

# Against Partitioned Readings of Reciprocals

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## Abstract

This paper examines interpretations of sentences with reciprocal expressions like *each other* or *one another*. We concentrate on cases where two or more separate groups can be discerned in the interpretation of the subject of predication. We study the availability of such partitioned interpretations with definite subjects and proper name conjunctions, and show new evidence that partitioning effects are independent of the semantics of the reciprocal expression, and are exclusively determined by the interpretation of the subject. We then propose that the effect is yet another result of the familiar dependency of descriptions on contextual quantifiers.

## 1 Introduction: partitioned interpretations of reciprocal sentences

Sentences with *reciprocal expressions* like *each other*, *one another* or *mutually* involve a variety of interpretations, which have been in the focus of much recent research. In this paper we examine a special kind of interpretations of reciprocal sentences, which we call *partitioned interpretations*. These interpretations involve reciprocal relations between two or more disjoint sets, with no reciprocal relations between the different sets. For example, sentence (1), from Fiengo and Lasnik (1973), has a partitioned interpretation because it is acceptable in the situation depicted in figure 1, where reciprocal hitting relations appear within two disjoint sets of men, but not between those sets.<sup>1</sup>

(1) The men are hitting each other.

Another example of a partitioned interpretation is exemplified by sentence (2) below, from Dalrymple et al. (1998). This sentence is judged to be true when there are several disjoint stacks of planks. In such cases each stack is connected via the relation *be stacked atop*.

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<sup>1</sup>We are grateful to Tali Ore for creating this figure.

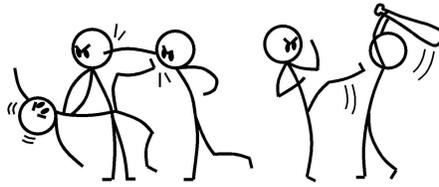


Figure 1: The men are hitting each other

- (2) He and scores of other inmates slept on foot-wide planks stacked atop each other.

What are the origins of partitioning effects with reciprocals? A priori, partitioning effects could stem from the *antecedent* of the reciprocal (e.g. the subject *the men* in (1) or the nominal *foot-wide planks* in (2)), from the relational expression (e.g. *hit* or *stacked* respectively), or from the reciprocal expression itself. Of course, the combined interpretation of the three expressions can also lead to partitioning effects. In this paper, studying the availability of partitioned readings with different antecedents, we show new evidence that partitioned interpretations of simple reciprocal sentences are independent of the semantics of the reciprocal expression, and are exclusively determined by the interpretation of the antecedent. We propose that *definite* (as well as *indefinite*) antecedents can be interpreted as dependent on an implicit, contextually driven, quantifier, which triggers their partition. This factor was previously argued in Winter (2000) to be a crucial element for the analysis of other phenomena involving plurality and quantification.

## 2 Previous proposals

In the literature about reciprocals there is disagreement concerning the origin of partitioned interpretations. For sentence (1), many works (see Schwarzschild (1996), Dalrymple et al. (1998), Beck (2001)) agree that the partitioned interpretation arises from a partitioning of the subject NP. The subject *the men* is assumed to be partitioned into two disjoint sets by a mechanism independently motivated for plural NPs. For each of the two sets, the interpretation of the reciprocal expression is determined independently of the partitioning of the NP denotation. In all of these works, the operator that is assumed to create this NP partitioning is the *cover* mechanism suggested in Schwarzschild (1996). This mechanism distributes a set denoted by a plural NP into contextually salient subsets, such that the union of the

subsets equals the original set.

There is less agreement about the origin of the partitioned interpretation in cases like sentence (2) above. Dalrymple et al. (1998) (henceforth DKKMP) propose a system for the semantics of reciprocal expressions based on the principle called the *Strongest Meaning Hypothesis* (SMH). DKKMP's system includes a variety of available meanings, and in each reciprocal sentence the logically strongest meaning that is consistent with relevant contextual information is chosen as the interpretation of that sentence. The partitioned interpretation of (2) is then derived by assuming that stronger, 'unpartitioned' meanings in their system are precluded because it is impossible for 'scores' of planks to form a single stack. The SMH accordingly selects a semantic operator called *Inclusive Alternative Ordering* (IAO) as the interpretation for the reciprocal in this sentence. The definition of the IAO operator allows the partitioned interpretation of sentence (2), as solely derived by the meaning of the reciprocal expression *each other*. Thus, DKKMP make a distinction between the origins of partitioning in (2), which is the SMH, and partitioning in (1), which is external to the meaning of the reciprocal expression. Another view on this kind of examples is offered in Beck (2001), where all partitioned interpretations are attributed to a general semantic process with plurals, using the cover mechanism of Schwarzschild (1996). In Beck's system, the IAO operator is not generated as one of the possible meanings of reciprocal expressions.

### 3 New evidence about partitioned reciprocals

The following minimal variation pair poses a challenge for both DKKMP's and Beck's analyses:

- (3) The planks are stacked atop each other.
- (4) Planks 1, 2, 3, and 4 are stacked atop each other.

Suppose there are two stacks of two planks each. Sentence (3) is true, whereas sentence (4) is false or very odd in this situation. This minimal pair shows that the type of the subject NP affects the availability of the partitioned interpretation: changing it from a definite plural NP to a proper name conjunction, without changing its denotation, eliminates the partitioned interpretation. The SMH mechanism cannot account for the contrast between sentences (2) and (3), in which partitioning is available, and sentence (4), in which it is not: in both cases forming one stack with four planks is easily possible, hence DKKMP's analysis expects both sentences not to show any partitioning effect. Schwarzschild's cover mechanism is also problematic, as it assumes no inherent difference between partitioning effects

of different types of plural NPs: in both (3) and (4) the cover mechanism should allow the same partitioning effects, at least in the absence of explicit assumptions about its interaction with contextual factors.<sup>2</sup>

The effect of the type of the antecedent NP on the interpretation of reciprocal sentences is clearly exemplified when world knowledge only allows a partitioned interpretation. Consider the following sentences, in a situation where there are four singers:

- (5) The singers are looking into each other's eyes in this photo.
- (6) #John, Paul, George and Ringo are looking into each other's eyes in this photo.

Sentence (5) is felicitous, whereas sentence (6) is rather weird. In (6), despite world knowledge, the truth conditions derived from the reciprocal expression are not easily weakened to allow a partitioned interpretation.<sup>3</sup>

#### **4 A new account of partitioned interpretations of reciprocals**

In the literature on plurality, it has often been proposed that the way plurals are interpreted is governed by contextual factors that determine partitioning of their denotations. These factors are often independent of reciprocal expressions, and may therefore point to a general mechanism of partitioning. Beck's account that was mentioned above proposes to exploit the *cover* mechanism of Schwarzschild (1996) to capture such effects. Consider one of Schwarzschild's simple illustrations for partitioning, involving sentences like *the vegetables are too heavy to carry*. Clearly, the heavy objects referred to in this sentence do not have to be individual vegetables. They can also be baskets or boxes of vegetables. We adopt Schwarzschild's and Beck's view that such partitioning effects are strongly related to partitioned interpretations of reciprocals. However, we consider contrasts like

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<sup>2</sup>See Winter (2000) and Beck and Sauerland (2001) for discussion of such possible factors. In the case of sentence (4) above, we were not able to find contexts that clearly allow the partitioned interpretation, and similarly for the other reciprocal sentences below with proper noun conjunctions.

<sup>3</sup>Note that a partitioned interpretation *is* available if the partition is syntactically expressed in the conjunction, as in the following variation of sentence (6) in (i) below. In this case, a partition to two pairs of singers is perfectly possible, as expected by compositionality and intersective ("Boolean") analysis of the italicized *and*.

- (i) [John and Paul] *and* [George and Ringo] are looking into each other's eyes.

the ones between sentences (3) and (4) as further evidence for the relations suggested in Winter (2000) between “partitioning” effects with plurals and the dependent/anaphoric interpretation of definite and indefinite descriptions. Winter shows that while definite plural NPs easily allow distribution to contextually salient subsets of their set reference, conjunctions of proper names often resist such distribution. The following example, adapted from Winter (2000), exemplifies this contrast.

- (7) The committee will commission operas to be written by teams of two composers.
  - a. The composers will earn \$100,000.
  - b. Lloyd Webber, Penderecki, and Stockhausen will earn \$100,000.

Consider a case where an opera was commissioned by the committee to be written by Lloyd Webber and Penderecki, while another opera was commissioned to be written by Lloyd Webber and Stockhausen. Each pair of composers received a total pay of \$100,000 for their opera. In this situation sentence (7)a is judged to be true whereas sentence (7)b is judged to be false, or very odd. According to Winter (2000), partitioning is available for the definite NP in (7)a because of the anaphoric power of the definite, which can combine with implicit quantification to create distribution into subsets. Informally, sentence (7)a is analyzed as follows:

- (8) For every team  $x$ , the composers in  $x$  will earn \$100,000.

This kind of *dependent* interpretation of definites is highlighted in the following example from Winter (2000) (cf. Partee (1989)):

- (9) At a shooting range, each soldier was assigned a different target and had to shoot at it. At the end of the shooting we discovered that *every soldier hit the target*.

In the italicized sentence, the noun phrase *the target* is interpreted as a bound anaphor, dependent on the subject quantifier. The same mechanism does not operate on proper name conjunctions as in (7)b since they are not anaphoric.

This analysis captures the contrasts in (3)-(4) and (5)-(6), and more generally, it gives an alternative account of partitioning effects with reciprocal expressions and definite antecedents. For instance, for (3) we informally assume the following analysis.

- (10) In each group of planks  $g$ , the planks in  $g$  are stacked on top of each other.

A more complicated analysis may also work with DKKMP's example (2), provided we allow the quantifier over groups of planks, or situations, be in the scope of the subject, as in the following paraphrase:

- (11) He and scores of other inmates slept on foot-wide planks  $G$  s.t. in each subgroup  $g$  of  $G$ , the planks in  $g$  were stacked atop each-other.

This analysis agrees with the general assumption of previous works that partitioning is sensitive to context: the actual grouping of planks in the analysis (10) is determined by the context. However, crucially, this analysis of (3) relies on the anaphoric potential of the definite subject (cf. (7)a and (9)). In (4), with proper name conjunction, by contrast, partitioning is expected to be impossible due to the fact that the subject cannot be referentially dependent on any implicit quantifier.

A critical assumption in this analysis is that the interpretation of the reciprocal expression itself does not allow partitioning. For if partitioning could originate from the reciprocal itself, sentences like (4), with conjunctive antecedents, would also have been expected to show a partitioned interpretation. This suggests that there is a "lower bound" on the meaning of the reciprocal expression itself: it cannot be weak enough to allow partitioned readings. We contend that all the cases of reciprocal sentences with partitioned interpretations are the result of an independent partitioning mechanism, while the reciprocal expression itself always has an unpartitioned reading. In more formal terms, we adopt the following assumption on the interpretation of reciprocals:

- (12) *Connectivity*: Let  $A$  be a set and let  $R$  be a binary relation. If the one-place predicate  $R$  *each other* holds of  $A$ , then the graph induced by  $R$  on  $A$  is *connected* (=not partitioned).

## 5 Further evidence

Once we examine further previously suggested reciprocal meanings that allow for partitioned interpretations, we see that these partitions as well are affected by the identity of the antecedent, similarly to the examples discussed above. Sentence (13) below is brought in DKKMP as an example for a reciprocal reading they call *One-way Weak Reciprocity* (OWR), which requires that each member of the antecedent set participate in the denoted relation with another member of the antecedent set.

- (13) "The captain!" said the pirates, staring at each other in surprise.

In sentence (13), OWR requires that each pirate stare at another pirate. This seems correct, for sentence (13) is true in both figures 2(a) and 2(b) below. However,

consider what happens when we replace the subject in (13) by a proper name conjunction, as in sentence (14) below.

(14) Morty, Charley, Oswald and Bob are staring at each other.



Figure 2: pirates staring at each other

Here the truth conditions generated by OWR become less adequate, for sentence (14) is odder than (13) in figure 2(a), with a partitioned interpretation, while both sentences are perfectly OK in figure 2(b), with a non-partitioned interpretation. From this contrast between (13) and (14) we conclude that the actual interpretation of the reciprocal expression with the predicate *stare at* requires connectivity (i.e. lack of partitions) on top of the truth conditions required by OWR. The acceptability of (13) in figure 2(a) is again attributed, as in (3) and (5), to the anaphoric potential of definites, independently of the meaning of reciprocal expressions.

## 6 Conclusions

We have shown some evidence for a systematic contrast between the interpretation of reciprocal sentences with different plural antecedents. While reciprocals with plural definite antecedents often allow partitioning effects, reciprocal sentences with proper name conjunctions resist such partitioning. As in Winter (2000), we attribute this difference to the anaphoric potential of definite noun phrases – possibly on implicit quantifiers contributed by the context. Accounting for the main contrast we analyzed requires that the meaning of reciprocal expressions do not involve any partitioning effects. Thus, we believe that this paper has shown evidence that are pertinent for the theory of reciprocal expressions, as well as for the more general theory of plurality of quantification.

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