Children's Acquisition of Negation and Adjective Scales

Introduction. In the adjectival domain, negation interacts with antonyms in complex ways. Recent studies examined children's comprehension of **contrary opposition** (happy/A^+ vs. sad/$\neg A^+$), and their ability to manipulate the standard associated with each member of a pair of antonyms ([2],[3],[5],[6],[7]). Beyond this, children must also grasp **contradictory opposition** (happy/A^+ vs. not happy/$\neg A^+$). Finally, they need to understand that the co-occurence of **two negatives** yields a positive meaning in some cases (Anna is not not happy/$\neg\neg A^+ \equiv$ Anna is happy/A^+), but not in others (Anna is not sad/$\neg A^- \neq$ Anna is happy/A^+). Our study investigates children's ability to understand the intricate interplay between negation and the adjective's polarity. Specifically, we ask whether children are able to interpret differently (a) contrary and contradictory opposition and (b) doubly negated positive antonyms and negated negative antonyms.

Methods. 60 French-speaking children (age range: 4;8–6;9, M=5;8, SD =0.62) and 71 adults participated in a computerized Picture Selection Task. The task involved sets of 6 images of animals, objects, or characters having the property described by an adjective to varying degrees: 2 pictures depicted the negative end of the scale, 2 represented a middle gap, and 2 the positive end of the scale (**Fig. 1**, with dogs). The task was framed as a game in which a player provided a descriptive clue, prompting participants to select all items matching the description. There were 4 experimental conditions (6 items per condition): 2 negated conditions ($\neg A^+$ and $\neg A^-$), a negative antonym condition (A^-) and a double negation condition (DN) ($\neg\neg A^+$). For negated conditions ($\neg A^+$ and $\neg A^-$), we expected a literal interpretation NOT-{POS/NEG}), alongside a stronger {NEG/POS}-STR interpretation (*Negative Strengthening* [1]). The negative antonym condition (A^-) was expected to receive a NEG-STR interpretation, while the DN condition ($\neg\neg A^+$) was predicted to receive only a positive (POS-STR) interpretation (see summary in **Fig. 1**).

Results. (Fig. 2) Overall, children performed significantly less accurately than the adults ($p<0.001$), the $\neg\neg A^+$ condition being by far the most difficult: their performance in this condition was significantly below chance ($p<0.001$). In the other three conditions ($\neg A^+$, A^-, $\neg A^-$), children showed the same dominant response patterns as the adults. Their performance for these patterns was significantly above chance ($p<0.001$) (except for the NOT NEG pattern in $\neg A^-$ condition ($p=0.9$)), but the fact that their performance remains inferior to that of the adults suggests that their understanding of these constructions is still developing.

Discussion. Our results show that doubly negated positive antonyms ($\neg\neg A^+$) are not mastered by age 7. The pattern most frequently chosen by children for this condition corresponds to a single negation interpretation (str-NEG, **Fig. 3**), echoing children's well-known non-adultlike tendency toward Negative Concord, in the domain of negative indefinites ([4]). Adults gave both strengthened and unstrengthened interpretations for negated antonyms ($\neg$A+ and $\neg$A−). Children also exhibited both patterns but showed a stronger preference for strengthened interpretations. This seems to go against previous findings with scalar implicatures showing that children struggle with strengthened meanings until age 6-7 ([8]). Two explanations emerge: (1) *Negative Strengthening* is an easier type of implicature, allowing for early mastery; (2) alternatively, children (and presumably some adults as well) have a bias toward selecting extreme scale options (e.g., the two leftmost or the two rightmost images), unintentionally mirroring *Negative Strengthening*. We also discuss delays in the emergence of some negative antonyms (*small, short, light* before *poor, young, narrow*), in line with [3],[9].

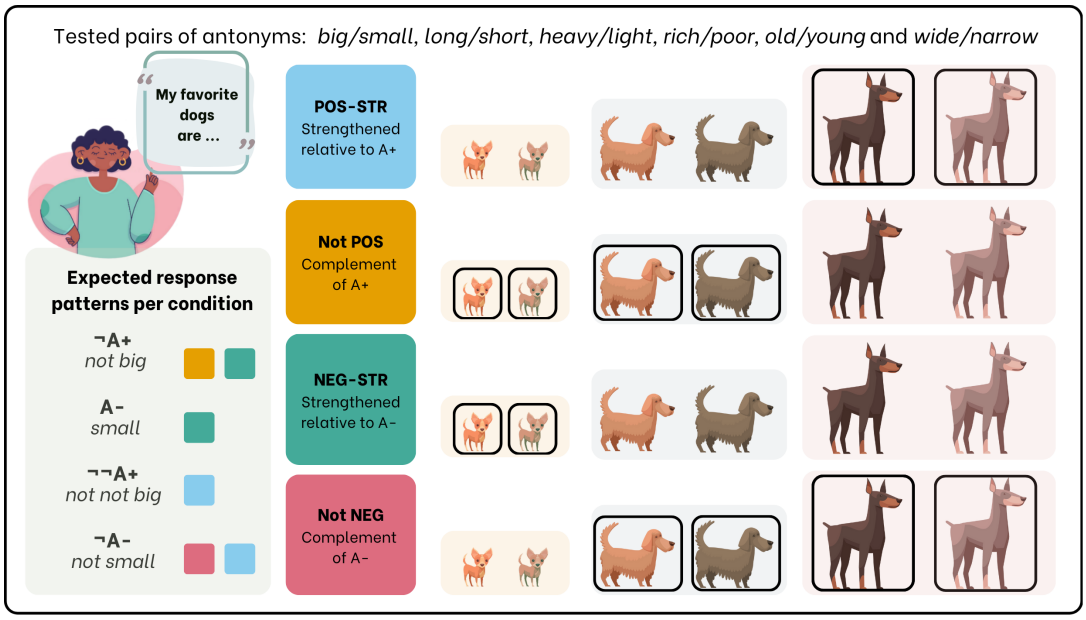

Fig. 1: Expected response patterns for each of the four conditions given on the left. Black rectangles indicate the dogs that would be selected for each pattern.

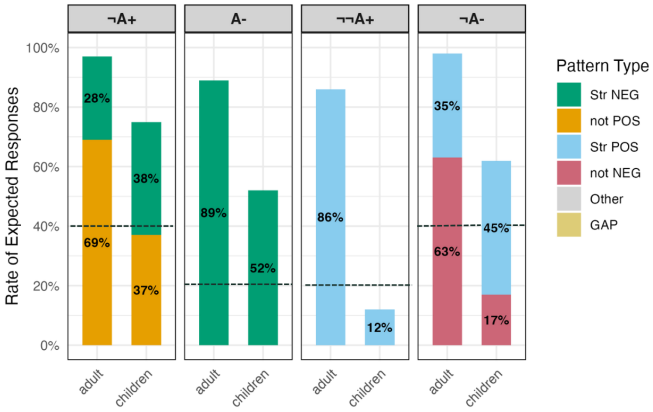

Fig. 2: Cumulative percentages of **expected** responses across conditions and groups. Dashed lines indicate chance levels per CONDITION (40% for $\neg A^+$, $\neg A^-$; 20% for A^-, $\neg\neg A^+$). The different chance levels across conditions are taken into account in our statistical analyses. The chance level per PATTERN, however, is fixed at 20%.

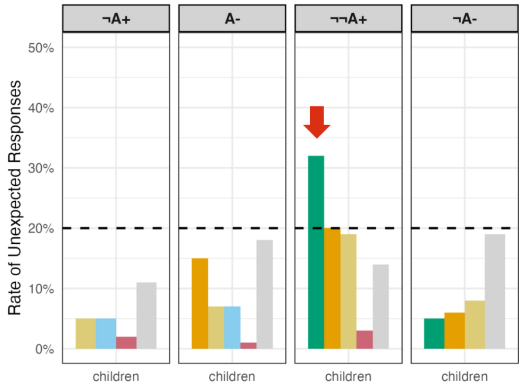

Fig. 3: **Unexpected** response patterns by condition (children only). 'GAP' refers to selection of the two middle images. 'Other' includes all types of implausible responses (e.g. only one or all images selected). Chance level is fixed at 20% per plausible pattern.

Selected references. [1] Alexandropoulou & Gotzner (2024). The interpretation of relative and absolute adjectives under negation. *J. Semantics.* [2] Barner & Snedeker (2008). Compositionality and statistics in adjective acquisition: 4-year-olds interpret tall and short based on the size distributions of novel noun referents. *Lang. Cogn. Process.* [3] Clark (1972). On the child's acquisition of antonyms in two semantic fields. *J. Child Lang.* [4] Driemel et al (2023). Negative concord without agree: Insights from German, Dutch, and English child language. *Languages.* [5] Ehri (1976). Comprehension and production of adjectives and seriation. *J. Exp. Child Psy.* [6] Pagliarini et al. (2022). The acquisition of antonymous dimensional adjectives by Italian preschoolers. *BUCLD 46.* [7] Weicker & Schulz (2020). Not everything needs to be big or small: Evidence from children's interpretation of vague adjectives. *BUCLD 44.* [8] Foppolo & al. (2012). Scalar Implicatures in Child Language: Give Children a Chance. [9] Kilani-Schoch, & Xanthos. The Adjective Petit 'Small, Little' in French Acquisition Data: An Example of the Relationship between Pragmatics and Morphosyntactic Development. *J. of Prag.*