

## **Problems with Quantifiers: Children's Interpretation of Different Types of Universal Quantification**

Most research on children's interpretation of universal quantification has focused on Exhaustive Pairing (Inhelder and Piaget, 1964; Roeper and de Villiers, 1991; Philip, 1995; Drozd, 2001; among others). This phenomenon seems to occur irrespectively of which type of universal quantifier is presented, so whether it is *every*, *each* or *all*. As a result, most accounts which have related exhaustive pairing to properties of universal quantification have assumed that children interpret all universal quantifiers in the same way. However, in this paper we will show, based on research into a less-studied construction, that this is not the case, and that in fact children do distinguish between distributive universal quantifiers and collective universal quantifiers (see also Brooks and Braine, 1996; Drozd and Van Loosbroek, 2006). The results of this study lead us to propose an account which relies on prototypical interpretations of certain types of quantifiers, and show that the problems typically arise when contexts do not match these prototypical interpretations.

Su and Crain (2000) and Su (2001) showed that when preschool children were presented with double-object constructions like (1) in a situation in which every flower was given to a single lady (which we will call a ONE>ALL event), they often judged sentences to be false. When presented with situations in which every flower was given to a different lady (an ALL>ONE event), they judged sentences to be true. We label this performance pattern (which occurs between 35 and 60 percent of the time) the Reverse-pattern, as it is the complete opposite of the targetlike response pattern. It occurs irrespectively of the type of indefinite that is presented, but we hypothesised that, following Drozd and Van Loosbroek (2006), the type of universal quantifier would influence the occurrence of this performance pattern.

To test this prediction, a group of 30 Dutch-speaking preschool children (mean age 5;5) was presented with test sentences like (2a) and (2b) in a Truth-Value Judgment task. The test sentences were presented in both a ONE>ALL event and an ALL>ONE event. Each child was presented with test sentences containing *alle* ('all') and test sentences containing *iedere* ('every'). The results show that when children were presented a collective universal quantifier, they judged test sentences to be true of ONE>ALL events 94.2 percent of the time, whereas they only did so 58.6 percent of the time with a distributive universal quantifier. By contrast, when presented with *alle*, they judged test sentences to be true of ALL>ONE events significantly less often than when presented with the distributive universal quantifier. The differences are significant ( $p \leq .001$ ). In addition, the Reverse-pattern only occurred once with *alle* and nearly 40 percent of the time in the case of *iedere*.

The results show that children do differentiate between different (types of) universal quantifiers, supporting the findings of Brooks and Braine (1996). We will further show that the specific interpretation that children assign to distributive universal quantifiers contributes to an understanding of why children show the Reverse-pattern, and possibly why Exhaustive Pairing occurs as well.

(1) Snow white gave a lady every flower. (Su and Crain, 2000; Su 2001)

(2) a. *De beer heeft een vos alle stukken taart gegeven* (DO-ALLE).  
Lit. The bear has a fox all pieces cake given.

b. *De beer heeft een vos ieder stuk taart gegeven* (DO-IEDER).  
Lit. The bear has a fox every piece cake given.

(3) Results:

Sentence type	event	% acceptance
DO-ALLE	ONE>ALL	94.2
	ALL>ONE	56.3
DO-IEDER	ONE>ALL	58.6
	ALL>ONE	79.3

## References

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