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Cognitive bias overrides syntactic bootstrapping in novel verb learning

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Background

We investigate children's interpretation of novel verbs in terms of MANNER and RESULT. Several factors may be at play:

- Syntactic information such as transitivity limits the availability of MANNER and RESULT interpretations. In a transitive context like (1) either the MANNER or RESULT can be lexicalized in the verb:

- (1) a. The monster is *ripping* the chair. RESULT
 b. The monster is *combing* the chair. MANNER

However, in an intransitive context like (2) only a MANNER interpretation is possible if the monster is the AGENT:

- (2) a. The monster is *combing*. MANNER
 b. *The monster is *ripping*.

- Previous experimental evidence suggests that transitivity is also exploited in children's comprehension of novel verbs. [1] showed that 2- to 3-year-olds prefer MANNER interpretations when the novel verb was presented in an intransitive frame, and RESULT meanings are favoured in a transitive frame. This suggests that syntactic information such as transitivity is actively exploited and mapped on the semantic meaning of a verb in the process of acquiring verb meanings, even though such a link is, in fact, not warranted by the grammar: intransitives can encode result when the THEME is subject:

- (3) The chair is *breaking*. RESULT

- Children's cognitive biases may play a role too [3, 4, 5].

Experiment 1: Language production

- How do adults describe ambiguous events with a MANNER and RESULT subcomponent?
- This experiment investigates people's biases and furthermore tests the claim that English is a MANNER language [6].
- It also serves as a stimuli validation tool for Experiment 2.
- English-speaking adults (N = 20) described the events with one action word.
- The responses as a whole revealed no clear preference (Fig. 1).
- The responses for the individual items showed that some events might elicit a specific bias (Fig. 2).

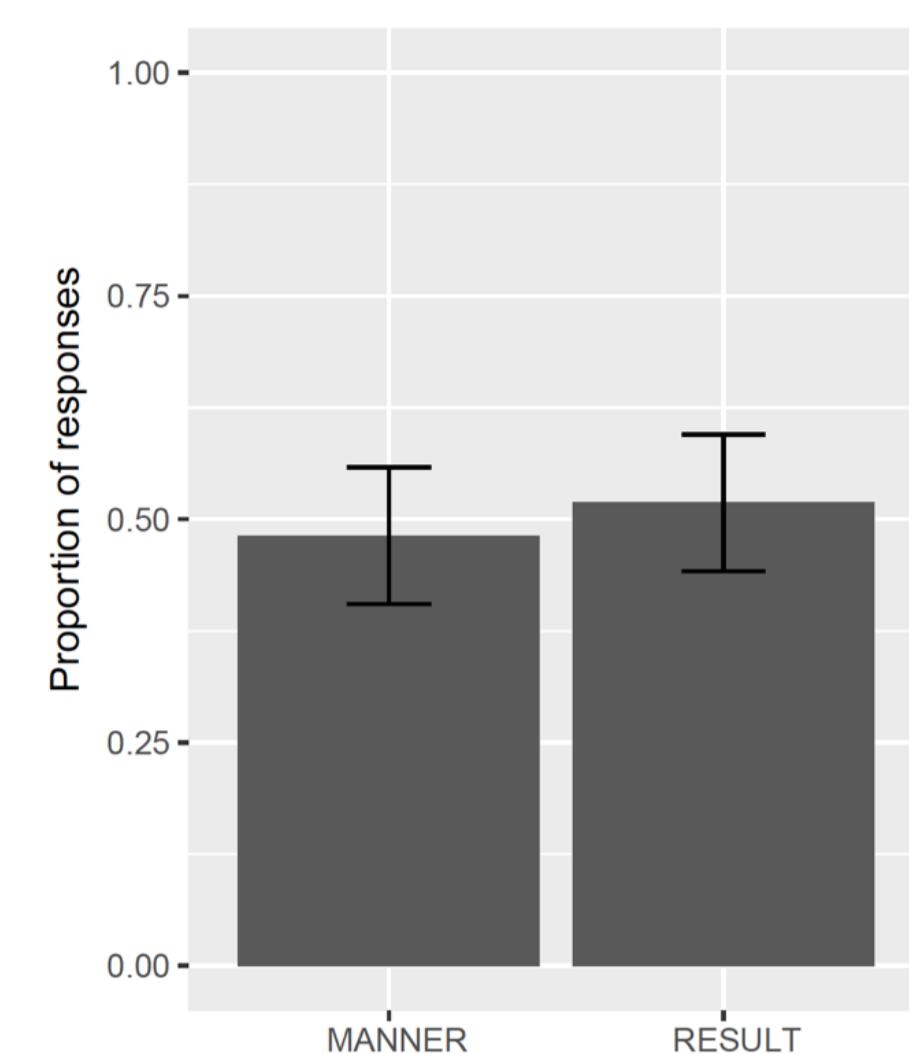


Figure 1: Proportion of MANNER and RESULT responses across all eight experimental items. The error bars depict a Wilson exact 95% confidence interval.

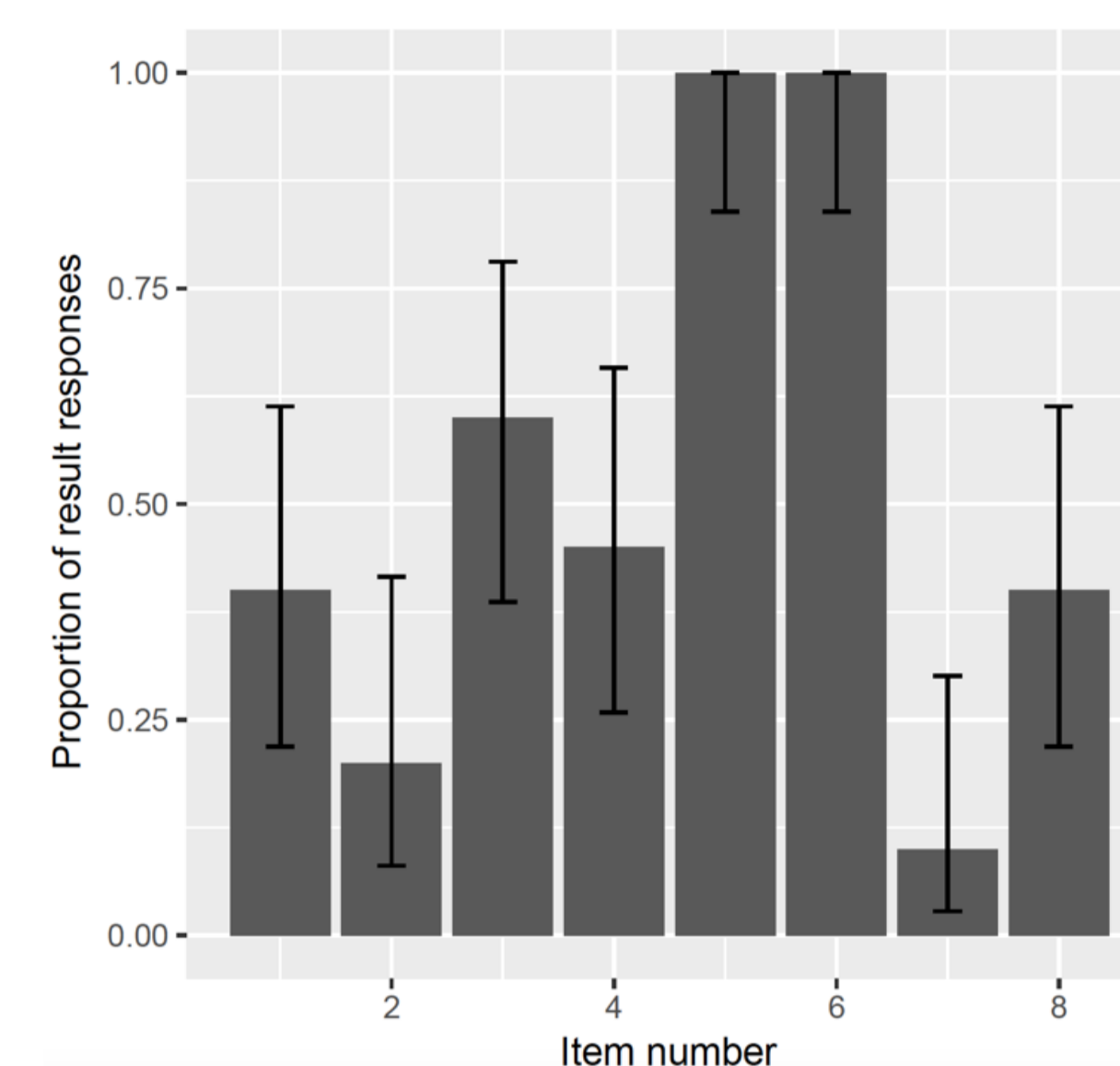


Figure 2: Proportion of RESULT responses per individual item. The error bars depict a Wilson exact 95% confidence interval.

Experiment 2: Syntactic bootstrapping

- Do children and adults interpret novel verbs presented in an intransitive frame as MANNER meaning and novel verbs presented in a transitive frame as RESULT meaning?
- Forced-choice video selection task, between-subjects design
- Dutch preschoolers (N = 39, M_{Age} = 3;11), older English children (N = 51, M_{Age} = 7;08), and Dutch adults (N = 12).

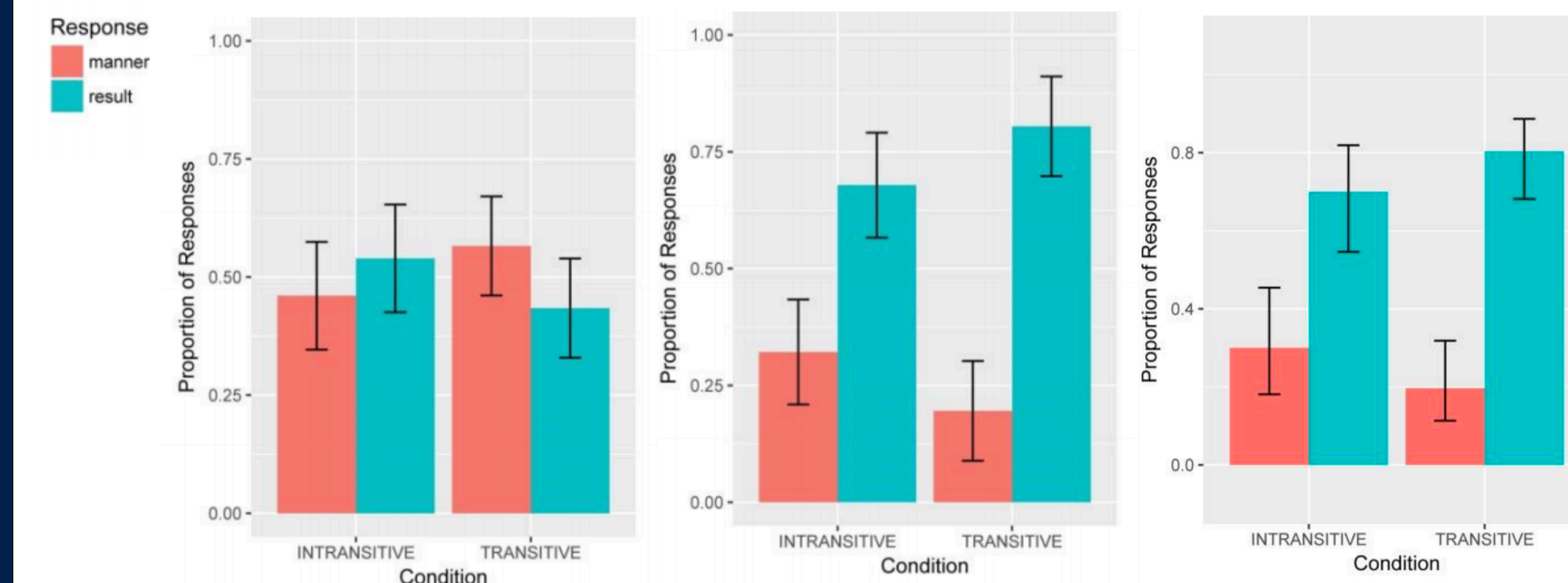
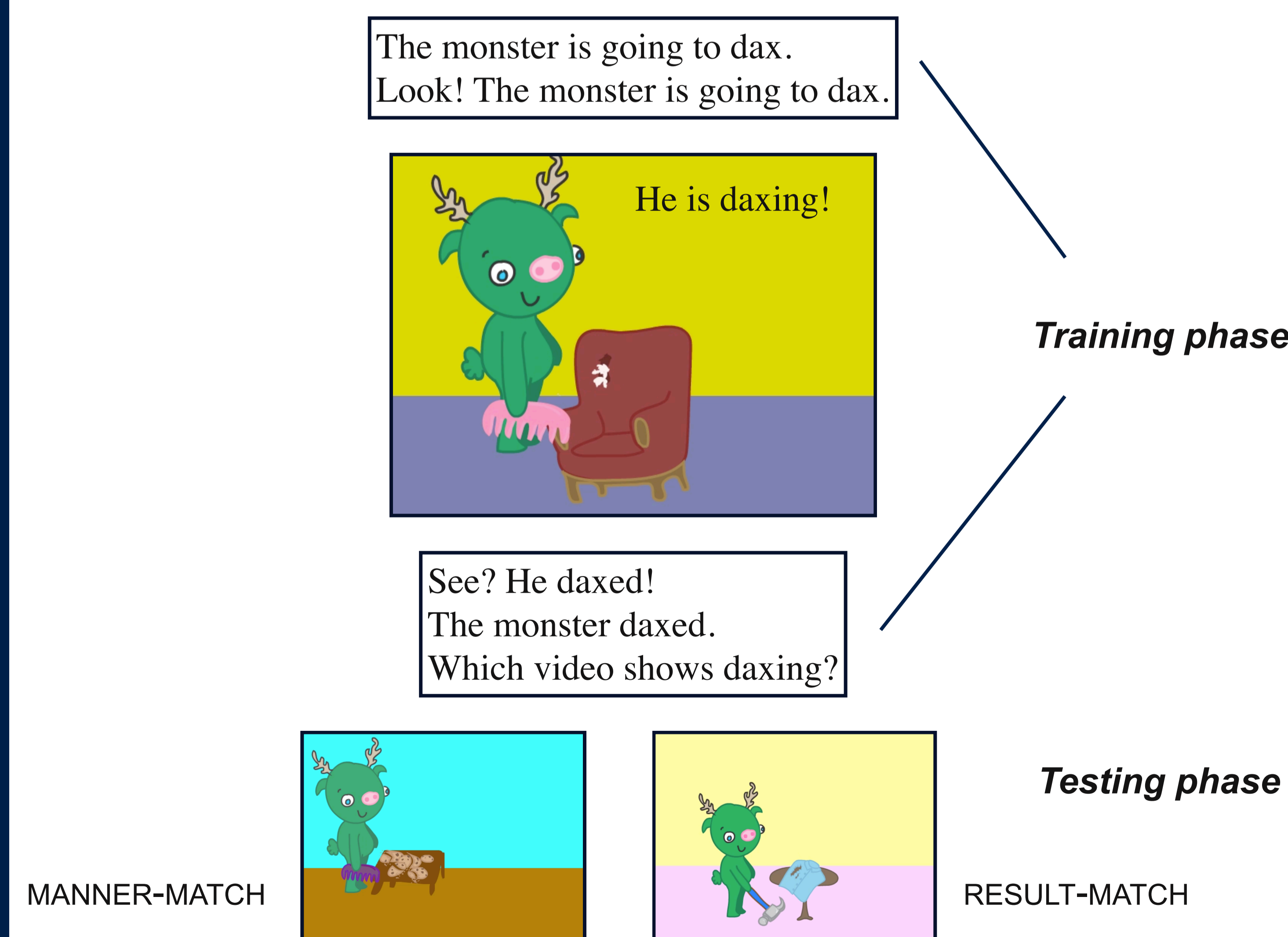


Figure 3: Dutch children Age 3

Figure 4: English children Age 7

Figure 5: Dutch adults

- A two-way repeated-measures ANOVA showed that Dutch adults ($F(1,10) = 5.07, p < .05$) and English children ($F(1,49) = 34.8, p < .0001$) were strongly result biased. None of the participants was manner biased.
- A logistic mixed-model revealed no effect of sentence frame: the result bias occurred equally often in both conditions.
- Furthermore, there was a strong positive relationship between age and the degree to which participants were result biased ($b = .03, SE = .006, p < .0001$).

Discussion

English children and Dutch adults seem to be RESULT biased; younger Dutch children don't show a clear preference. This does not support the syntactic bootstrapping hypothesis which predicted MANNER readings for the intransitive frame. Given the unexpected overall RESULT bias, we hypothesize, post hoc, that participants may have been RESULT biased because humans naturally observe behaviour by other agents as goal-directed, and that syntactic bootstrapping cannot always override this cognitive bias.

Remaining questions:

- Is English as MANNER biased as claimed in the literature[6]?
- Under what circumstances does syntactic bootstrapping work? (Different test sentences across studies.)
- What kind of events elicit a MANNER interpretation?
- Could verb frequency play a role?
- Could the nature of the events be problematic?

References & Acknowledgements

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