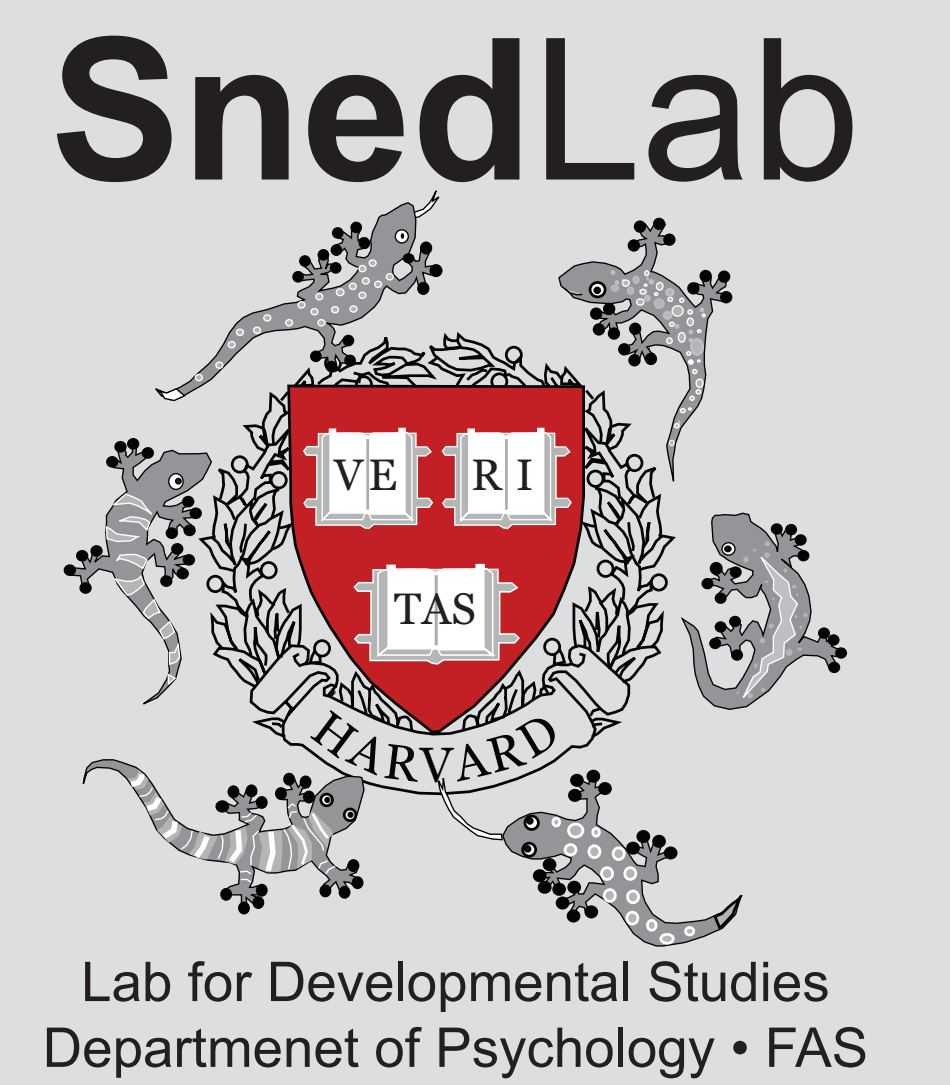


Incremental processing of *only*-sentences in adults and children



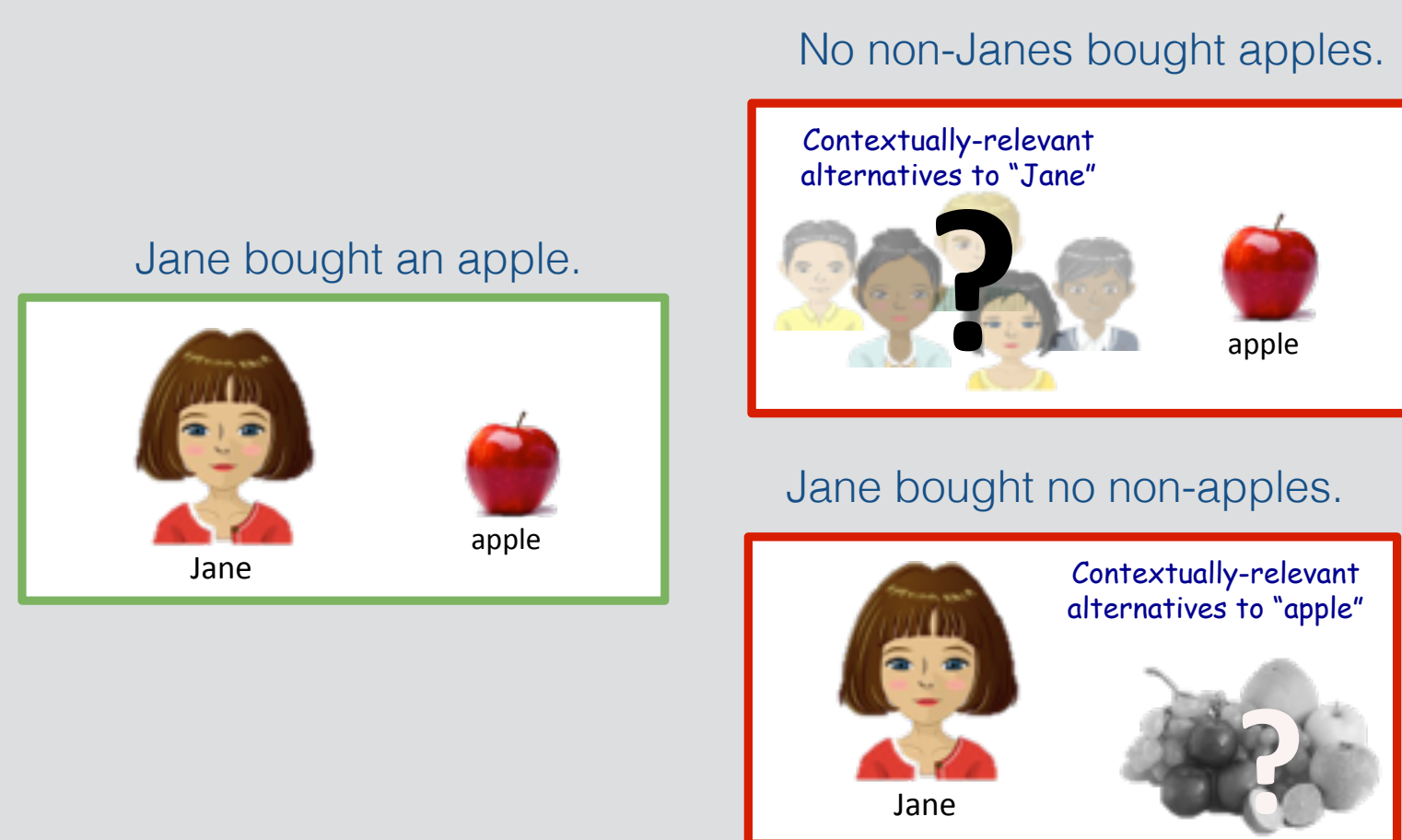
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1. Introduction

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

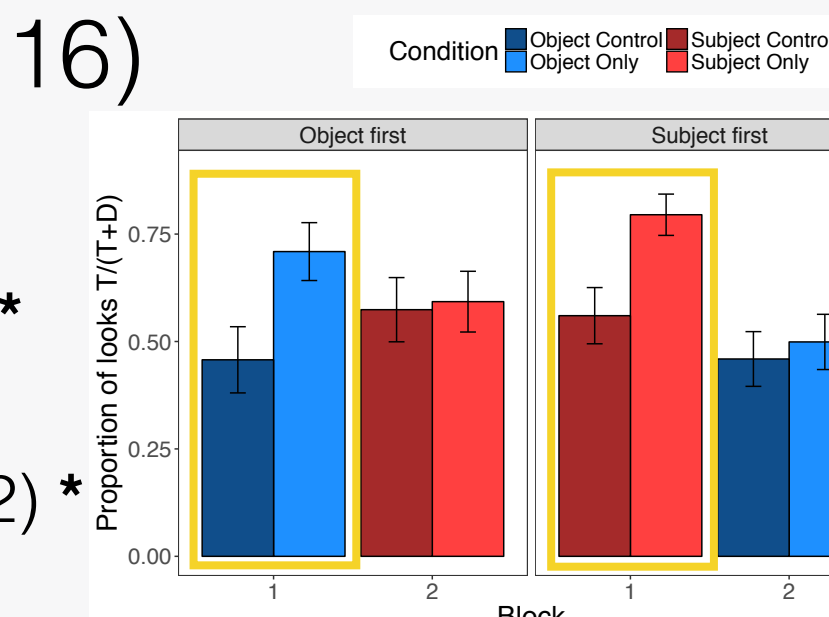
- Widely-cited delay in children's mastery of subject-*only* sentences compared to object-*only* sentences; conflicting accounts for basis of asymmetry [Crain et al. 1998; Paterson et al. 2003, 2006; Sugawara 2016]
- Prior developmental work used offline measures, but no *online* studies to date investigating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

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?

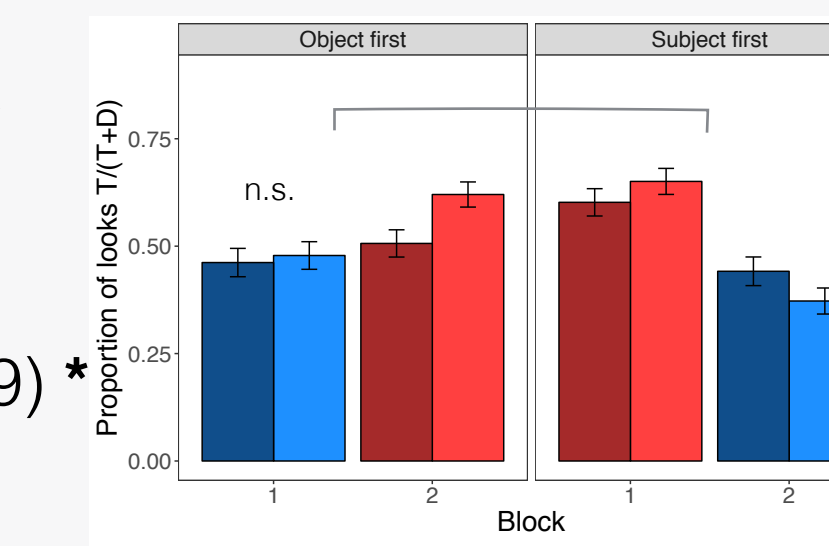
Experiment 1: Adults (n=16)

- 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

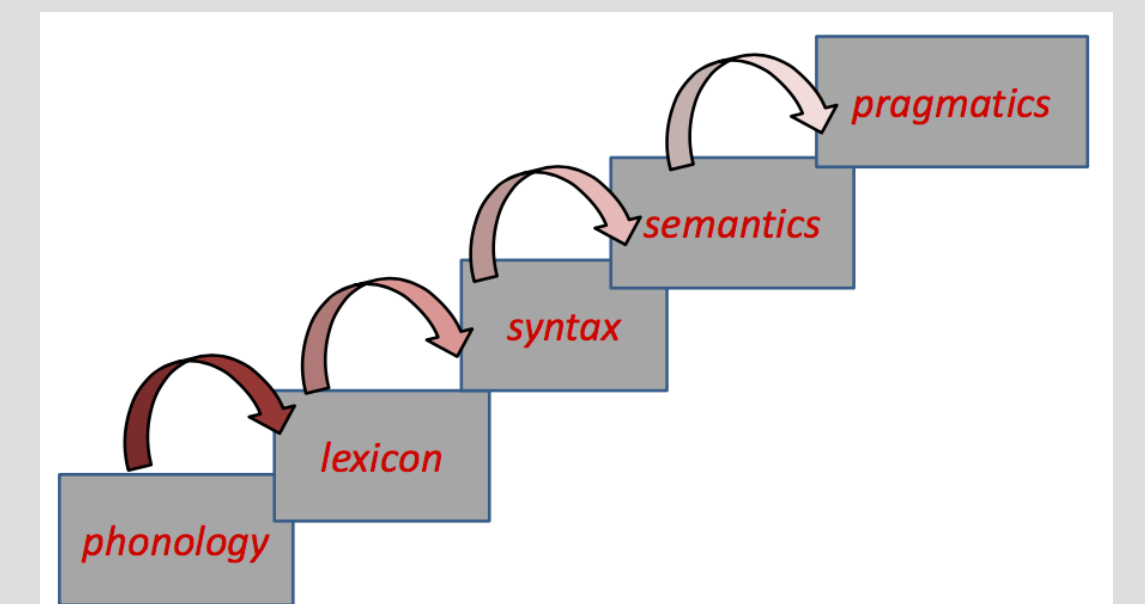
Kids

- 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

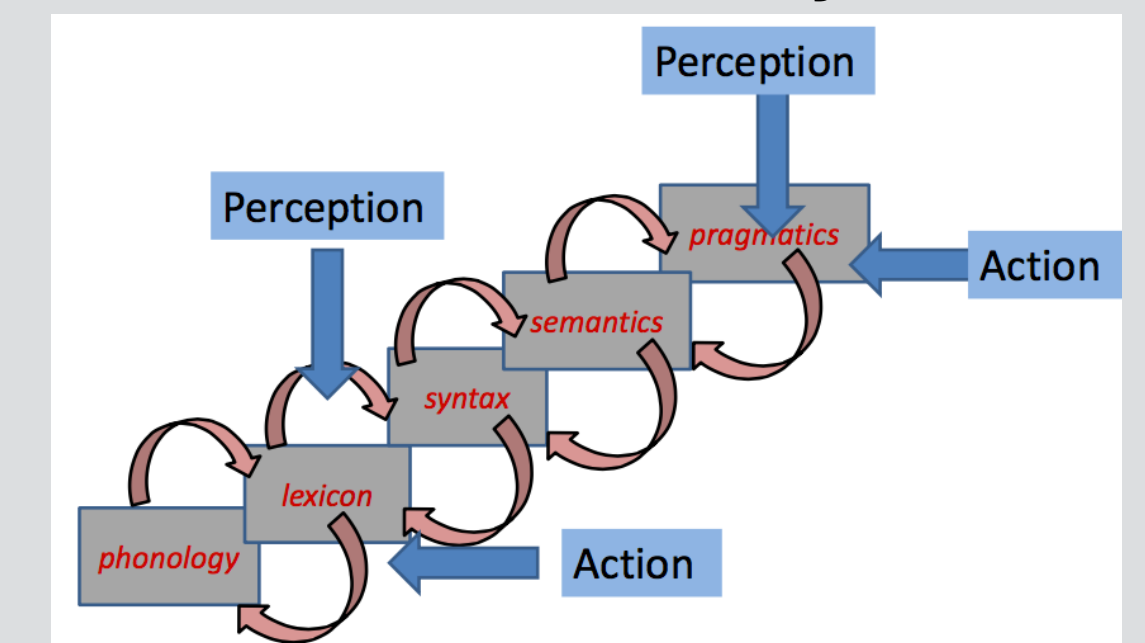
4. Conclusions

- 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

2. Methods

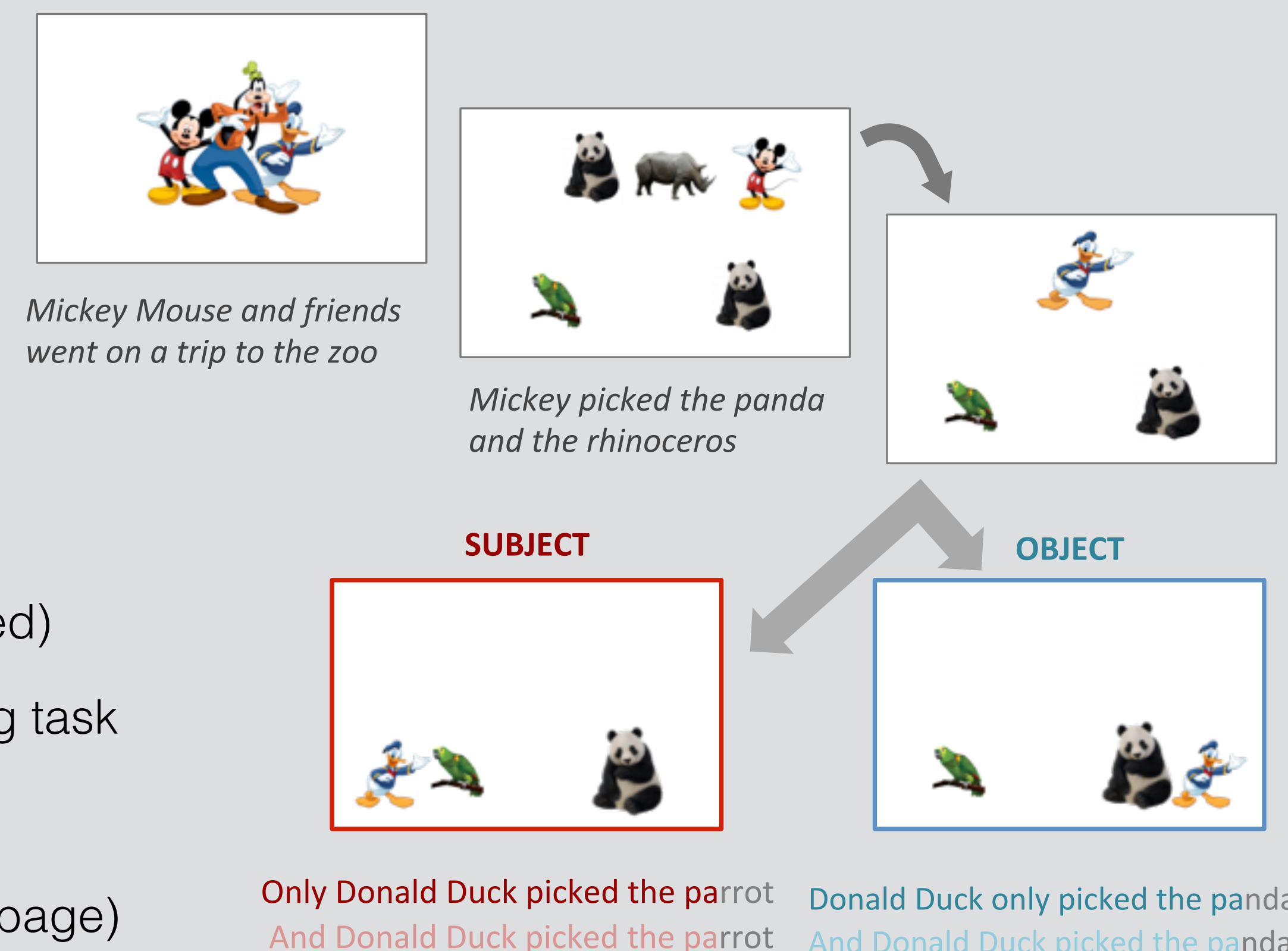
Visual World Eye-tracking Study

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

Subject- <i>only</i>	Object- <i>only</i>
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



Selected References

- Crain, S., W. Ni & L. Conway. (1998). Learning, Parsing and Modularity. In: *Perspectives on Sentence Processing*.
- Kim, C., C. Gunlogson, M. Tannenhaus & J. Runner. (2015). Context-driven expectations about focus alternatives. *Cognition*.
- Paterson, K., S. Livesedge, C. Rowland & R. Filik. (2003). Children's comprehension of sentences with focus particles. *Cognition*.
- Paul, P., T. Levvari, D. Hardenbergh & J. Snedeker. (2016). *Poster presented at CUNY 2016*, Gainesville, FL.
- Romoli, J., M. Khan, Y. Sudo & J. Snedeker. (2014). Resolving temporary referential ambiguity using presupposed content.



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