.*
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[5] Romoli, J., M. Khan, Y. Sudo & J. Snedeker (2014). Resolving temporary referential ambiguity using presupposed content.

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