Multiple Syntactic Functions and Bipartite Interpretation of NPs

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Introduction
NPs like other constituents generally have syntactic functions that are associated with specific interpretations. They may not only have one such semantically relevant syntactic function, but also a combination of them. Syntacticians have traditionally directed their attention to only a certain number of semantically relevant syntactic functions of NPs, in particular to the status of an NP as an argument, an anaphor, a variable, or quantifier. This paper examines a new type (or new types) of such semantically relevant syntactic functions. These functions have common syntactic characteristics that distinguish them from more familiar syntactic functions. Furthermore, these functions are associated with semantic operations of a specific type. The semantic content of these functions, again, differs in a number of characteristic properties from the semantic content of traditional syntactic functions. The type of semantic content, however, resembles in these properties distributivity, i.e. the distributive interpretation of predicates. But it can be shown that, unlike the semantic effects of the syntactic functions discussed, distributive interpretation is a semantic effect that is not associated with a specific syntactic function, but rather associated with lexical predicates in general.

   I first illustrate the semantic content of this new type of syntactic function with reciprocals introducing the essential characteristics of this content, namely three diagnostic semantic properties and the alternation between nominal and adverbial expression of this content. Then, I compare this content with distributivity, first semantically, then syntactically. In the later case, I show that reciprocals, but not distributivity, requires a specific syntactic relation for that content and furthermore that the specific syntactic relation is distinct from more familiar syntactic relations, for instance those involved with overt wh movement or wh movement at LF or the relation between a 'bound' plural pronoun and a plural antecedent. In the next section, I examine a construction that involves the same type of semantic operation, namely same / different in the internal reading (Carlson 1987). In the discussion of same / different, I show that apparent differences between the syntactic relations involved with reciprocals and same / different can be explained by the fact that reciprocals have an additional semantically relevant syntactic function beside being 'reciprocity expressions', namely the function of being an anaphor. I then argue that the semantic operation of reciprocals and same / different is also involved in constructions like English reflexives and adverbs like individually. Finally, I examine two other constructions with respect to the syntactic relation and the type of semantic operation in question, a total of and comparative superlatives. The latter construction in particular turns out to exhibit exactly the same syntactic constraints as same / different.

1. On the semantics of reciprocals
Reciprocal sentences have three semantic characteristics that distinguish them from quantificational constructions, for instance floated each. These characteristics, (A), (B), and (C), are not only typical of reciprocals, but characterize all other constructions that will be discussed.
(A) the 'requirement of plurals'
Reciprocals require in certain contexts plural NPs, where the corresponding construction with floated each requires singular NPs:
   (1) a. They gave each other new noses / # a new nose.
       a'. They each gave the other a new nose / # new noses. (Williams 1989)
       b. Mary and Sue saw the husbands / # the husband of each other.
       b'. Mary and Sue saw each the husband / # the husbands of the other.
(B) no quantifier scope interaction
Reciprocals cannot interact in scope with other quantifiers, in particular not with adverbial quantifiers. For quantified arguments, this is seen already in (1a'). For quantified adjuncts, it was observed by Higginbotham (class lectures 1989) with examples such as in (2).
   (2) a. John and Mary saw each other twice
       a'. John and Mary each saw the other twice.
       b. John and Mary rarely called each other.
       b'. John and Mary each rarely called the other.
(2a) means that there were two occasions such that on each one John saw Mary or Mary saw John or both. (2a'), in contrast, means that on two occasions, John saw Mary and at another two occasions, Mary saw John. Thus, (2a') involves four occasions on which John saw Mary or Mary saw John, whereas (2a) involves only two such occasions. Similarly, (2b) involves only one set of occasions which are 'rare' in number, whereas (2b') may involve two distinct such sets, which may together amount to a set of occasions that are 'frequent' in number rather than 'rare'. Thus, the event quantifiers in (2) have narrow scope with respect to the universal quantifier representing each, whereas the universal quantifier which is involved in reciprocals simply cannot interact in scope with event quantifiers.
(C) single event desciption
Reciprocal sentences generally have a tendency of being interpreted as describing a single event, rather than a set of disconnected events, as was observed by Lasnik / Fiengo (1973).
   (3) a. John and Bill looked at each other.

b. John and Bill each looked at the other.

(3a) most likely describes a situation in which John looked at Bill at the same time at which Bill looked at John. In contrast, (3b) may equally well describe a situation in which John looked at Bill on a totally different occasion than when Bill looked at John. This characteristics of reciprocals is not a strict condition, but rather a tendency, a preference law. This status of property (C) is as such in fact predicted by the analysis that will be given below.

The properties (A) - (C) of reciprocals can semantically be accounted for under the following assumption. Reciprocals do not have the status of ordinary quantifiers (such as floated each) in a sentence meaning , but rather modify an (open) proposition that has been built independently of the presence of the reciprocal. Let me first illustrate the analysis of a reciprocal sentence with the example John and Bill hit each other. I will simplify radically the exact formulation of the reciprocal relation involved (see Moltmann 1990 for discussion) and assume that in order for this particular sentence to be true, John must hit Bill and Bill must hit John. Then, the sentence meaning is as given in (4), where [John and Bill] denotes the group consisting of John and Bill and 'P' is the relation 'is part of' (or 'is group member of').

(4) $e(hit(e, [John and Bill_i], [each other_i]) \& xy(xP[John and Bill] \& yP[each other] \&$
    $x = y --> e'(e'Pe \& hit(e', x, y))))$

(4) reads as follows. There is an event e of hitting relating the group of John and Bill to the same group (the referent of each other, which is coindexed and thus coreferential with John and Bill) and for any two distinct parts x and y of the group of John and Bill there is a subevent e' of e such that e' is a hitting involving x and y. Here, coreference of each other and John and Bill is treated solely as a matter of the interpretation of coindexing (as the indication of the relation between anaphor and antecedent) and is thus not considered part of the specific reciprocity effect of reciprocals.

The general idea about the semantic analysis of a reciprocal sentence is the following. When the meaning of a reciprocal sentence is construed, the reciprocal is first disregarded and the rest of the sentence is assigned an open proposition as its meaning which consists of a relation between events and participants. The semantic content of the reciprocal itself is a relation of this type, and the semantic effect of the reciprocal in the complete sentence meaning consists in conjoining these two event-participant relations. This sort of interpretation of a sentence is in this sense a bipartite interpretation.

It can easily be seen that properties (A) - (C) follow from this analysis of reciprocals. (A) follows because in the first conjunct, a group antecedent is related to other group participants. Thus, the analysis entails that for (1a) the following is true: they gave them (i.e. the same group) new noses or they gave them (i.e. the same group) a new nose, which would both express the first conjunct of the reciprocal sentence meaning. But only the former makes sense.1 (B) follows because all true quantifiers should be represented in the first conjunct of the meaning of a reciprocal sentence, and there, they cannot interact in scope with the universal quantifier associated with each other in the second conjunct. (C) follows because the event variable e in the first conjunct requires a single event value. It is a general condition on events that are values of variables requires that they be 'single events', that is, events that have a certain degree of integrity (in space, time, or in the interaction among the event participants), rather than arbitrary sums of unconnected events. This condition is simply a preference law on the individuation of entities (entities with strong integrity are preferred over entities that have a weak degree of integrity).

A sentence meaning such as in (4) can be built in a compositional way. This is in detail executed in Moltmann (1990).

Besides properties (A) - (C), there is further evidence for this analysis of reciprocal sentences. If the reciprocity and the anaphoricity aspect of reciprocals are in fact to be represented independently in a sentence meaning, then both semantic effects could also be expressed independently syntactically. This is in fact often so. Cases in question are adverbial reciprocals in Romance languages and in German. In these languages, plural reflexives are neutral with respect to reciprocal and reflexive interpretations. Reciprocity can then be expressed separately by an adverbial, for instance l'un l'autre in French or gegenseitig in German, as in (5a) and (5b) respectively.

(5) a. Ils s'aiment l'un l'autre. 'They love them (refl.) one the other.'
    b. Sie schlugen sich gegenseitig. 'They hit them (refl.) mutually.'

With respect to the properties (A) - (C), the semantic content of reciprocals resembles another semantic phenomenon , namely distributivity, i.e. the distributive interpretation of predicates. However, we will see that, in contrast to the semantic effect of reciprocals, distributivity is not associated with a specific syntactic relation. In this sense, distributivity is a reducible semantic phenomenon. By contrasting the distributivity syntactically with reciprocals, we will get a first characterization of the specific syntactic relation that is associated with the reciprocity aspect of reciprocals.

2. The semantic phenomenon of distributivity
By distributivity I mean the distributive interpretation of predicates such as lift in (6), in which the predicate is understood as holding of every single element of the group referent of the subject.

(6) The men lifted the piano.

Distributive interpretation of predicates exhibits the same three properties (A) - (C) that characterize reciprocals. First, distributive interpretation requires plural and disallows singular NPs in certain contexts, thus satisfying (A). This is seen in the example (7a), which contains a predicate of the appropriate sort.2 It is to be understood as describing a situation in which John criticized a different film than Mary. The plural requirement also holds of nouns that have plural complements undergoing distributive interpretation, as in (7b) in the relevant reading.

(7) a. The students criticized films / the films / # a film.

b. Sue and Mary do not know the fathers / # the father of their sons.

Second, distributive interpretation cannot interact in scope with quantifiers and thus fulfills condition (B). In this respect, it differs, together with reciprocals, from overt distributivity operators such as floated each.. This is shown in (8).

(8) a. The students criticized the film twice.

a'. The students each criticized the film twice.

b. The students criticized two films.

b'. The students each criticized two films.

(8a) means that there were two occasions on which the students criticized the film (either collectively or individually by distributive interpretation). In contrast, (8a') means that for each student, there were two occasions on which he or she criticized the film, whereby each student may have criticized the film at a different two occasions. (8b) implies that there were only two films such that all the students criticized those two films, whereas (8b') allows for each student to have criticized a different two films.

Finally, distributive interpretation satisfies condition (C) to some extent, the requirement of a single event description. (9a) naturally undergoes obligatory distributive interpretation (i.e., it is true that John and Mary each saw the film), but the sentence suggests, in contrast to (9b), that John and Mary watched the film at the same occasion.

(9) a. John and Mary watched the film.

b. John and Mary each watched the film.

Thus, distributivity is a semantic phenomenon that has the same characteristic properties as reciprocal interpretation.

Distributive interpretation is available in English systematically with all predicates. I propose therefore that distributivity is due to a rule in the lexicon of the form in (10) (formulated for three-place predicates), where 'v' is an operator mapping two entities into the sum or group of these two entities.

(10) Distributive Interpretation: If $Q(e, x, y)$ & $Q(e', x', y')$, then $Q(eve', xvx', yvy')$

Thus, in this account, distributivity is not due to a semantic operation that represents an implicit distributivity operator in sentence meaning (as, for instance, in Roberts 1987), but rather is a purely lexical option for predicates, which does not have to be represented in sentence meaning at all. In this account, the properties (A) - (C) immediately follow. The don't follow, however, if distributivity is considered the effect of an implicit syntactic distributivity operator that has the same status in sentence meaning as usual quantifiers (such as the universal quantifier over parts of groups represented by floated each). This, then, implies that distributivity is not associated with any specific syntactic relation at all (since it is a purely lexical property) and ought to have syntactic consequences with respect to the scope of distributivity. The next section shows that this is in fact the case.

3. Syntactic differences between reciprocals and distributivity

A first difference between distributivity and reciprocals is that distributivity, unlike reciprocals, does not depend on the fom of the NP or the VP. For instance, it is possible with all kinds of plural determiners:

(11) The / two / all men lifted the piano.

The important difference between distributivity and reciprocals, however, lies in the syntactic locality conditions that are associated with these two semantic effects. Distributivity is essentially restricted to the relation of argumenthood. A predicate can be interpreted distributively only with respect to its arguments, but not with respect to any group in the semantic context that is not an argument. Of course, an apparently wider scope of distributivity may arise if two (or more) predicates are interpreted distributively and one of them is part of an argument of the other.

(12) a. John and Mary criticized two films.

b. John and Mary hope for the election of Sue and Bill.

c. Bill and Frank fear the invasion of two countries.

d. Bill and John saw the husbands / # husband of Sue and Mary.

In (12 a), distributivity applies to the predicate criticize in the interpretation in which John criticized a film that is different from the film that Mary criticized. In (12b), (12c), and (12d), distributivity may apply to both the predicates hope, fear and saw and the predicates (or better functional terms) election, invasion and husbands. This may give for (12b) the interpretation in which John hoped for the election of Sue and Mary hoped for the election of Bill, and for (12c) the interpretation in which Bill fears the invasion of country X and Frank the invasion of country Y. Similarly, for (12d), we may get the interpretation in which Bill saw Sue's husband and John saw Mary's husband. Thus we have an instance of distributivity that has apparently wider scope than argumenthood. Notice the the plural requirement (A) apparently holds only for concrete terms like husband, but not for abstract or event-denoting terms like election or invasion. This may be traced to the general fact that event nouns behave semantically like mass nouns, rather than count nouns - irrespective of their syntactic category (see Moltmann 1989).

Wide scope distributivity effects are impossible if the group argument is embedded in a proposition. This is shown in the examples (13a) and (13b) in the relevant interpretation, minimal contrasts to (12b) and (12c) respectively.

(13) a. John and Mary hope that Sue and Bill will be elected president.

b. Bill and Frank fear that two countries will be invaded.

(13a) cannot mean that John hoped for the election of Sue and Mary for the election Bill (at least not without explicit respectively , which would induce a syntactic relation of its own). The reason is that the group consisting of Sue and Bill is argument of elected , but elected does not refer to any entity that is argument of hope (or any predicate that

refers to an argument of hope). Elected refers to an event of election, but this event is not the argument of hope. Rather, the argument of hope is a proposition, which is a 'closed' semantic object.

There are at least two contexts, in which plurals seem to allow for distributivity even across clause-boundaries. One such context are propositional complements of nouns, as in (14).

(14) a. John and Mary heard claims that Sue and Bill were elected president.
b. Bill and Frank spread lies that two countries were invaded.

(14a) can have the interpretation in which John heard a claim that Sue was elected president and Mary heard a claim that Bill was elected president. A similar distributive interpretation is available for (14b). Apparently, only when a clause is complement of a noun, not when it is complement of a verb, can it denote a group of propositions. In (14a), this is the group consisting of the proposition that Sue was elected president and the proposition that Bill was elected president. 'Distributivity' is possible also across the boundaries of a relative clause. (15) may describe a situation in which John read a book that was written by Mary and Bill read a book that was written by Sue.

(15) John and Bill read books that were written by Mary and Sue.

When it is complement of a verb, the embedded clause in (14a) can only denote a single proposition involving a group entity as a participant of an event, namely the propositon that the group consisting Sue and Bill was elected president. This shows that the interpretation of a clause does not proceed in an entirely compositional way, but rather depends in some way on the category governing it. The reason why this should be so remains mysterious. Notice that the governing noun in the case of 'broad distributivity' must satisfy the plural requirement:

(16) a. # John and Mary heard a claim that Sue and Bill were elected president.
b. # Bill and Frank spread a lie that two countries were invaded.

The other context in which distributivity may apply 'across' clause boundaries are ECM clauses and small clauses. A number of speakers get the relevant distributive interpretation in (17).

(17) a. John and Mary believe Sue and Bill to have been elected president.
b. Bill and Frank expect two countries to have been invaded.
c. John and Bill consider Sue and Mary the most talented.

Again, it seems that a clause may denote a group of propositions, rather than a single proposition, in a specific syntactic context. However, the two contexts, complements of nouns and ECM contexts, presumably do not constitute a uniform condition, since 'pluralization of propositions' is not possible for all speakers in the second context.

Summarizing these observations, it appears that distributivity generally is strictly limited to argumenthood - as predicted by the 'lexical' treatment above, but that under certain syntactic conditions a specific syntactic relation can be established which allows clauses to denote groups of propositions as semantic values and allow for distributivity across clause-boundaries.

The syntactic locality conditions on the interpretation of reciprocals are very different in nature from those on distributivity. However, first, two sorts of antecedent have to be distinguished for reciprocals. A reciprocal always has to have an anaphoric antecedent, a plural NP in the local domain (governing category) of the reciprocal satisfying condition A of Binding Theory (cf. Chomsky 1981). This antecedent enters the rule of coreference, but not necessarily the rule of reciprocal interpretation. Instead, the rule of reciprocal interpretation may apply to another, nonlocal plural NP. I will call the occurrence of a plural NP that enters the reciprocal relation the reciprocal antecedent. In the 'broad reading' of each other in (18) ('John thinks that he likes Mary and Mary thinks that she likes John, but neither of them necessarily knows about the feelings of the other'), John and Mary is the reciprocal antecedent, but they is the anaphoric antecedent.

(18) John and Mary think they like each other.

The relation between reciprocal antecedent and reciprocal is obviously not subject to condition A of Binding Theory and not clause-bound. But it is subject to other syntactic conditions. Two general constraints should be noted at this point. First, the reciprocal antecedent of a reciprocal may not be outside a complement of a nonbridge verb, as in (19a), or an adjunct clause, as in (19b), as was noted by Heim/Lasnik/May (to appear).

(19) a. John and Mary whispered that they hated each other.
b. John and Mary got upset because they saw each other on TV.

(19a) cannot have the meaning in which John whispered that he hated Mary and Mary whispered that she hated John. Rather, the content of John's and Mary's whispering can only be about mutual hatred. (19b) cannot mean that John got upset because he saw Mary on TV and Mary got upset because she saw John on TV. Rather, it can only mean that the reason for John's and Mary's getting upset was that both John saw Mary on TV and Mary saw John on TV.

This constraint on the reciprocal antecedent of each other might suggest that each other is subject to the constraints on wh movement with respect to the reciprocal antecedent (as argued by Heim / Lasnik / May, to appear). However, in crucial respects, the relation does not behave at least like overt wh movement. It is clearly not subject to the wh Island Constraint and the Complex NP Constraint (CNPC), as seen in (20), where a broad reading of each other is easily available.

(20) a.The enemies wondered what they should do to each other.
b. John and Mary heard rumors that they exceeded each other.

Furthermore, overt wh movement is subject to the Subject Condition, but the relation between each other and its reciprocal antecedent is not:

(21) a. * Who do you think pictures of t are on sale?
b. John and Mary think that pictures of each other are on sale.

But maybe the relation between reciprocal antecedent and each other behaves like wh movement at LF, rather than wh movement at S-Structure. This would be more plausible anyway, since recprocals could involve movement only at LF (for instance, adjunction of the each part of each other to the reciprocal antecedent as in Heim / Lasnik / May, to appear). LF wh movement is generally not subject to subjacency (Huang 1982, Lasnik / Saito 1984). First, it is not subject to the Subject Condition, one of the cases that fall under the Condition on Extraction Domains (CED) (cf. Huang 1982), which again can be reduced to Subjacency (Chomsky 1986).

    (22) Who thinks that pictures of whom are on sale?

Furthermore, it is not subject to the wh-Island Constraint and the CNPC, as seen in (23).

    (23) a. Who wondered what he should do to whom?
         a'. Who wondered whether he should do what?
         b. Who heard a rumor that he exceeded whom?

However, LF wh movement also is not subject to the other cases subsumed under the CED, in particular, it is not subject to island constraints with adjuncts and complements of nonbridge verbs (cf. Huang 1982).

    (24) a. Who whispered that he hated whom?
         b. Who cried after / before John hit whom?

    In any case, we see that the constraints on wh movement at LF are quite different in nature from the constraints on reciprocals and their reciprocal antecedents.

    It has been suggested (Williams 1986) that the broad reading of each other involves the same syntactic relation as the bound reading of plural pronouns in (25) reporting John's belief that he won the race and Mary's belief that she won the race.

    (25) John and Mary believe that they won the race.

Then, as Williams suggests, the broad reading of each other should be reduced to that other relation and would not constitute a relation of its own. The type of example that would verify this conjecture would be as in (26).

    (26) John and Mary believe that they (by collaborating) could only damage each other's
        carreer.

(26) should not be possible in the semantic interpretation indicated, since the 'distributive' or individual reading of they is required in order for each other to take John and Mary as its reciprocal antecedent. But (26) in the relevant interpretation seems acceptable. Thus, the broad reading of each other does not seem to be dependent on the binding relation between a plural pronoun and its plural antecedent.

    Concerning the status of the rule of bound pronouns, one might conjecture that this is simply an instantiation of the rule of distributive interpretation. But it is easy to see that bound plural pronouns and distributivity are completely independent phenomena. A predicate may undergo distributive interpretation without a plural pronoun contained in its clausal complement undergoing the bound plural pronoun rule. (27a) can report individual statements by John and by Mary that they (John and Mary as a group) were collaborators. Unbound pronouns even allow for the overt syntactic distributor each, as in (27b).

    (27) a. John and Mary said that they were collaborators.
        b. John and Mary each said that they were collaborators.

Thus, plural pronouns in the bound interpretation require a syntactic relation of its own. Then a conjecture might be that the relation is like the one between each other and its reciprocal antecedent. But the relation between each other and its reciprocal antecedent and the relation between a 'bound' plural pronoun and its antecedent differ in a number of syntactic properties. First, a bound plural pronoun can take an antecedent outside an adjunct, as in (28a) (from Heim / Lasnik / May, to appear) and a complement of a nonbridge verb, as in (28b) - provided the plural pronoun is c-commanded by the antecedent, a condition not satisfied in (28c).

    (28) a. The candidates criticized each other after they left the room.
        b. John and Mary whispered that they were exhausted.
        c. After they left the room the candidates criticized each other.

The c-command requirement can also be seen in the contrast between (29a) and (29b), where a 'bound' interpretation of the plural pronoun is possible only in the first, but not in the second case.

    (29) a. Frenchmen think that they are smart.
        b. The mothers of Frenchmen think that they are smart.

(29) cannot mean that for any Frenchman x, the mother of x thinks that x is smart. It can only mean that the mothers of Frenchemn think that Frenchmen in general are smart.

    Like each other bound plural pronouns undergo reconstruction (or participate in connectivity, cf. Barss 1986).

    (30) a. That they are sick, Bill and John will never believe.
        b. What Bill and John believe is that they are sick.

The c-command requirement and the possibility of taking an antecedent outside an adjunct or complement of a nonbridge verb might suggests that the relation is like the relation between bound pronouns and quantified antecedent. However, also these two relations are syntactically distinct. There are no locality conditions on the relation between bound pronouns and quantified antecedent: it is a completely unbound relation. But there are locality conditions that restrict the relation between a 'bound' plural pronoun and its antecedent. A plural pronoun cannot take a plural NP as its antecedent if a tensed clause intervenes. However, the relation is possible if the pronoun and the antecedent are separated only by an infinitival clause. This is shown in the contrasts between (31a) and (31b) and (31c) in the bound interpretation of they / them.

(31) a. * Bill and John said that Sue claimed that they reached the goal first.

    b. ?? Bill and John said that Sue believed them to have reached the goal first.

    c. Bill and John believe Sue to have claimed that they have reached the goal first.

(32) shows that there is no such restriction for bound pronouns with quantified antecedent:

    (32) Every boy believes that Sue claimed that he reached the goal first.

So, whatever the precise conditions on the relation between bound plural pronouns and their antecedents may be, this relation is clearly distinct from the relation between each other and its reciprocal antecedent as well as from the relation between bound pronouns and quantified antecedents.

4. Same / different and other relational adjectives

The syntactic relation between reciprocal and reciprocal antecedent can be illuminated further if we compare it to the relation between same / different in the internal reading (Carlson 1987) and other relational adjectives and their antecedents. It is quite obvious that same / different in the relevant construction involves the same type of semantic interpretation as reciprocals. I assume as in Carlson (1987) (see also Moltmann, 1990) that the semantic antecedent of same / different in (33a) is the (complex) event argument of the verb, rather than the group participant of John and Mary itself. This is motivated by data such as in (33b) and (33c) where an internal reading of same / different may be licensed by conjoined event predicates denoting complex events.

    (33) a. John and Mary saw the same film.

      b. John saw the same film on Monday and on Tuesday.

      c. John saw and criticized the same film.

Let us consider the characteristic properties (A) - (C). The plural requirement (A) must be satisfied by constructions with same / different in the internal reading in the following respects. First, an NP with different must itself be in the plural, as seen in (34) (though of course not an NP with same, as in (33a)).

    (34) John and Mary saw different films / # a different film.

Second, for the relevant semantic interpretation, certain other arguments have to be in the plural:

    (35) a. The two men sent letters / # a letter to different women.

      b. The two men planned attacks / # an attack against different politicians.

Also condition (B) is satisfied. Consider (36).

    (36) a. The two men, John and Bill, wrote few letters to different women.

      b. The students rarely saw the same film.

(36a) cannot be true if John wrote only x letters to a woman v and Bill wrote y letters to a woman w (w = v) such that x+y does not count as 'few', but rather as 'many'. That is, few cannot interact in scope with any distributive operation that is involved with the interpretation of different. The same holds for rarely in (36b).

   The requirement (C) that a sentence descibe a single event, rather than a set of disconnected event, can, of course, not properly be satisfied by a sentence with same / different in the internal reading, since the semantic interpretation of same / different implies inherently distributivity (as was already observed by Carlson 1987).

   I assume the following semantic analysis of same / different in the internal reading (see Moltmann 1990 for details). Again, the sentence meaning of (33a) (with the plural different films) is constituted by two parts. The first part constitutes an event argument relation representing John and Mary saw films and the second one accounts for the specific semantic effect of same / different. The full sentence meaning is then as given in (37).

    (37)   ex(see(e, [John and Mary], x) & films(x) & e'e''yy'x'x''(e'Pe & e''Pe & e' = e'' &

        see(e', y, x') & see(e'', y', x'')) --> x' = x''))

The parts of the event represented by e that are the values of e' and e'' are precisely the event of film watching by John and the event of film watching by Mary. (37) then says that there is an event e and a group of films x such that e involves John and Mary and x in the relation of seeing and for any two distinct parts e' and e'' and any y and x' that are participants in the relation of seeing in e' and any y' and x'' that are participants in the relation of seeing in e'', x' and x'' are distinct.

   This kind of semantic interpretation of same / different again can be given a compositional analysis (see Moltmann 1990). It is not necessary here to go into details.

   Let us now compare the syntactic relation between same / different and its syntactic antecedent (namely the relevant event predicate, i.e. a verb) and the syntactic relation between the reciprocal antecedent of each other and each other. A first observation is that same / different need not have an antecedent in its governing category, i.e., it need not have an anaphoric antecedent. Thus, in (38) an internal reading of same / different relating to the matrix verb is possible - though apparently this reading is increasingly degraded the more constraints subsumed under condition A of Binding Theory are violated. Speakers generally find (38c), which violates both the Specified Subject Condition and the Tensed S condition, far worse than either (38a) or (38b), and some speakers do not get an internal reading of same / different in (38c) at all. Also (38a) with an ECM clause is generally taken to be better than (38b) with a tensed clause.

    (38) a. John and Mary believe Sue to have seen different movies / the same movie.

      b. John and Mary believe that different movies were shown.

      c. John and Mary believe that Bill went to different universities / the same university.

This difference between each other and same / different is more general. It is not only the case that the reciprocal itself must have an anaphoric antecedent in its governing category, but also the anaphoric antecedent requires a local antecedent - whether this is the reciprocal antecedent or simply another intermediate antecedent. Compare (39a) and

(39b) with (39c).

(39) a. John and Mary believe Bill to expect them to exceed each other.

b. Sue and Mary believe Bill to expect them to marry the same man.

c. John and Mary want themselves to believe that they exceed each other.

In (39a), a broad reading of each other taking John and Mary as its reciprocal reading and allowing for a noncontradictory content of Sue's expectation is impossible. But in (39b), many speakers get a reading in which Bill has an expection compatible with monogamy. That is, each of Sue and Mary believes that Bill expects her to marry a certain man, which turns out to be the same for both of them. (39c), in turn, allows for a 'very broad' reading of each other, where the reciprocal antecedent is John and Mary.

The locality domain for the antecedent of the immediate antecedent of each other and same / different is not exactly the governing category in the sense of Chomsky (1981). If the immediate antecedent occurs in the subject position of a finite clause (its governing category), it may also take an antecedent outside its clause, namely in the next higher constituent containing an NP subject, as was seen in (39c). Thus, the relation between reciprocal antecedent and reciprocals apparently requires a chain in which each link consists of an antecedent and an anaphor that satisfy condition A of Binding Theory.

This difference between same / different and each other can be explained straightforwardly from the fact that each other, in addition to being a reciprocal with the specific reciprocity effect, is an anaphor requiring coreference with respect to a local antecedent. Coreference is a requirement that is necessary for the reciprocity operation to make any sense at all semantically. Thus, in order for each other and its reciprocal antecedent to be coreferent, they must syntactically be connected by a chain of antecedents and anaphors to which the rule of coreference may apply. Same / different, in contrast, has only one semantic and syntactic function, a function whose semantic effect is the second conjunct in the sentence meaning of the type given above in (37).

There are a number of other apparent syntactic differences between the syntactic relation between theeach other and its reciprocal antecedent and same / different and its antecedent. All these differences ought to follow from the double function of each other as a reciprocal and an anaphor. First, reciprocals and same / different behave differently in contexts involving reconstruction or connectivity (see Barss 1986 for a recent discussion). Each other behaves as if it unerwent reconstruction, but not same / different. This is shown in (40) - (42).

(40) a. # Different movies, John and Mary certainly saw.

b. Pictures of each other, John and Mary certainly saw.

(41) a. # What John and Mary saw was the same movie.

b. What John and Mary received was information about each other.

(42) a. # Different solutions will be difficult for John and Mary to find.

b. Information about each other will be difficult for John and Mary to get.

Reciprocals behave in this respect like reflexives. Thus the ability of reciprocals to undergo reconstruction should be attributed to their status as anaphors.

Another difference between reciprocals and same / different is that each other, but not same / different, can take an (reciprocal) antecedent outside a factive clause, as seen in (43).

(43) a. John and Mary know that they love each other (but they don't know whether they are
loved in return)

b. John and Mary know that different students were guilty.

(43b) cannot describe a situation in which John knows that student x was guilty and Mary knows that student y was guilty, whereby x and y are distinct. It can only have the meaning in which different acts as a simple group predicate and does not have an internal reading. For this difference between each other and same / different it is more difficult to see how it should follow from the anaphoric status of each other. But I assume that an explanation based on this fact is possible.

In a number of other respects, same / different in the internal reading behaves like each other regarding its reciprocal antecedent. First, same / different cannot take an antecedent outside an adjunct or a complement of a nonbridge verb.

(44) a. John and Mary whispered that different students were guilty.

b. John and Mary got upset after Sue made different mistakes.

Second, the reciprocal antecedent of each other the anaphoric antecedent of same / different may be outside a complex NP. This can best be shown with same / different taking a quantified antecedent (which behaves in all other syntactic respects like same / different with internal reading), as in (45a) and (46a). The reason is that here, the head noun need not be in the plural, as with same / different in the internal reading, as in (45b) and (46b). One might argue that in the latter case, same / different might as well relate to the referent of the head noun, i.e. the group of rumors in (45b) or the group of films in (46b), rather than to the group of John and Mary, and thus might not constitute a conclusive test for the CNPC.

(45) a. Everybody believes a rumor that a different country was invaded.

b. John and Mary believe rumors that different countries were invaded.

(46) a. Everybody saw a film that was made in a different country.

b. John and Mary saw films that were made in different countries.

Same / different cannot take an antecedent outside an indirect question:

(47) John and Mary know what different students did.

This is certainly due to the fact that indirect questions pattern semantically with factive clauses.

The construction type of same / different in the internal reading is not limited to the adjectives same and different. It appears systematically with all kinds of relational adjectives. Thus in (48) neighboring may take the belief of John and Mary as its semantic antecedent.

(48) John and Mary believe Sue to live in neighboring countries.

(48) can describe a situation in which John believes Sue to live in France and Mary believes Sue to live in Spain. Crucially, the interpretation of neighboring in (48) cannot be reduced to distributivity since its antecedent is not in the same clause. Relational nouns may not enter this construction type. (49) does not allow for a reading in which John believes Sue to have visited x and Mary tbelieves Sue to have visited y and x and y are neighbors.

(49) John and Mary believe Sue to have visited neighbors.

There are further formal restrictions for when adjectives may enter the construction, for instance the adjective may not be preceded by a determiner. (50) cannot get the same interpretation as (48) where the country John believes Sue to live in is different from the country Mary believes Sue to live in.

(50) John and Mary believe Sue to live in two neighboring countries.

A final observation of interest about same / different is the following. For many (but not all) speakers, same / different in a subject may relate to the plural subject of an ECM clause or a small clause, as in (51).

(51) a. Different people believe Bill and John to have won the race.
b. The same employer consideres Sue and Mary appropriate for the job.

These cases might constitute counterevidence against the claim that same / different in the internal reading is always related to an event, since in (51) it can appropriately relate only to the goup denoted by Bill and John or the group denoted by Sue and Mary . However, under proper examination, it turns out that (51a, b) require a different analysis. It appears that the speakers that accept (51a, b) are exactly those who allow 'pluralization of propositions' with plural arguments in ECM clauses and small clauses. Then for those speakers, the ECM clause in (51a) and the small clause in (51b) actually do not denote a single proposition, but rather a group of two propositions, in (51a) of the group consisting of the proposition that Bill won the race and the proposition that John won the race. This group stands in the relation 'believe' to a group of people and an event. The event, under the usual rules, may be a group event consisting of a belief of some of the people that Bill won the race and a belief of the other part of the people that John won the race. Thus different in (51a) then may actually relate to a complex event and thus take the verb believe as its antecedent.

Each other and same / different exemplify a new type of semantic operation and a new type of synactic relation. The question then is how widespread this type of semantic operation and syntactic relation is. There are number of constructions that either involve the same type of semantic operation or the same type of syntactic relation or both. I will only briefly mention some of them in the next sections. As with each other, I will try to explain from independent facts why constructions that involve the same type of semantic content are in certain cases not correlated with the same kind of syntactic relation.

5. English plural reflexives

There is evidence that English plural reflexives do not only act as anaphors associated with the semantic rule of coreference, but have an additional semantic and syntactic function. This function is associated with the same type of semantic operation as reciprocals. In fact, one can say that English reflexives have the additional function of being antireciprocals. But without either specific reciprocity effect or antireciprocity function, two plural NPs in a sentence allow for both reciprocal and reflexive relations - as a result of the application of the ordinary rule of distributivity. There are two arguments for this. First, two full NPs in a sentence that happen to be coreferent allow for both reciprocal and reflexive relations, as in Langendoen's (1978) example (52a), where either each woman has released herself or some other woman. In contrast, the corresponding sentences with a plural reflexive allows only for the reflexive relation.

(52) a. The women released their mother's daughters.   b. The women released themselves.

Second, in other languages plural reflexives often may have both reflexive and reciprocal readings, as in the German example in (53a) and the French example in (53b), which allow for the two readings of (52a) and are compatible with both a adverbial reciprocal (cf. (5a) and (5b)) and a reflexive reciprocal, as in the French example in (53c), where elles-memes functions as an adverbial reflexive.

(53) a. Die Frauen haben sich befreit.   b. Les femmes se sont liberees.
'The women have released them (refl.).'
c. Les femmes se sont liberees elles-memes.
'The women have released themselves.'

Like reciprocals, English plural reflexives can best be captured by a semantic analysis that assumes a bipartite interpretation, where reference and coreference of the reflexive is separated from the antireciprocity effect. For (52b), this is given in (54).

(54)   e(release(e, [the women], [themselves]) &   e'xy(xP[the women] & yP[themselves]
& e'Pe & release(e', x, y) -->x = y))

Is there evidence that English plural reflexives involve the same 'special' syntactic relation as each other ? For instance, can reflexives take a 'reflexive' antecedent outside their governing category. It is not easy to test this. One case in question would be (55), a type of example discussed in Lasnik / Fiengo (1973) and Higginbotham (1981).

(55) # They expect each other to hit themselves.

Such examples have been taken to be unacceptable or anomalous and explained on the basis of 'antecedent clash' (Higginbotham 1981). If this explanation is correct, it might show that reflexives differ in fact from reciprocals in that a distant antecedent cannot enter the antireciprocity relation without any intermediate antecedent also entering that relation.

6. Adverbials of the type individually, one by one, one at a time

Another construction that involves the same type of semantic operation as reciprocals are adverbials of the sort given in (56).

(56) John wrapped the presents individually / one by one / one at a time / pairwise / in
    groups of three.

Sentences with these adverbials exhibit clearly properties (A) - (C). The plural requirement (A) is illustrated in (57), describing a situation in which John put each tart on a separate plate.

(57) John put the tarts individually / one / one by one / one at a time on plates / the plates /
    # a plate.

Lack of quantifier scope interaction can be shown with frame adverbials such as in one hour. In order for (58) to be true John must have spent only one hour wrapping the presents individually, but not, for instance a different hour for each single present.

(58) John wrapped the presents individually / one by one / one at a time in one hour.

Lack of quantifier scope interaction (B) with arguments is illustrated in (59), which can only involve a total of two or few friends.

(59) John gave the presents individually / one by one / one at a time to two friends / few
    friends.

The requirement of a single event description (C) can be shown with adverbials such as several a day, which are of the same type of one at a time. Several a day implies that a single event be described (which lasts a number of days). This can be seen from the contrast with the quantifier each day, which allows for quantifier scope interaction and, in particular, requires the event quantifier to take narrow scope.

(60) a. John read the books several a day.   b. Each day, John read several of the books.

This is again accounted for in a semantic representation that separates the effect of adverbials like individually from the interpretation of the other constituents of the sentence. For (56) with individually the analysis is given in (61).

(61)   e(wrap(e, [John], [the presents]) &   x(individual(x) & xP[the presents] -->
        e'(e'Pe & wrap(e', [John], x))

In contrast to nominal constructions that induce this kind of bipartite interpretation such as each other and same / different, adverbials of the type individually can only take antecedents with their minimal clause:

(62) The patients said [that John saw them individually].

But this is a generally property of adverbials. Adverbials can have only clause-bound scope.

7. Comparative superlative

The comparative superlative is a construction that involves a syntactic relation of essentially the same type as same / different and that arguably involves a bipartite interpretation as well. The construction, discussed in Szabolcsi (1985) and Heim (1985), is illustrated in (63) in a reading where among a set students each of whom solved a certain number of problems John solved the most problems. In (63) then John is the syntactic antecedent of most.

(63) John solved the most problems.

The semantic analysis of (63) can be given approximately as follows, where the values for the variables are as usually to be taken to be only contextually relevant entities.

(64)   ex(solve(e, [John], x) &   problems(x) &   more(sup({n| x'e(n problems(x') & solve(e,
        [John], x)}), sup({m| ezy(m problems(y) & z = [John] & solve(e, z, y))

Now let us look at the syntactic constraints on the comparative superlative and its antecedent. A first observation is that most and its antecedent must be focused (cf. Szabolcsi 1985). This holds especially in the more marked case in which the most phrase is in subject position and the antecedent in object or adjunct position, as in (65).

(65) a. The most people criticized John.   b. The most people were visited by John.
      c. The most people arrived in the afternoon.

Notice that the focus requirement also holds for same different and the phrase they relate to:

(66) Different people admire Sue and Mary.

There certain semantic constraints on the kind of verb, when most is in subject position taking a lower constituent as antecedent. Verbs like sleep or hate are worse than verbs like arrive in (67) orsuspect.

(67) a. The most people slept in the afternoon.   b. ?? The most people hate / suspect Mary.

Notice also that beside objects and adjuncts as in (65b) and (65c), most apparently can also take verbs or prepositions as antecedents or at least verbs and preopositions carry the required focus in examples such as (68a) and (68b). Notice also that even parts of words may be the bearer of the focus related to most, as in (68c). The same holds for same / different, as seen in (69a) and in the German example in (69b), which displays two conjoined focused prepositions.

(68) a. The most people kissed Mary (but not hugged her or shook her hand).
      b. The most boxes are on the table (not beside or beneath it).
      c. The most people were overworked, only few people were overexited.

(69) a. Different books were put under and on the table.
　　 b. Verschiedene Kinder waren uber- und unter ernaehrt.
　　　 'Different children were overfed and underfed.'

A constituent that is a phonologically focused is not an absolute requirement for most. A wh trace and PRO also meet the requirement, as in (70).

(70) a. This is the student who t solved the most problems.
　　 b. PRO to solve the most problems is easy.

Most need not have an antecedent in its minimal clause. Most can take an antecedent outside an ECM clause and a subjunctive clause (cf. Szabolcsi 1985), as in (71)

(71) a. John believes the most people to be crazy.
　　 b.John believes Mary to have stole the most money.
　　 c. John demands that the most money be paid to Mary.

Marginally, a number of speakers even get most taking an antecedent outside a tensed clause.

(72) a. John believes that the most money was lost.
　　 b. John believes that Mary solved the most problems.

Like same / different, most when it occurs in the matrix clause may also take as antecedent the subject of an ECM or subjunctive clause, but not of a tensed clause. Again, this option is degraded and for some speakers not available at all.

(73) a. The most people believe Mary to be guilty.
　　 b. # The most people believe that Mary is guilty.
　　 c. The most people demand that Mary be arrested.

As with same / different, a worse case results when most takes an antecedent inside an ECM clause across a specified subject as in (74).

(74) a. The most people want John to have killed Mary.
　　 b. The most people want PRO to please Mary.

Most behaves like same / different in all the other respects. It cannot take an antecedent outside a factive clause, an adjunct or a complement of a nonbridge verb, as seen in (75).

(75) a. # John knows that the most students were guilty.
　　 b. # Mary absent when the most disasters happened.

The relation between most and its antecedent need not obey the CNPC - at least not with relative clauses as the example (76) from Heim (1985) shows.

(76) John won the prize that had the greatest value.

Within noun complements comparative superlatives are, for whatever reason, more difficult to get, and for some speakers impossible:

(77) ?? John heard the claim that the most expensive painting had been stolen.

Like same / different, most does not participate in connectivity effects:

(78) a. The most pictures, John certainly saw.
　　 b. What John got was the most information.
　　 c. The most money will be difficult for John to make. (cp. It will be difficult for John to make the most money).

6. A total of

Another nominal plural modifier that cannot be reduced to a group predicate and thus constitutes a syntactic relation of its own is a total of as in (78).

(78) John and Bill saw a total of ten movies.

The a total of construction resembles the semantic and syntactic function of the type of reciprocals in a number of respects, though it is not exactly parallel. First, a total of alternates with adverbials, and its content is expressed, for instance, in German by the adverbials insgesamt.

(79) Hans und Maria haben insgesamt zehn Filme gesehen.
　　 'John and Mary have seen ten films adv.'

Second, a total of cannot requires plurals in the relevant contexts and cannot interact in scope with other quantifiers, as shown in (80), where a plate in (80a) and twice in (80b) seem to take only wide scope with respect to a total of ten books.

(80) a. Mary put a total of ten tarts on plates / the plates / a plate.
　　 b. Mary read a total of ten books twice.

Third, the relation between a total of to its antecedent if not strictly clause-bound. A total of may take scope outside an ECM clause, and, marginally, outside a tensed clause when it modifies the subject.

(81) a. ? The two detectives believe a total of ten people to be involved in the crime.
　　 b. ?? The detectives believe that a total of ten people are involved in the crime.

Sentences with a total of can be given a bipartite interpretation. Then (79) has the meaning indicated in (81), where all usual quantifiers can be represented only in the first conjunct.

(82)　 e(see(e, [John and Bill], x) & movies(x) & ten(sup({x'| e'(see(e', [John and Bill], x')}))))

Notes

1 Not all speakers agree with Williams' example. Many speakers find They gave each other a new nose OK. However, what seems to be at stake is that for these speakers 'give a new nose' can constitute a composite predicate whose meaning is not construed in sentence meaning, but rather in the lexicon. Then the plural requirement does not hold, because a new nose would not be represented as an existential quantifier over individual noses in sentence meaning st all. Generally, such lexicalization of NP + V is possible only if the resulting predicate describes a well-established property (cf. Moltmann 1990).

2 Again, the same comment as in note 1 holds. For many speakers, the plural requirement does not hold for certain predicates, namely those that are arguably lexicalized composite predicate like see a film. Thus, John and Mary saw a film seems fine under the distributive interpretation for those speakers.

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