

WHY CHILDREN (INCORRECTLY) ACCEPT INVERSE SCOPE: INVERSE SCOPE DERIVED FROM GENERALIZED DISTRIBUTIVITY

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Introduction: Doubly-quantified sentences (e.g., *Someone caught every cat*) allow inverse scope in languages like English, but not in Japanese, Mandarin or German.

- (1) a. Surface scope (*some* > *every*): There is someone who caught every cat.
 b. Inverse scope (*every* > *some*): *For every cat, there is someone who caught it.

Nonetheless, Japanese/Mandarin/German children (incorrectly) permit inverse scope (Chien & Wexler, 1989; Goro, 2007; Sano, 2004; Szendrői et al., 2017). Previous studies have proposed several theoretical explanations, while no study has experimentally investigated the source of children’s non-adult-like behavior. Here we provide a novel explanation for Japanese children’s acceptance of inverse scope: a generalized preference for distributive interpretations over collective.

In the typical doubly-quantified construction used in previous research (existentially-quantified subject and universally-quantified object), the surface scope reading depicts a collective scene (1a) and the inverse scope reading depicts a distributive scene (1b). Independently from this, children are known to prefer to interpret numerals/quantifiers distributively, differently from adults (Syrett & Musolino, 2013; Rouweler & Hollebrandse, 2015): When hearing a sentence (2), children prefer the distributive (each boy is pushing a car) over the collective (two boys are pushing a car together), while adults prefer the collective.

- (2) *Two boys are pushing a car.*

A generalized preference for distributivity might lead children to select pictures that correspond to the inverse scope reading, thus giving the non-adult-like behavior. We conducted two experiments testing for a correlation between children’s incorrect acceptance of the inverse scope reading in doubly-quantified sentences and their preference for a distributive interpretation of plural expressions.

Study: Two experiments (within-subjects) tested Japanese-acquiring children’s (4;6-6;1, Mean: 5.49) interpretation of doubly-quantified sentences (Experiment 1) and distributivity/collectivity preference on plural expressions (Experiment 2).

Experiment 1 (TVJT, Crain & Thornton, 1998): 4 doubly-quantified sentences (plus practice and fillers). The doubly-quantified sentences (3) were presented after a story where the inverse scope reading is true.

- (3) *Umm, dareka-ga dono-tori-mo tsukamae-ta to omou.*
 Umm someone-NOM every-bird catch-PST COMP think
 ‘Umm, I think someone caught every bird.’

Experiment 2 (Picture-selection): Conducted on a different day to Experiment 1; 4 sentences with a plural subject (4) (plus practice and fillers). Each test sentence was presented with a distributive picture and a collective picture, and children are asked to pick one of the pictures.

- (4) *Doubutsu-san-tati-ga okasi-o tsukut-ta.*
 animal-POLITE-PLURAL-NOM sweet-ACC make-PST
 ‘Animals made (a) sweet.’

Results: For Experiment 1, children accepted the inverse scope reading in doubly-quantified sentences 52.2% of the time, significantly higher than adults (27.5%). However, children can be divided into two groups (Table 1): Children who consistently rejected inverse scope (0% acceptance as a group) and children who consistently accepted inverse scope (95% acceptance as a group). Most importantly, we found that children who incorrectly accepted the inverse scope reading chose the distributive picture 91.6% of the time, while children who correctly rejected this reading chose the distributive picture only 45% of the time, and this correlation was significant ($p = 0.041$).

Table 1: Correlation between Exp. 1 and Exp. 2

	% acceptance of inverse scope in Exp. 1	% selection of the distributive picture in Exp. 2
Children who correctly rejected inverse scope	0%	45%
Children who incorrectly accepted inverse scope	95%	91.6%

The correlation was significant ($p = 0.041$, $SE = 3.1$).
 Model: glmer(Acceptance_of_inverse_scope + Times_to_select_distributive_picture + (1|ParticipantID) + (1|Item), family="binomial")

We conclude that those children who do not have the preference for the distributive reading can also reject the inverse scope reading of doubly-quantified sentences, showing that children’s non-adult-like behavior with doubly-quantified sentences may derive from the previously-documented generalized preference for distributive interpretations.