What's the topic? Comprehension of pronouns by Dutch children and adults

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This talk

- Delay of Principle B Effect
- Influence of discourse on DPBE
- Spenader et al. (2009): Off-line experiment with Dutch children:
  - Comprehension & production
- Eyetracking experiment with Dutch adults:
  - Responses, RTs & eye movements (preliminary results)

DPBE

- Acquisition of pronouns is delayed in English and Dutch (e.g., Chien & Wexler, 1990; Koster, 1993)
  - This is Goldilocks; this is Mama Bear. Is Mama Bear washing her?
- Due to processing limitations? (Reinhart, 2006)
- Substantial variation across experiments
- DBPE almost disappears in balanced context, therefore experimental artifact? (Conroy, Takahashi, Lidz & Phillips, ms. 2006)

Conroy et al.: The Painting Story

Papa Smurf announces that Snow White is going to have a party, and that she is going to have a painting contest. Papa Smurf declares that he is going to be the judge. Each of the dwarves shows and discusses the color of paint that he is going to use to get painted, as does Tennis Smurf. However, Hiking Smurf does not have any paint, and he wonders whether one of the other characters will be willing to share. He first approaches Happy, who says that he would be glad to help out if any paint remains after he is painted. Fortunately, when Happy is finished some paint remains, and so he paints Hiking Smurf. Hiking Smurf, however, is not yet satisfied, so he approaches Dopey with a similar request, which is similarly successful. Then, Grumpy, who is in such a bad mood that he does not even want to go to the party, declares that he doesn't need to get painted. The other dwarves really want him to go, and Grumpy agrees to get painted, using all of his paint in the process. After Grumpy is painted, Hiking Smurf approaches him and asks for some paint. Grumpy politely apologizes that he would like to help but cannot, because he has used up all of his paint. Hiking Smurf realizes that his best remaining chance is to ask Tennis Smurf for some extra paint, and Tennis Smurf obliges when he is asked. Finally, everybody is ready for Snow White's party.

OK, this was a story about painting. Hiking Smurf didn't have any paint, and Grumpy almost didn't go to the party. Let me see ... I think …

Grumpy painted him.

Pronoun use depends on discourse

- Centering Theory (Grosz, Weinstein & Joshi, 1995):
  - Referents are ranked according to prominence
  - Referent in current utterance that was most prominent in previous utterance is the topic
  - If anything is pronominalized, then the topic is also pronominalized (Pronoun Rule)
- This is Goldilocks; this is Mama Bear. Is Mama Bear washing her? (Chien & Wexler, 1990)
- Pronoun Rule: *her* refers to Mama Bear

Spenader, Smits & Hendriks (2009)

Methods:

- Truth Value Judgment Task + Elicitation task: comprehension and production of similar sentences in same children in same experiment (cf. De Villiers, Cahillane & Altreuter, 2006)

Participants:

- 83 Dutch speaking children (38 boys, 45 girls), age 4;5 - 6;6 (mean 5;5); 17 children were excluded from further analysis

Spenader et al.: Materials

1. *Classic context condition*:

   Here you see an elephant and an alligator. The elephant is hitting him/himself.

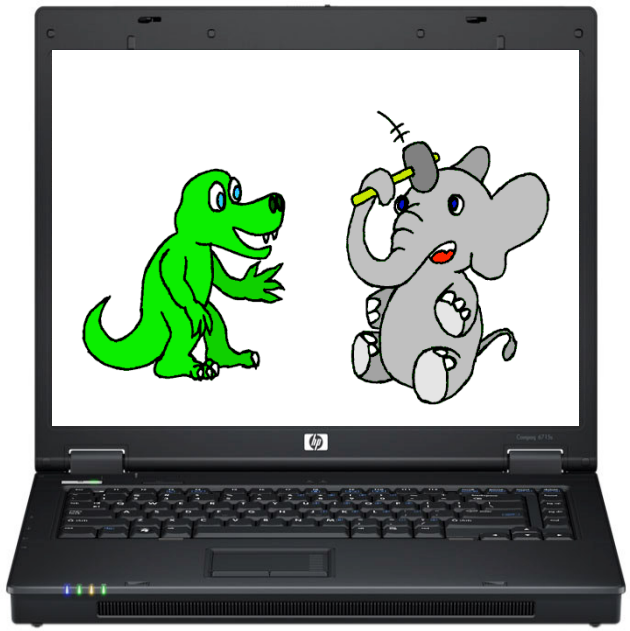
2. *Single-topic condition*:

   Here you see an alligator. The elephant is hitting him/himself.

3. *Embedded condition*:

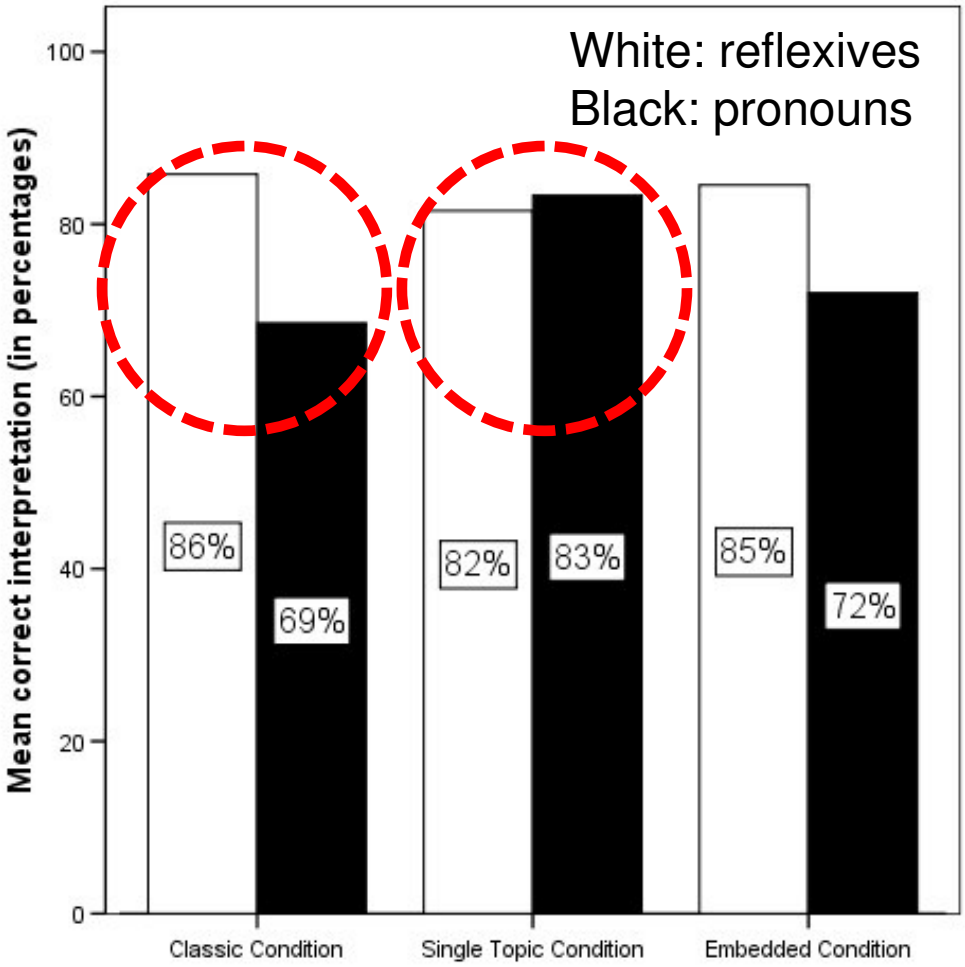
   The alligator says that the elephant is hitting him/himself.

Here you see an elephant and an alligator. The elephant is hitting him.



Does the sentence match the picture?

Comprehension results

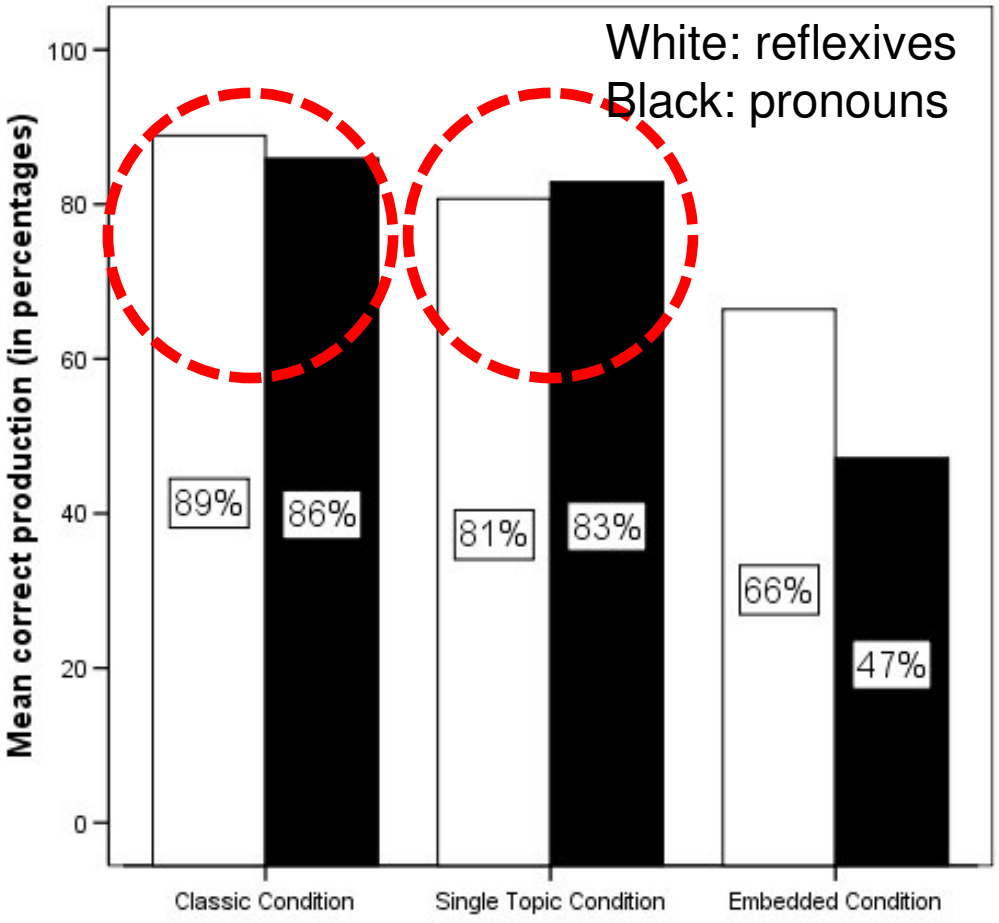


- Clear DPBE in Classic Condition.
- DPBE disappears entirely in Single Topic Condition.

Spenader et al., 2009

Can you describe what is happening in the picture?

Production results



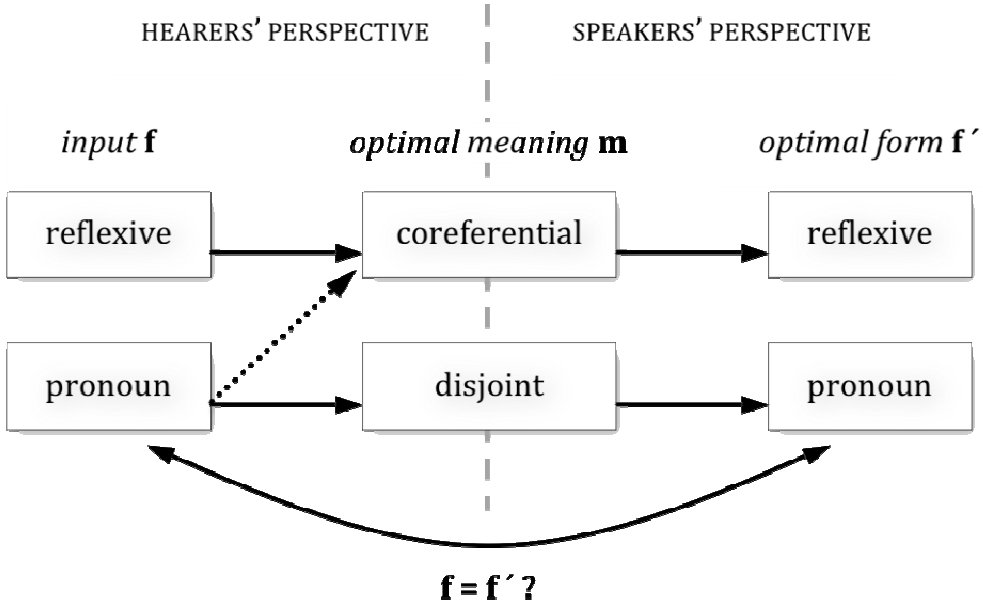
- NO DPBE in production in either Classic Condition or Single Topic Condition.

Spenader et al., 2009

Explanation Spenader et al.

Optimality Theory: Optimization from form to meaning (comprehension) or from meaning to form (production)

Constraints may have different effects in comprehension and production ➔ Grammar is direction-sensitive



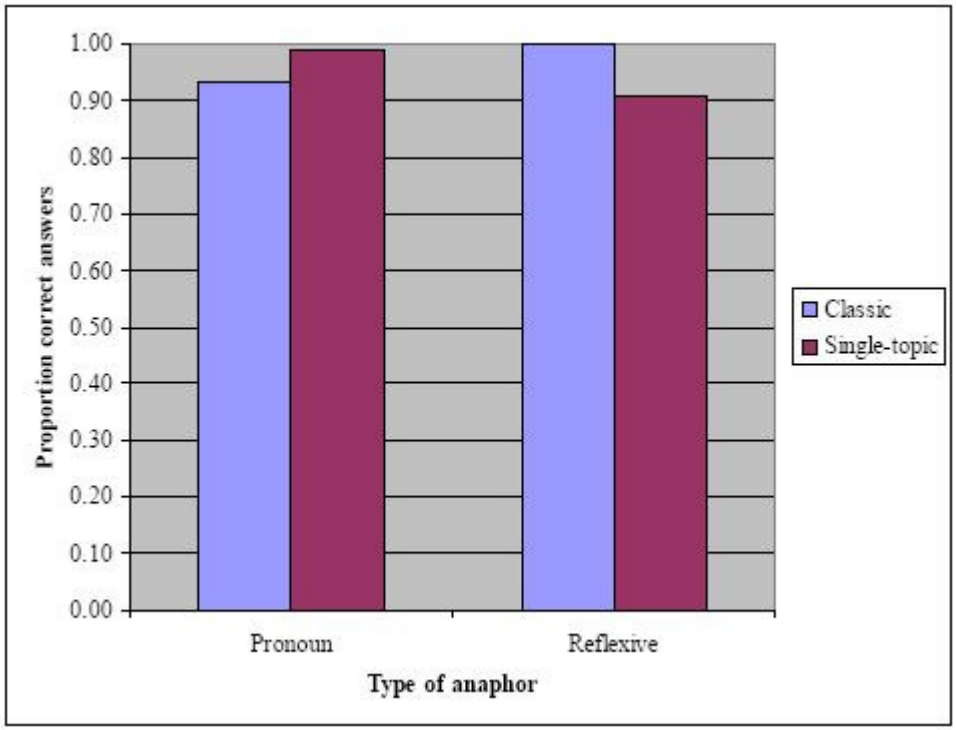
Effects of discourse

- Adults disambiguate pronouns by taking into account speaker (bidirectional OT)
- Children are not yet able to do so, but may use discourse information instead:
  - Constraint “Pronouns refer to discourse topic” (Spenader et al., 2009; Wubs et al., in press)
- Prediction: If adults use discourse to resolve pronoun, then discourse effects in adults’ on-line processing

Eyetracking experiment

- TVJT with remote Tobii T120 eye-tracker:
  - Accuracy
  - Reaction times
  - Eye movements
- Materials: Similar to Classic Condition and Single Topic Condition of Spenader et al.
- Participants: 24 Dutch adults (13 men, 11 women), ages 18 – 27 (mean 22.3)

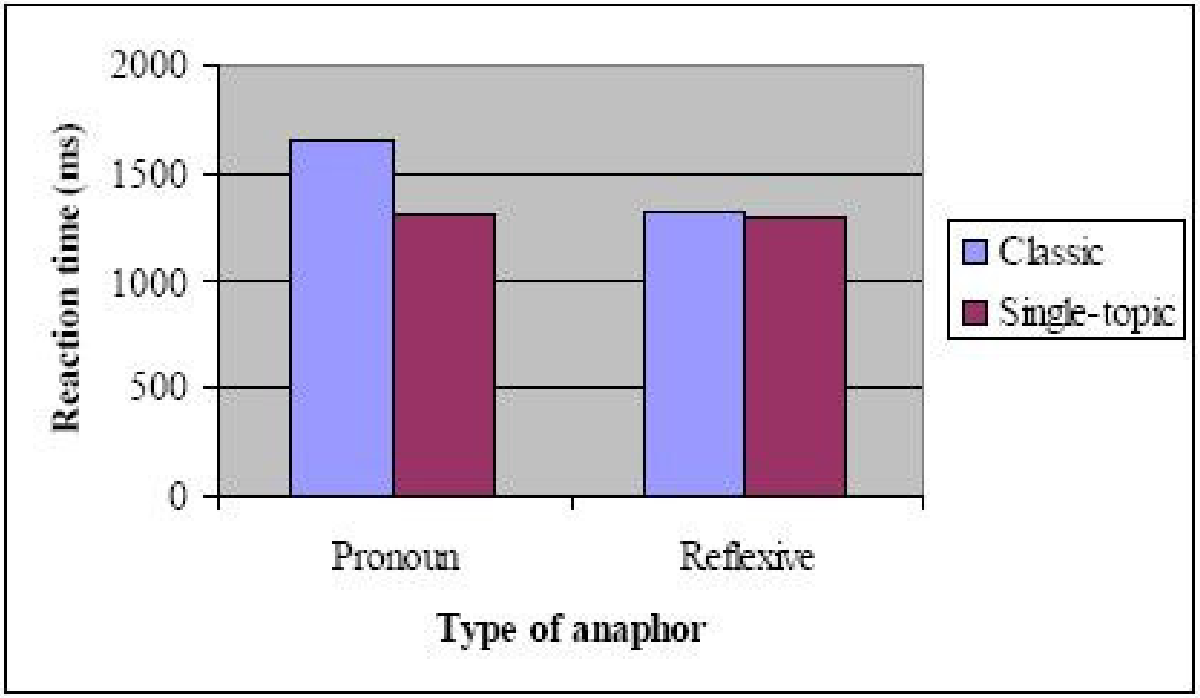
Accuracy



Mean proportion of correct responses in Truth Value Judgment Task

- Hardly any accuracy errors with pronouns or reflexives

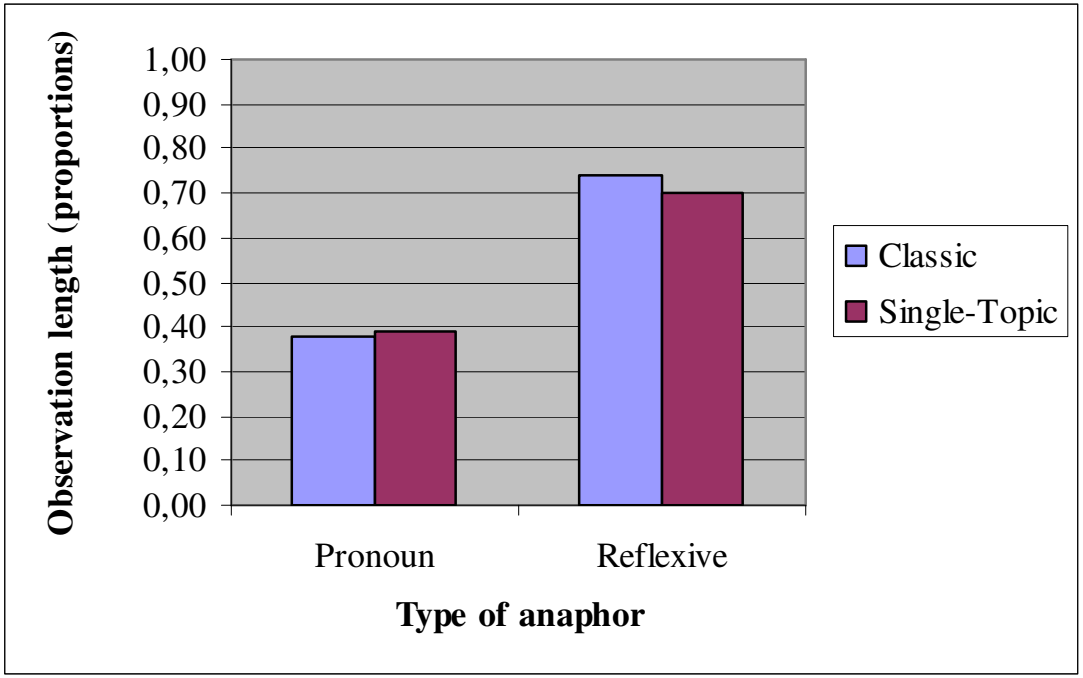
Reaction times



Analysis only includes correct responses; RTs are measured from onset of anaphor (*hem* vs. *zichzelf*)

- Responses to pronouns in Classic Condition take significantly longer than to other items

Eye movements (preliminary)

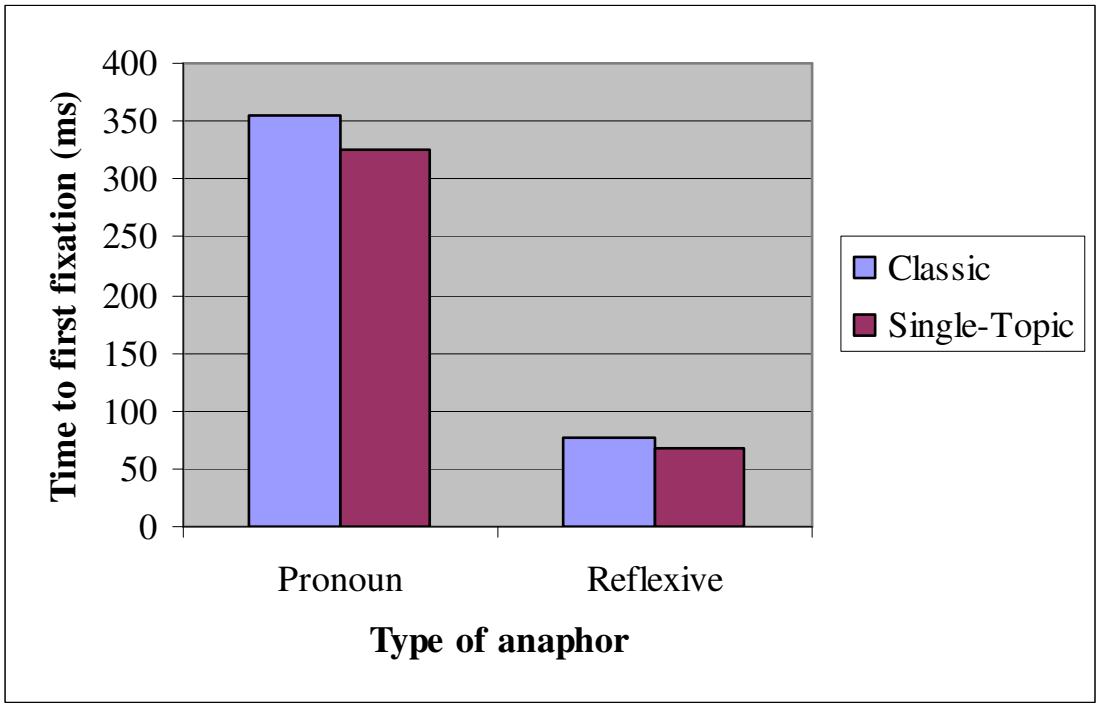


Observation Length

Mean proportion of total observation time to correct antecedent in between onset of anaphor and response

- Main effect of pronoun vs. reflexive
- No effect of discourse context
- No significant interaction

Eye movements (preliminary)



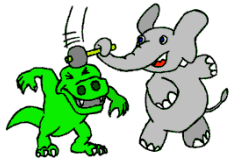
Time to first fixation

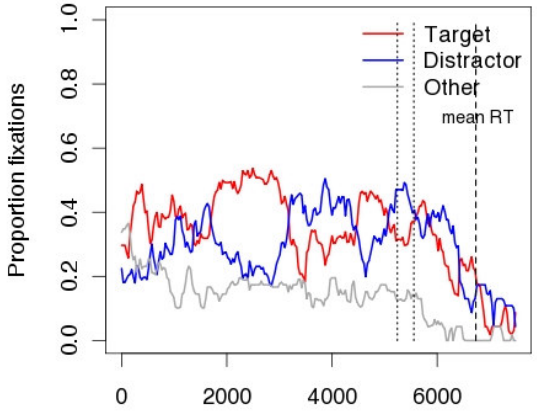
Mean time to first fixation on correct antecedent, measured from onset of anaphor

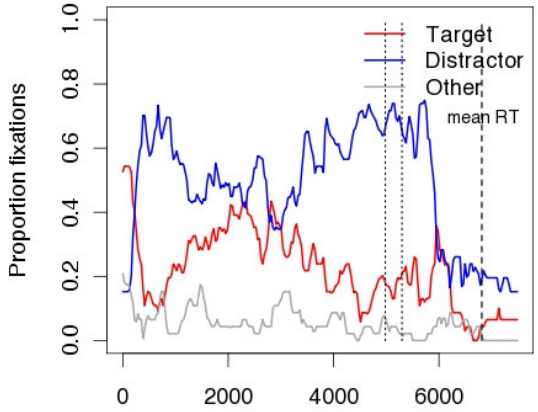
- Main effect of pronoun vs. reflexive
- No effect of discourse context
- No significant interaction

Pronouns: Entire trial

Classic Condition

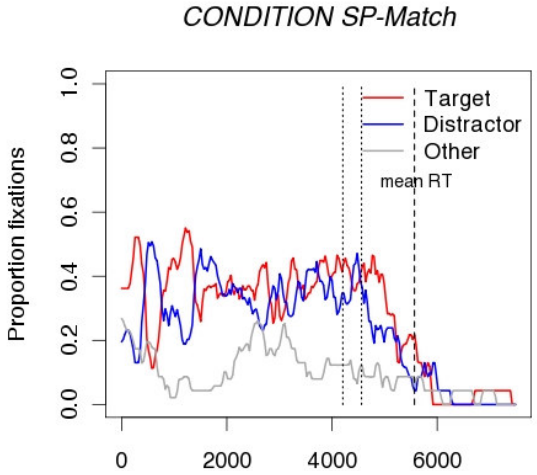


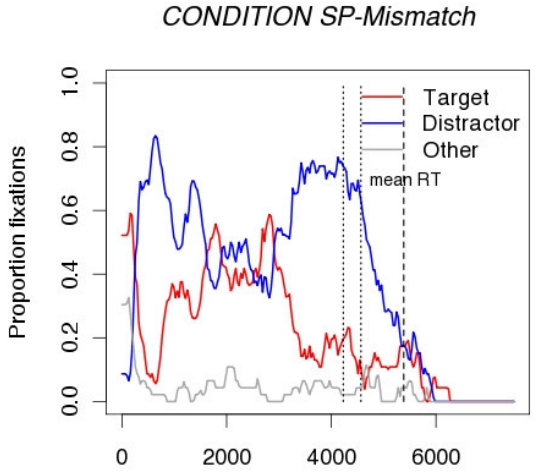




An elephant and an alligator are on the sidewalk. The elephant is hitting him.

Single Topic Condition

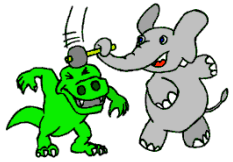


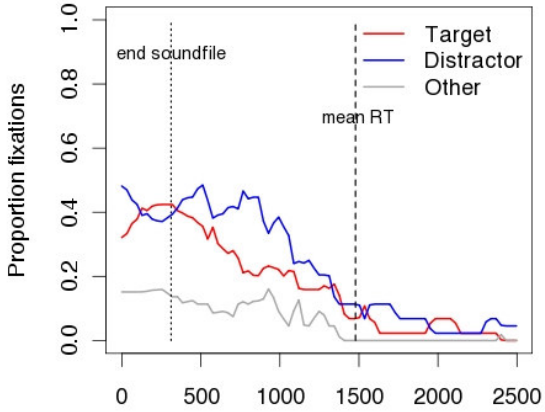


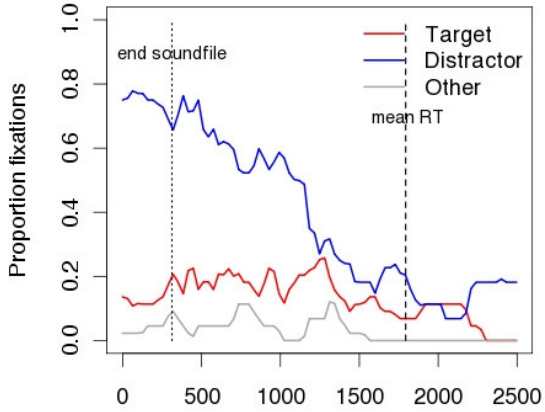
An alligator is on the sidewalk. The elephant is hitting him.

Pronouns: Zooming in

Classic Condition







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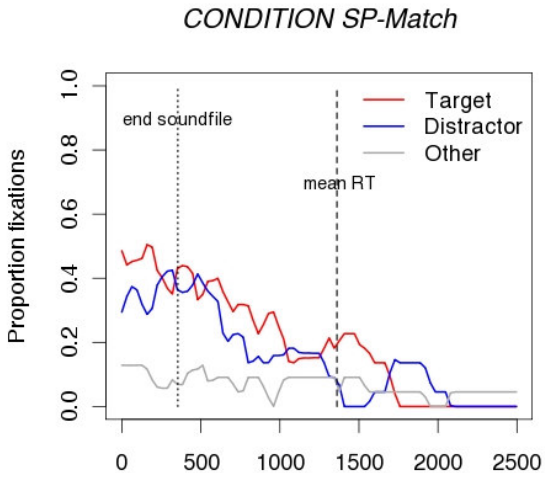
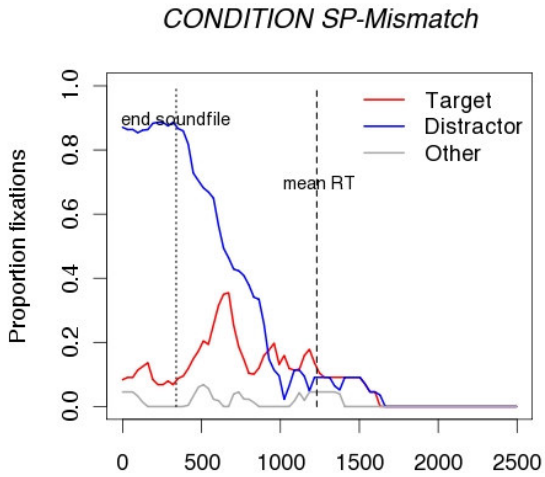
Single Topic Condition





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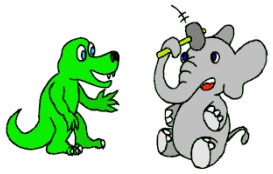
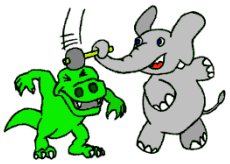
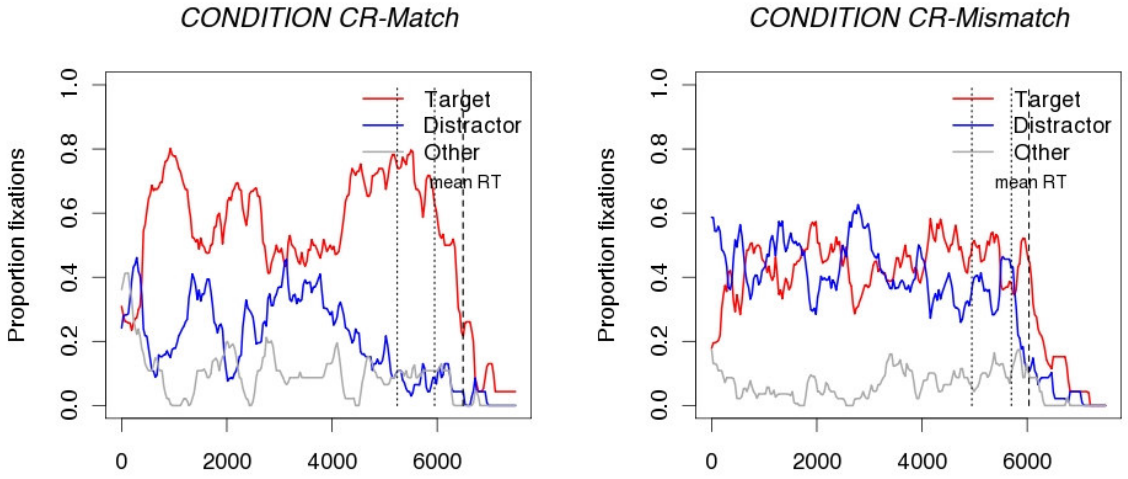
Reflexives: Entire trial

Classic Condition







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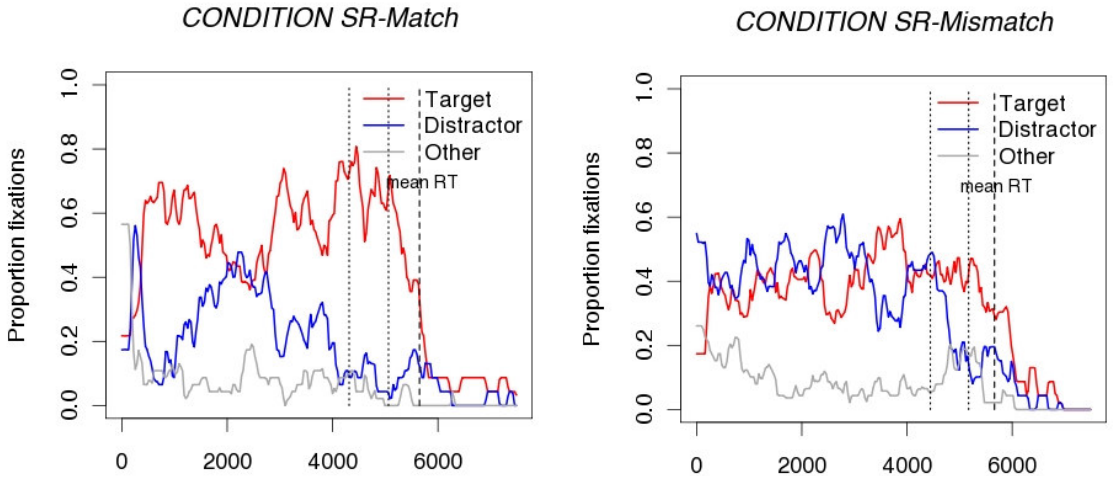
Single Topic Condition



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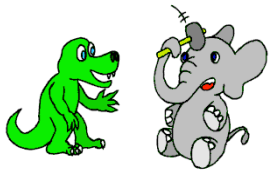
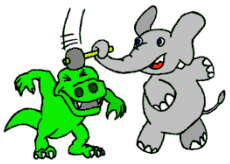
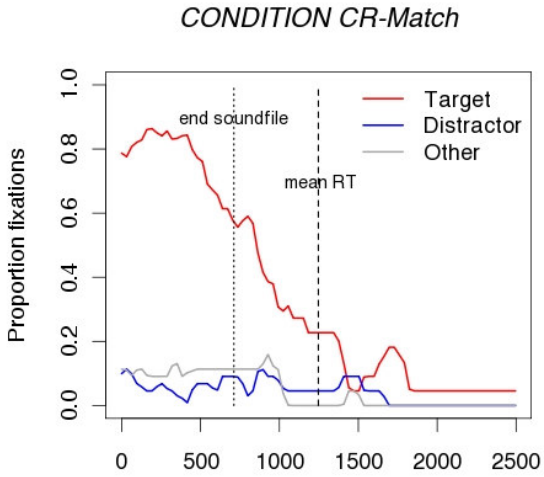
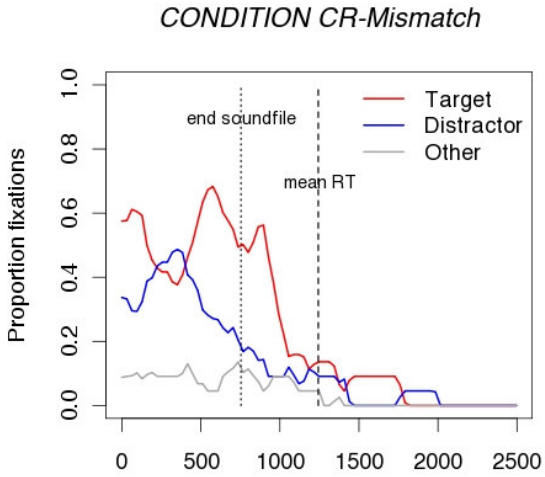
Reflexives: Zooming in

Classic Condition









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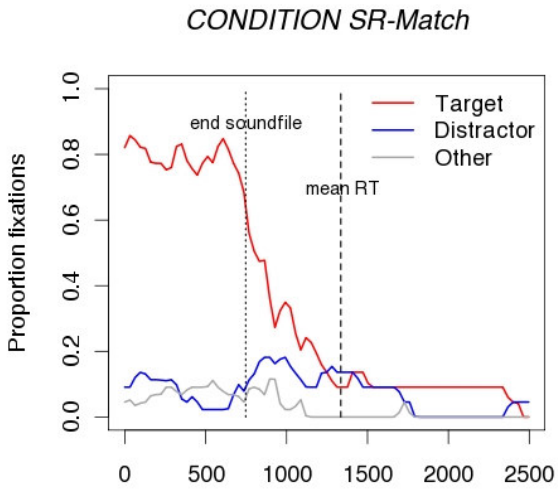

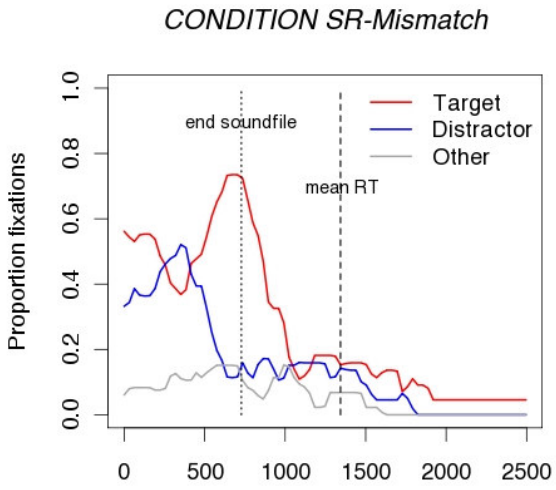

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Discussion

- Discourse influences DPBE in children
- Differences in discourse context (topic status of potential antecedents) may account for variation among experiments
- Languages encode information-structural aspects of meaning in different ways
- Perhaps this could also explain (part of) the observed cross-linguistic differences with DPBE

Conclusions

- Pronouns in a discourse that has no clear topic are difficult for children (more errors)
- No effects of discourse on adults' responses or their eye movements
- But longer RTs for pronouns in absence of clear topic
- How should we explain difference between eye movement measures and RTs?

Thanks to

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