Incremental processing of only-sentences in adults and children

Pooja Paul¹(poojapaul@fas.harvard.edu), Jayden Ziegler², Jesse Snedeker³

¹Department of Linguistics, ²Department of Psychology, Harvard University

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: Mickey Mouse and friends went on a trip to the zoo
  - Subject-control: Mickey picked the pondle and the rhinoceros
  - Object-only: Only Donald Duck picked the pondle
  - Object-control: Donald Duck only picked the pondle

Trial Structure

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

3. Results

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 = 0.030)*
    - 2-way (Object/Only):
      - Marginal effect of (object-only) (p = 0.07)

Experiment 2: 6-8 year olds (n=40)
• ME of Position (p < 0.001)**
• ME of Block (p = 0.048)*
• Posn/Only interaction (p = 0.01)**
• 3-way interaction (p = 0.007)
  - 2-way (Subject/Only):
    - ME of (subject-only) (p = 0.009)**
    - No effect of (object-only)

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 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

Selected References