Children's interpretations of *Every...some* sentences

Cory Bill[1,2], Elena Pagliarini[3], Jacopo Romoli[4], Lyn Tieu[5], Stephen Crain[6]

[1] Leibniz-Centre General Linguistics (ZAS), [2] University of Konstanz, [3]University of Padova, [4]University of Bergen, [5]Western Sydney University, [6]Macquarie University

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Introduction

Children derive fewer scalar inferences than adults

- Children derive **fewer** scalar inferences than adults. For example, children's interpretations of *Some* sentences like (1) are **less likely** than adults to include, in addition to **the literal meaning** in (1-a), **the scalar inference** in (1-b) (Noveck, 2001).

(1) The pig carried some of his rocks.
  a. The pig carried at least one of his rocks.
  b. ⇝ *The pig didn't carry all of his rocks.*

EverySome sentences have multiple scalar inferences

- '*EverySome*' sentences, where the scalar term *some* is **embedded** under the universal quantifier *every* (i.e. (2)) have the **literal meaning** in (2-a), and have been associated with **both** the *NotEvery* inference in (2-b), and the *None* inference in (2-c).

(2) Every pig carried some of his rocks.
  a. Every pig carried at least one of his rocks.
  b. ⇝ *Not every pig carried all of his rocks (NotEvery)*
  c. ⇝ *None of the pigs carried all of his rocks (None)*

- Adults **prefer** interpretations of *EverySome* sentences **containing** *NotEvery* inferences **over those** containing *None* inferences (Chemla & Spector, 2011).
- No previous work has investigated children's interpretations of such sentences.

Research Question: Do **children** derive inference-based interpretations of *EverySome* sentences, and if so, **which** of the two possible inferences are such **interpretations** based on?

Experiment 1

Method: **Truth Value Judgment task** (Crain & Thornton, 1998) with **20 English-speaking children** (4;00-5;11, M = 5;04) and **24** adults. In the test items **a character** (e.g. a pig) had a set of **4 objects** they could **act upon** (e.g. rocks) (see Fig. 1). Figure 2 presents further details.

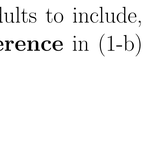


Fig. 1: Exp. 1 test item.

Condition	Target Sentence	Context	Consistent with
Exp. 1	The pig carried some of his rocks.		The pig carried at least one of his rocks (Literal) & ~~*The pig didn't carry all of his rocks (Inference)*~~

Fig. 2: Experiment 1 test condition. An 'outlined' rock indicates it has been acted upon.

Results

- We conducted a **mixed-effect logistic regression analysis**, following Barr et al. (2013).
- There was a **significant effect of group**: Children computed **fewer** scalar inferences than adults..
- **Consistent** with previous work.

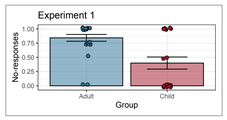


Fig. 3: Mean *no*-responses.

Experiment 2

Method: **Same** paradigm as Ex. 1, with **31 children** (4;00-5;10, M = 4;05) and **18 adults**. In the test items **3 characters** (e.g. 3 pigs) had a **set of 4 objects** each they could act upon (e.g. rocks) (see Fig. 4). Figure 5 **presents** further details regarding the conditions designed to test for the *NotEvery* and *None* inferences (see Fig. 8 for all conditions).

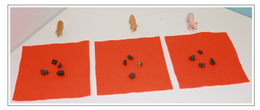


Fig. 4: Experiment 2 test item.

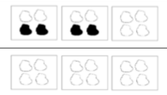
Condition	Target Sentence	Context	Consistent with
OneInf	Every pig carried some of his rocks.		Every pig carried at least one of his rocks (Literal) & *Not every pig carried all of his rocks (NotEvery)* & *None of the pigs carried all of his rocks (None)*
NoInf	Every pig carried some of his rocks.		Every pig carried at least one of his rocks (Literal) & ~~*Not every pig carried all of his rocks (NotEvery)*~~ & ~~*None of the pigs carried all of his rocks (None)*~~

Fig. 5: Experiment 2 conditions. An 'outlined' rock indicates it has been acted upon.

Results

- **Mixed-effect logistic regression** analysis.
- **Significant interaction** between Group and Condition.
- The groups derived inference-based interpretations at **similar** rates in the NoInference condition, but children derived **more** in the OneInference condition.

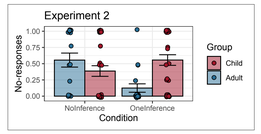


Fig. 6: Mean *no*-responses.

Experiment 1 vs. Experiment 2

- **Group** was significant.
- Each group derived inference-based interpretations at **similar** rates across sentences (i.e. (1) vs. (2)).

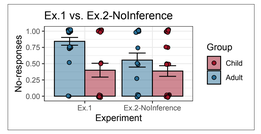


Fig. 7: Mean *no*-responses.

Discussion

Same rate of inference derivation across sentences

The **similar** (within-group) rates of inference-based interpretations across **both** sentence types suggests that the **ease** of deriving such interpretations is **not** affected by any of the **differences** between these sentences (e.g. structural complexity).

Children prefer interpretations with stronger inferences

- While adults **preferred** interpretations of *EverySome* sentences containing *NotEvery* inferences, **consistent** with previous work, children **preferred** those with *None* inferences. **Why?**
- It has been suggested that in order to **acquire** the range of **possible meanings** in a target language, children (unlike adults) are **guided** by a preference for **stronger** or 'subset' meanings (Crain, Ni, and Conway 1994). This could explain why **children** preferred interpretations containing the **stronger** *None* inference (i.e. (2-c)), whereas **adults** were free to respond **charitably** by preferring interpretations containing the **weaker** *NotEvery* inference (i.e. (2-b)).

References

- Barr, D. J., Levy, R., Scheepers, C., & Tily, H. J. (2013). Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language, 68*(3), 255-278.
- Chemla, E., & Spector, B. (2011). Experimental evidence for embedded scalar implicatures. *Journal of Semantics, 28*(3), 359-400.
- Crain, S., & Thornton, R. (1998). *Investigations in universal grammar: A guide to experiments on the acquisition of syntax and semantics.* Cambridge: MIT Press.
- Crain, S., Ni, W., & Conway, L. (1994). Learning, parsing and modularity. *In Clifton Jr, C., Frazier, L., & Rayner, K. (Eds) Perspectives on sentence processing*, 443-467. Hillsdale: Lawrence Erlbaum Associates.
- Noveck, I. A. (2001). When children are more logical than adults: Experimental investigations of scalar implicature. *Cognition, 78*(2), 165-188.

Appendix

Condition	Target Sentence	Context	Possible interpretations
Tst_True	Every pig carried some of his rocks.		Every pig carried at least one of his rocks & *Not every pig carried all of his rocks* & *None of the pigs carried all of his rocks*
Tst_OneInf	Every pig carried some of his rocks.		Every pig carried at least one of his rocks & *Not every pig carried all of his rocks* & ~~*None of the pigs carried all of his rocks*~~
Tst_NoInf	Every pig carried some of his rocks.		Every pig carried at least one of his rocks & ~~*Not every pig carried all of his rocks*~~ & ~~*None of the pigs carried all of his rocks*~~
Tst_False	Every pig carried some of his rocks.		~~Every pig carried at least one of his rocks~~ & ~~*Not every pig carried all of his rocks*~~ & ~~*None of the pigs carried all of his rocks*~~
Ctl_True	Every pig carried rocks.		Every pig carried at least one of his rocks
Ctl_False	Every pig carried rocks.		~~Every pig carried at least one of his rocks~~

Fig. 8: All of Experiment 2's conditions.