DISCUSSIONS

REPARTEE, OR A REPLY TO 'NEGATION, CONJUNCTION AND QUANTIFIERS'*

B. H. Partee, in her recent 'Negation, Conjunction, and Quantifiers: Syntax vs. Semantics'[1], claims to "disprove conclusively" the theory that deep structures determine semantic representations and that transformations are meaning-preserving. The basis of her claim is that certain phenomena involving the interaction of quantifiers and conjunction are "explainable quite naturally on the basis of surface structure", although she proposes "no specific rules". At the same time, she claims that these phenomena cannot be accounted for by any theory in which semantic interpretation is based on deep structure. Her 'disproof' involves finding difficulties with one such proposal, that made in an appendix to my dissertation.[2] Since that proposal did not explicitly deal with the phenomena she is discussing, she attempts to extend my proposal in what she considers a natural way, and then attempts to find difficulties with her extension. Her extension is fair, for the most part, but not completely so, as will be discussed below.

Since writing my dissertation, I have given up the belief that deep structures exist, so I would find it difficult to defend a view that semantic representation is based on such entities. My views are now much closer, though not identical, to those of McCawley (1967), and I would continue to maintain the view that transformations are meaning-preserving. However, I will, as far as possible, assume a theory with deep structure, for the sake of argument. I will argue that:

(i) Only two of Partee's criticisms of my 1965 proposal are correct.

(ii) These two inadequacies of that proposal do not constitute a disproof of all such proposals. In fact, it appears that the same difficulties would arise in the case of surface structure interpretation rules of the sort Partee hints at, but does not discuss.

(iii) Partee's claims are exaggerated in view of her failure to consider, even vaguely, any particular proposal for semantic representations and surface structure interpretation rules and to subject such a proposal to the same

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[1] *Foundations of Language* 6 (1970), 153–165.

[2] Lakoff (1965).

Foundations of Language 6 (1970) 389–422.

scrutiny to which she subjects the more concrete proposal made in my dissertation.

It is to Professor Partee's credit that she has presented her case very clearly and that her objections to my proposal (as opposed to her claims for the efficacy of unstated surface interpretation rules) are based on serious syntactic and semantic arguments. I will consider these objections one at a time.

Objection (a) discusses the following examples (the numbering is Partee's).**

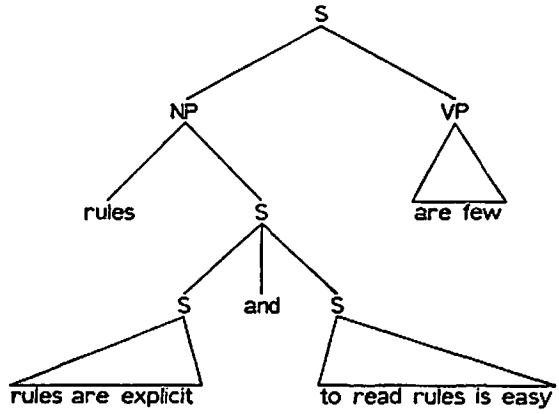
(1) Few rules are both explicit and easy to read.

(2) Few rules are explicit and few rules are easy to read.

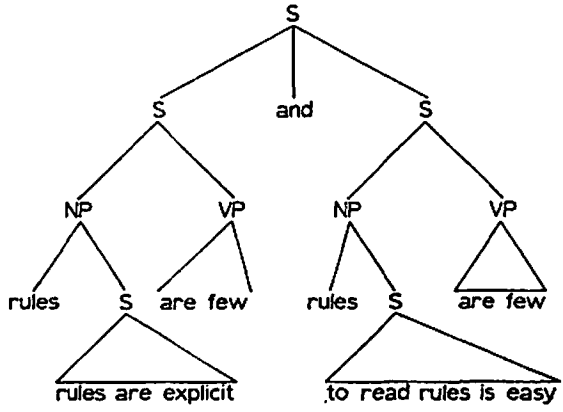
(6) The few rules are both explicit and easy to read.

(7) The few rules are explicit and the few rules are easy to read.

(15)



(16)



** (15) and (16) are based on an *Aspects*-type theory, and so do not include bound variables. The representation of these sentences, if brought up to date, would include bound variables and would not contain any VP-nodes.

Her objection (a) makes three claims to the effect that my proposal unnecessarily complicates the grammar of English. The crucial examples cited are:

(17) (a) Three rules on this page are both explicit and easy to read.
(b) The three rules on this page are both explicit and easy to read.
(c) Only the three rules on this page are both explicit and easy to read.

(18) (a) Three rules on this page are explicit and three rules on this page are easy to read.
(b) The three rules on this page are explicit and the three rules on this page are easy to read.
(c) Only the three rules on this page are explicit and only the three rules on this page are easy to read.

The (b) sentences are synonymous, while the (c) sentences show the same disparity of meaning as the (a) sentences.

The following are what Partee cites (p. 158) as "extremely complex rules" and "syntactically unnecessary constraints" which she believes are "serious problems" and, presumably, fatal flaws in my proposal.

> (i) Quantifiers occur as predicates only with indefinite noun phrases as subjects; quantifiers have some other source with definite noun phrases.
> (ii) *Only* occurs as a predicate with both definite and indefinite noun phrases as subjects.
> (iii) Conjoined sentences containing formally identical noun phrases may not be collapsed if that noun phrase contains a quantifier unless it also contains a definite article, and not even then if there is an *only* (p. 156).

(i) wasn't exactly what I had in mind; I had assumed that the constraint would be transformational and not selectional. However, since I never said that in print, (i) is a not unreasonable guess. And in any event, the transformational constraints would not be independently motivated and so would add to the complexity of the grammar, as Partee says. In fact, there would be constraints on two rules. The rule of quantifier-lowering (Carden's 'Q-magic'; see Carden, 1967) would apply only to indefinites, as in (1); this rule would not be independently motivated by the facts cited in my thesis. (For motivation, see Carden, 1967, 1968.) In the derivation of sentences like (6), the independently motivated rule of *Wh-be*-deletion would apply, with the additional constraint that a definite article must be present if the predicate of the nonrestrictive relative clause contains a quantifier. It is true that one extra rule and an odd constraint on another would be present in the syntax in my proposal, but not in Partee's. Is this objectionable or a "serious problem"? I don't think so. After all, the 'work' being done by the rule of quantifier-lowering

and by the additional constraint on *Wh-be*-deletion is to correlate the surface-structure difference between (1) and (6) with the difference in their semantic representations. This 'work' has to be done under Partee's proposal as well as mine. But under Partee's proposal, it is done by surface structure interpretation rules, not by transformations. Partee's proposal would have complexity (i'), which corresponds to (i).

(i') One surface structure interpretation rule applies only to quantifiers in indefinite noun phrases; another surface structure interpretation rule applies only to quantifiers in definite noun phrases.

The complexities have been removed from syntax and swept under the semantic rug, where they form a nice large lump. But they are still in the grammar (a full 'grammar' would include semantic rules). Since the complexities of (i) cannot be avoided by Partee's proposal, they are irrelevant to a choice between the two proposals.

Now let us consider objection (iii), leaving (ii) aside momentarily. According to Partee, (iii) is necessary, since conjunction reduction would have to be able to apply to (18b) to yield (17b), but would have to be stopped from applying to (18a) to keep it from being converted to (17a). It is true that conjunction reduction must be stopped from applying to (18a). However, no special constraint is necessary to accomplish this. It follows automatically from the nature of conjunction reduction and from part of the difference in meaning between (18a) and (18b). Two noun phrases can be collapsed by conjunction reduction only if they have the same derived structure, the same meaning, *and* if they refer to the same individual or individuals.[3] In (18b), the two occurrences of "the three rules" refer to the same rules. Thus, conjunction reduction will apply to (18b), yielding (17b). However, in (18a) the two occurrences of "three rules" do not refer to the same three rules; in fact, that noun phrase has no specific reference at all.[4] Thus, conjunction reduction

[3] There are, of course, some further complications. Identity of reference is required only for NPs. VPs may undergo conjunction reduction even though they contain noncoreferential NPs. For example, *John saw an explosion and Max saw an explosion* may reduce to *John and Max both saw an explosion*, which need not mean that they saw the same explosion. But *An explosion was seen by John and an explosion was seen by Max* may reduce to *An explosion was seen by both John and Max* only if they saw the same explosion. NPs may undergo reduction only if they are coreferential.

[4] Actually the NP *three rules on this page* is ambiguous between the senses *three particular rules on this page* and *three unspecified rules on this page*. NPs of the former type refer to particular rules, as in *three rules on this page, namely, 4, 5, and 6*; the latter type do not refer to specific rules, as in *three rules on this page, but I don't know which*. Partee seems to be referring to the latter type, which do not undergo conjunction reduction, since they do not have specific reference. Since the former type have specific reference, they would undergo conjunction reduction. Following Partee, I shall limit my discussion to those without specific reference.

cannot apply to (18a). No special constraint is needed. All that is required is the independently motivated specification of reference. No problem exists.

Now let us turn to *only* and sentences (17c) and (18c). Partee maintains in (ii) that according to my proposal, *only* would have to occur as a predicate. This is not so. *Only* is not a simple predicate, but a reflex of a much more complex structure. Note that "Only Muriel voted for Hubert" has the rather complex paraphrase "Muriel voted for Hubert and no one other than Muriel voted for Hubert". In a theory of transformational grammar without deep structure, or with a very abstract deep structure, the structure underlying the former sentence would be essentially the same as that underlying the latter. That is, the underlying structure would contain two conjoined sentences, one of which would contain the negative of an existential quantifier. Conjunction reduction would apply yielding an intermediate form something like "Muriel and no one other than Muriel voted for Hubert". Then an additional rule, which I will call *only*-collapsing, would convert "Muriel and no one other than Muriel" to "Only Muriel". (Perhaps there would be two rules, accounting for the intermediate stage "Muriel and only Muriel".) Under this proposal, the only structure or rule not independently motivated would be *only*-collapsing. *Only*-collapsing would be a syntactic rule that, under Partee's proposal as opposed to mine, would not be needed in syntax. It should be noted however, that such a tightening of the syntactic girdle would lead to an unseemly bulge in the semantic component. Partee would need an extra rule of semantic interpretation, which would essentially be the inverse of *only*-collapsing. Such a rule would have to account for the fact that "Only Muriel voted for Hubert" has the paraphrase cited above. Thus, the fact that I would need a rule of *only*-collapsing is not an argument for Partee's proposal, just as the fact that she would need the inverse of such a rule is not an argument for my proposal. The issue of relative complexity leads to a stand off here.

Now let us assume that the rule of *only*-collapsing applies after all applications of conjunction reduction have taken place. (To my knowledge, there is nothing to prevent such an assumption about rule-ordering.) Under this proposal, the question of why (18c) does not reduce to (17c) becomes the question of why (A) does not undergo conjunction reduction, yielding (B).

(A) The three rules on this page and no rules other than the three rules on this page are explicit and the three rules on this page and no rules other than the three rules on this page are easy to read.

(B) The three rules on this page and no rules other than the three rules on this page are both explicit and easy to read.

Now note that the noun phrase "no rules other than the three rules on this

page" does not refer to specific rules[5], just as the noun phrases "three rules on this page" and "few rules on this page" may not (cf. fn. 3). Thus, we would expect this noun phrase not to be able to undergo conjunction reduction. This is indeed the case. (C) and (D) show the same meaning disparity as (1) and (2).

(C) No rules other than the three rules on this page are both explicit and easy to read.

(D) No rules other than the three rules on this page are explicit and no rules other than the three rules on this page are easy to read.

In general, the condition defining identity of reference for two coordinate noun phrases involves checking identity conjunct-by-conjunct. If one pair of conjuncts fails to refer to the same individual (or individuals), then the full coordinate NPs are judged not to be identical with respect to reference. This applies to (A). Since the noun phrase "no rules other than the three rules on this page" does not have specific reference, we would predict that (A) would not undergo conjunction reduction. Note that (A) and (B) show the same disparity of meaning as (E) and (F).

(E) Barbara's rule and three rules on this page are explicit and Barbara's rule and three rules on this page are easy to read.

(F) Barbara's rule and three rules on this page are both explicit and easy to read.

Thus, we find that in coordinate NPs, the NP "no rules other than the three rules on this page" acts just like the NP "three rules on this page", which can be nonspecific. This is just as we would have expected it to act from its meaning. Thus we see that under this proposal for dealing with *only*, the fact

[5] In this discussion, I am assuming that 'identity of reference' means 'presupposed identity of reference' (as opposed to asserted or inferred identity), and that referential identity in this sense is to be indicated by identity of referential indices on the noun phrases in question. Now referential indices will be associated not with every noun phrase, but only with those noun phrases that can have different references in different uses. For example, *the blond girl* may be used to refer to different girls on different occasions. It is just these noun phrases which are subject to Donnellan's referential/attributive distinction. (See Donnellan, 1966.) As Donnellan points out, such noun phrases may be used to refer independently of their meaning. There are other noun phrases which are not like this: *few blond girls, no blond girls, every blond girl*, etc. The first does not even specify a particular set of girls. The latter two do specify particular sets of girls (the null set, the set of all blond girls); however, they may not have different references in different uses. Thus, if Sam and Max each say *All blond girls are dumb* they have spoken of the same set of girls. However, if they each say *The blond girl is dumb* they may be speaking of quite different girls. In general, syntactic constraints on coreferentiality only involve those noun phrases that can have different references in different uses.

that (18c) does not reduce to (17c) is automatically predicted. No additional apparatus is necessary.

However, this is not true of Partee's proposal. Partee could not block the conjunction reduction of (18c) to (17c) on any independently motivated grounds. Indeed, she does not want to block it. She wants to permit it, and then account for the difference in meaning between (18c) and (17c) with a surface structure interpretation rule. In my proposal, this difference in meaning follows automatically. Partee, however, needs an extra, ad hoc, surface interpretation rule to account for it. In short, her proposal misses a generalization. The difference in meaning between (17c) and (18c) should follow from an independently motivated constraint on conjunction reduction and the (independently motivated) definition of how coreferentiality is defined for coordinate noun phrases. Partee's proposal, and any proposal for the surface structure interpretation of these cases cannot capture this generalization. Thus sentences (17c) and (18c) turn out to provide an argument against, not for, Partee's proposal.

Now consider objection (b):

(b) Semantically, (2) implies (1) but not vice versa. However, if *few* is replaced by *many* in (1) and (2), the direction of implication is reversed. Yet the substitution of *many* for *few* in the trees (15) and (16) would give no basis for predicting such a change. It might be argued that deriving *few* from *not many* could account for this phenomenon. However, *a few*, which shares none of the negative properties of *few*, behaves just like it with respect to the direction of implication between (1) and (2).

Despite Partee's attempt at a rejoinder, I would still maintain that deriving *few* from *not many* would account for this phenomenon, which she does not dispute. Her rejoinder about *a few* is simply incorrect. *A few*, as Partee correctly points out, does not share any of the negative properties of *few*: like *many*, it acts much like a positive integer. And contrary to Partee's claim, *a few* acts like *many*, not *few*, with respect to the direction of implication in sentences like (1) and (2).

(1′) Many rules are both explicit and easy to read.
(2′) Many rules are explicit and many rules are easy to read.
(1″) A few rules are both explicit and easy to read.
(2″) A few rules are explicit and a few rules are easy to read.

(1″) implies (2″) just as (1′) implies (2′), and not vice versa. *A few* works like *many* here, not like *few*, which is just what one would expect from its lack of a negative meaning.

On to (c):

(c) The structures of (15) and (16) treat *few* as a predicate (presumably as an adjective or verb). This has at least some plausibility for such quantifiers as *many*, *few*, *several*, and the cardinal numbers (i.e., for those quantifiers that can follow the definite article inside

a noun phrase), whose predicative use, as Lakoff points out, sounds more archaic than grammatical. But there are a number of quantifiers which cannot even "archaically" occur in predicate position; they happen to be just the quantifiers which cannot follow the definite article. Compare (19) and (20):

(19) (a) *? the arguments are many / the many arguments
(b) *? the arguments are five / the five arguments
(c) *? the arguments are few / the few arguments

(20) (a) *the arguments are some / *the some arguments
(b) *the argument(s) is (are) every / *the every argument
(c) *the arguments are all / *the all arguments
(d) *the arguments are none / *the no arguments

The quantifiers in (19), like the quantificational adjectives *numerous*, *scanty*, etc., describe the size of a set. Those in (20), however, describe a certain proportion of a given set and not its absolute size.

But this distinction does not coincide with the synonymy or non-synonymy of pairs like (1) and (2). If for *few* in (1) and (2) we substitute *many*, *five*, *some*, or *no*, we still have non-synonymous sentences; but *all* or *every* yield synonymy. Thus the independent syntactic grounds for calling some quantifiers predicates do not lead to the right class of quantifiers with respect to the semantic behavior of quantifiers with conjunction. It would therefore be quite misleading to try to claim independent syntactic justification for structures like (15) and (16) on the evidence of (19) (pp. 157–158).

Partee is quite correct in noting that the quantifiers in (19) describe the absolute size of a set[6], while those in (20) describe relative size (or "proportion") of a set. (See Carden, 1967.) And as she notes, quantifiers which describe the absolute size of a set occur overtly as predicates in archaic English, while those which describe relative size do not. She seems, on the basis of these observations, to be arguing as follows, though I am reading between the lines here, since there seem to be some steps left out of the argument:

Step 1: The only quantifiers that I would (or justifiably could) set up as underlying predicates are those that occur overtly as predicates in archaic English.

Step 2: By step 1, only the quantifiers of (19) and not those of (20) would permit deep structure representations like (15) and (16), where the postulation of quantifiers as predicates allows for "a deep-structure syntactic difference in relative domination of conjunction and quantifier". The quantifiers of (20) could not allow for such a deep-structure difference.

Step 3: According to my proposal, the difference in meaning between (1) and (2) is correlated with a deep-structure difference in the relative domination of quantifier and conjunction.

[6] As McCawley points out (McCawley, 1967), the quantifiers in (19) don't really describe absolute size. In *There were few people at the football game* and *There were many people at my party*, the *few* would normally refer to more people than the *many*. Although *few*, *many* etc. do describe relative size, they describe the size of a set relative to one's expectations of its size. One might expect thousands of people at a football game, but only a few dozen at a party (unless one were Truman Capote). What Partee calls the quantifiers of proportion, or relative size, describe size of one set relative to another. With these qualifications, I shall continue to use *the terms* 'absolute' and 'relative' size.

Step 4: Some of the quantifiers in (20) show a difference in meaning like that in (1) and (2). But by Step 2, they do not permit a deep structure difference in relative domination. For them, the difference in meaning between sentences like (1) and (2) cannot be accounted for by such a device. Thus some semantic rule would be necessary to account for the meaning difference, presumably a surface structure semantic rule. This provides independent motivation for such a semantic rule. Moreover, since such a rule could be generalized to cover quantifiers like those in (19), my proposal for cases like (19) would miss a generalization.

Step 5: Suppose I were to try to avoid the consequence given in step 4 by taking the position that all quantifiers, even those in (20), originate as predicates. Then I would be making the prediction that all of the quantifiers in (20), including *all* and *every*, would allow a deep-structure difference in relative domination and thus could occur in deep structures like (15) and (16).

Step 6: This deep-structure difference corresponds to a difference in meaning for the quantifiers in (19).

Step 7: Therefore, this deep structure difference should correspond to a similar meaning difference for all the quantifiers in (20).

Step 8: But there is no such meaning difference in the case of *all* and *every*. Therefore, the way out proposed in step 5 will not work.

There are two flaws in this argument: step 1 and step 7. I would indeed take the alternative of step 5 and claim that all quantifiers, both those of (19) and those of (20), were underlying predicates. Thus, I would avoid the consequences of step 4. The other flaw is step 7. Suppose that we substitute *all* for *few* in (15) and (16) and call the results (15′) and (16′). These will correspond to semantic structures of the form:

(15″) $(x)\, Fx \wedge Gx$

(16″) $(x)\, Fx \wedge (x)\, Gx.$

It happens that there is a logical equivalence relating (15″) and (16″).

(*E*) $[(x)\, Fx \wedge Gx] \equiv [(x)\, Fx \wedge (x)\, Gx].$

Now two sentences will be synonymous not only if they have the same semantic representations, but also if they have logically equivalent semantic representations. In this way the two different underlying structures of (15′) and (16′) will turn out to be synonymous, even though those of (15) and (16) will not. The reason is that the logical equivalence, (*E*), applies to *all* but not to *few*. The only way in which step 7 could be maintained would be to deny the validity of (*E*), which I doubt that Partee would want to do. For these reasons, her argument is not valid.

Partee's claim that (19) does not constitute syntactic motivation for setting

up quantifiers as predicates deserves some comment. Partee agrees that the sentences of (19) are grammatical in archaic English. What is meant by 'archaic English'? Presumably, archaic sentences are those that were once fully grammatical in the language and that are today intelligible to native speakers. Such sentences are in active use today only in certain rhetorical settings (literary, legal, etc.) where a recognizable older form of the language is invoked. That is, archaic English today is a kind of dialect of modern English which is not actively spoken, but is used only for certain rhetorical purposes. This 'dialect' reflects an earlier stage of the language. Now in a grammar of that dialect (and at an earlier stage of English), the quantifiers in (19) would have to be set up as predicates. In order to relate quantifiers in predicate position with the corresponding prenominal quantifiers, as one would have to do in such a dialect, one would have to set up a rule of quantifier-lowering. Thus, such a rule would be independently motivated for quantifiers of absolute size, and would apply optionally for such quantifiers. Since the quantifiers of absolute size would be set up as underlying predicates, the deep structures of (15) and (16) would automatically be generated, and the distinction between (1) and (2) would follow automatically. No surface semantic rule would be necessary for these cases. Now if all quantifiers are generated in predicate position and if the rule of quantifier-lowering is generalized to operate on quantifiers of relative size (it would be obligatory for relative quantifiers, optional for absolutes), then one can account for the fact that relative quantifiers like *some* work like *few* in sentences like (1) and (2).

Under this proposal, the difference between archaic and modern English with respect to these phenomena could be described quite simply: in modern English, the rule of quantifier-lowering has been generalized so that it applies obligatorily for all quantifiers;[7] nothing else needs to be changed. Under Partee's proposal, the change would be a very complicated one: a change in base rules, a change in the lexicon, the loss of a transformation, the addition of a surface structure interpretation rule. This is an argument against Partee's proposal only relative to one's views on the nature of syntactic change. If one

[7] Actually, there would be a complication here. In modern English, *numerous* would have to be considered an exception to quantifier-lowering. The problem with this is quantifier-lowering would have to contain a variable (as I shall show below), and rules with variables should be ungoverned. Quantifier-lowering is also strange in that it is a cyclic rule (see Carden, 1967) which contains a variable. To my knowledge, it is the only such rule. I know of no other rule of this sort.

Numerous would also create problems for Partee's proposal. It would have to be listed in the lexicon as both an adjective and a quantifier. Since *numerous* in its use as an adjective yields the same semantic readings as in its use as a quantifier, Partee would need a special rule of semantic interpretation to map the adjective *numerous* into a semantic quantifier. (Note that *The men who shaved themselves were numerous* is synonymous to *Numerous men shaved themselves.*)

believes that changes by gross restructuring of the sort required by Partee's claims are possible, then it is no argument at all. If one does not believe that syntactic change works this way, then it is an argument.

Now let us consider objection (d).

(d) It was suggested above that a semantically consistent approach would require that *only* be treated as a predicate. In this case, the counterarguments are even stronger, since not only is *only* not permitted in predicate position in ordinary sentences (see (21)), but it can modify structures that are by no stretch of the imagination noun phrases, as in (22).

(21) *The three rules on this page are only.

(22) The three rules on this page are only explicit and easy to read (i.e., they are not, for instance, interesting or revealing).

Sentence (22) presents a grave problem for the proposal under consideration. It cannot be maintained that *only* is a predicate which takes whole sentences as its subject, for then the deep structure of (22) would be identical to that of (18c), and the two are clearly not synonymous.

To provide the proper semantic representation, the deep structure of (22) would have to contain *only* as a predicate whose subject is *explicit and easy to read*; but as we remarked earlier, *easy to read* cannot be a deep structure constituent. It thus appears particularly clear in this case that the semantic interpretation must depend in part on derived structure, where *explicit and easy to read* is indeed a single constituent in construction with *only* (p. 158).

Partee says that *only* can modify structures that are "by no stretch of the imagination noun phrases". To stretch her imagination, I would suggest that Partee read Ross' 'Adjectives as Noun Phrases', where evidence is presented that adjectives are dominated by the node NP at some point in their derivation. Consider (22′), which is synonymous to (22).

(22′) The three rules on this page have only the properties that they are explicit and easy to read.

(22′) is a paraphrase of (22) where we find *only* overtly modifying a NP.

As I mentioned above, my proposal does not require *only* to be a simple predicate. And in a no-deep-structure theory, this would not be possible, since (22) and (22′) are paraphrases of (22″), and so would be represented the same semantically.

(22″) The three rules on this page have the properties that they are explicit and easy to read, and they have no other properties.

Semantically, these sentences all involve quantification over properties. It is not at all clear how quantification over properties should be represented semantically. There are various possibilities, and it is not obvious how these will fit in with the view of quantifiers that McCawley, Carden, and I have proposed. Partee does not mention how she would deal with quantification over properties in semantic representations, nor how such semantic repre-

sentations would fit in with whatever her views on surface structure rules of semantic interpretation are. Partee's objection (d) is invalid since she is criticising a view that I do not hold, and have never held. The facts she brings up have no obvious bearing on either her proposal or mine, since both proposals are rather vague on the issue involved.

So far, we have seen that Partee's objections (a), (b), (c), and (d) are all invalid. Let us now proceed to the two criticisms of my proposal that are correct (although the arguments based on them are not). In my dissertation I claimed that

(23) Did many inmates escape?

was ambiguous. In one sense, it is presumed that some inmates escaped, and it is asked whether the number was large. In the second sense, no escape is presumed. It is only presumed that the speaker is discussing many inmates and asking whether they escaped. Partee claims that the latter sense is "marginal". If, by this term, she means "nonexistent", then I agree. A sober, post-dissertation look at the sentence shows that I simply had the facts wrong. So far as I can tell, the second sense simply does not exist. I also agree with Partee's critique of the mechanism I had set up to account for that sense of (23), namely, deriving the quantifier from a restrictive relative clause on an indefinite NP (diagram (24) in her paper). This source predicts all sorts of nonexistent ambiguities.

But acceptance of this critique does not have any effect on the rest of my proposal. If there is no ambiguity to account for, then so much the better if we can eliminate the source from which it supposedly arose. As Partee points out, overt quantificational adjectives like *numerous* cannot occur in restrictive relative clauses (though they can occur in non-restrictive relative clauses). If this constraint is generalized to all quantifiers, the excessive ambiguities that Partee points out would be eliminated, and so would the bulk of her objections on this issue.

It should be noted that the elimination of quantifiers in restrictive relative clauses would still permit the derivation of certain quantifiers from nonrestrictive clauses, contrary to Partee's claim:

> The semantic arguments all require the possibility of quantifiers in higher sentences. The suggestion that they also be derivable from embedded sentences was motivated primarily by syntactic arguments; the claim that quantifiers were predicates gained most of its syntactic plausibility from the apparent similarity of behavior of e.g., *numerous* and *many*:
>
> (30) (a) the flowers. which were numerous, were covered with dew
> (b) the numerous flowers were covered with dew
>
> (31) (a) (?) the flowers, which were many, were covered with dew
> (b) the many flowers were covered with dew
>
> But counterarguments to this line of reasoning have already been given above (p. 161).

It is not entirely clear which counterarguments she has in mind. But there are only two possibilities: objection (c) and her valid argument against deriving quantifiers from restrictive relative clauses. Objection (c), as we saw, is invalid; and the argument against deriving quantifiers from restrictive relatives has no bearing on the claim that sentences like (31b) are derived from *nonrestrictive* relatives, as in (31a). The above-mentioned constraint on *Wh-be*-deletion would guarantee that only quantifiers following definite articles would be derived in this manner. To my knowledge, none of Partee's objections are relevant to this proposal.

Such a proposal makes an interesting semantic claim. Nonrestrictive relative clauses are always attributed to the speaker. If some quantifiers are derived from nonrestrictive relatives and others are not, it should be possible to find a context where the former quantifiers are attributed to the speaker's judgement, while the latter are not. Consider the following:

(I) Barney believes that many honest politicians from Bayonne, N.J., are being smeared.

(II) Barney believes that the many honest politicians from Bayonne, N.J., are being smeared.

In (I), the speaker is not committed to the view that there are many honest politicians from Bayonne, N.J. In (II), the speaker is committed to this view. If the *many* in (II), but not that in (I), is derived from a nonrestrictive relative clause, as I have proposed, then this fact follows automatically. It does not follow automatically from Partee's analysis. Presumably she would need an additional surface interpretation rule of an unknown character to account for it.

Such a proposal would also explain why such quantifiers precede other adjectives inside the noun phrase. The reason is that all adjectives derived from nonrestrictive relative clauses precede those derived from restrictive relative clauses. For example, *the arrogant rich Germans* can either refer to *the rich Germans, who are arrogant* or *the Germans, who are arrogant and rich*, but not to *the arrogant Germans, who are rich*, where *arrogant* is from a *restrictive* relative and *rich* is from a nonrestrictive relative. For Partee, the order of post-article quantifiers does not follow from any other facts, but must be stated in a phrase structure rule. My proposal would also predict that, to the extent to which there are no output conditions constraining the order of adjectives from nonrestrictive relatives[8], quantifiers should be

[8] As Mark Liberman has pointed out (see citation in Ross, 1967), the constraints on the order of adjectives (excluding the restrictive-nonrestrictive difference) must be stated as output conditions. It seems fairly clear that such output conditions will have to be formulated for nonrestrictive adjectives, including quantifiers, as well as for restrictive adjectives.

ordered freely with other nonrestrictive adjectives, but would precede restrictive adjectives. This seems to be the case. Compare *the 50 million industrious Japanese* and *the industrious 50 million Japanese.* The former is ambiguous, with *industrious* being either restrictive or nonrestrictive; in the latter, *industrious* is only nonrestrictive, as predicted. It is not clear how Partee would account for such facts, or even how she would derive the latter noun phrase. She could not derive *industrious* in the latter NP via the ordinary adjective shift rule, since that rule does not move adjectives around quantifiers. Thus, she would need either an additional adjective shift rule or an *ad hoc* condition on the ordinary rule in order to derive the latter NP. These facts about the order of quantifiers follow automatically from my proposal, while in Partee's proposal they must be accounted for by two separate statements without independent motivation: a phrase structure rule and a condition on adjective-shift.[9]

Partee's second correct criticism of the proposal made in my dissertation involves the following sentences:

(26) Does John read many books?

(28) Few people read many books.

(28′) Many books are read by few people. (My example.)

I claimed in my dissertation that the difference in meaning between sentences like (28) and those like (28′) could be handled by deriving certain quantifiers from restrictive relative clauses and constraining the rule of quantifier-lowering so that it could apply only in subject position. As Partee points out,

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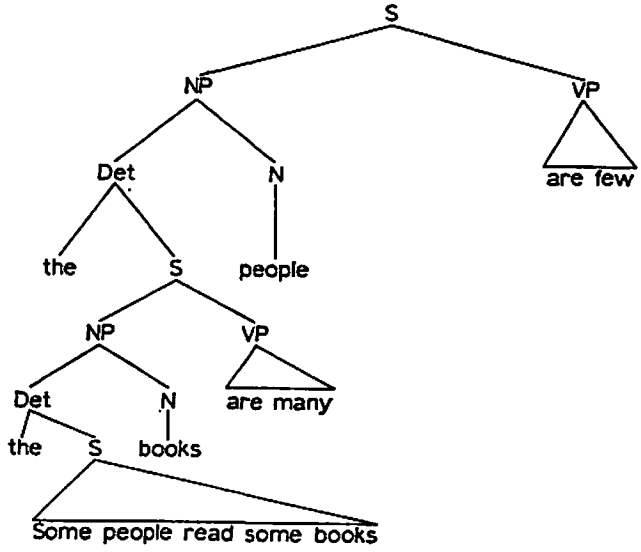
Thus, we get *the industrious 50 million Japanese* and *the industrious few Frenchmen who can afford a Mercedes,* but not **the industrious many Germans who can afford a Mercedes.* However, I find the following two phrases to have equal acceptability: *?the incredibly industrious few Japanese who can afford a Mercedes* and *?the incredibly industrious many Japanese who can afford a Mercedes.* It is my guess that such insane constraints are due to output conditions on the order of adjectives and not to constraints on rules. Accordingly, I would predict that such constraints would vary (perhaps wildly) from person to person.

Also note that noun phrases like *the numerous students* and *the many students* have the same intonation pattern as noun phrases with nonrestrictive adjectives. That is, the head noun *students* must bear heavier stress than *numerous.* This parallels the stress on the NP *the industrious Chinese* where *industrious* would presumably derive from a nonrestrictive clause, and not that on *the industrious Chinese,* where *industrious* has a restrictive meaning.

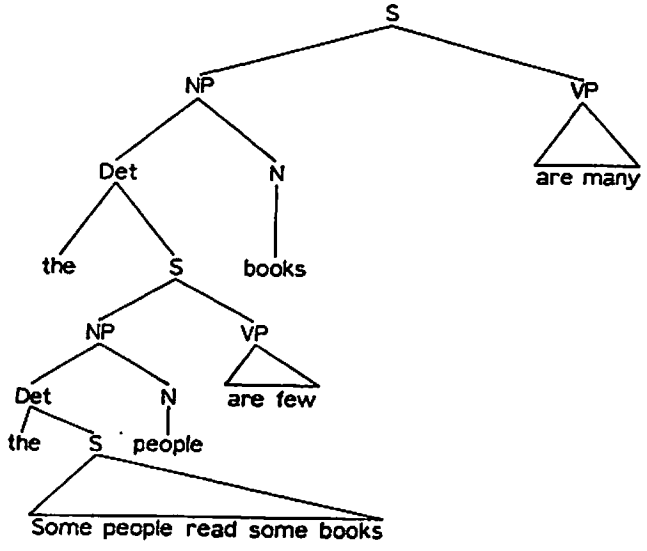
[9] In addition, it should be noted that the fact that nonrestrictive adjectives always precede restrictive adjectives follows from the fact that nonrestrictive relative clauses always follow restrictive relative clauses, taken together with the fact that the internal structure of NPs with relative clauses is [$_{NP}$ NP S $_{NP}$] and the fact that the correct form of the adjective shift rule permutes the VP (see Lakoff, 1965) immediately dominating the adjective in question and its sister NP. Thus the left-to-right order of adjectives in a noun phrase will be the mirror image of the left-to-right order of the relative clauses from which the adjectives were derived.

(26) shows that the latter constraint is incorrect (see also Carden, 1967). This shows that the particular analysis that I gave in my dissertation will not work; it does not show that all analyses based on the quantifiers-as-predicates hypothesis will fail. For example, Partee says that (29) would be "a semantically plausible" underlying structure for (28). In (29), both quantifiers are derived from predicates of higher sentences; neither is derived from a restrictive relative clause.

(29)



(29')



I would agree with Partee's judgement that *few* is the topmost predicate and that the assertion made by (28) is essentially the same as that made by *There are few people who read many books.* But now consider the structure of (29'), which is like (29), except that *many* is the highest predicate.
(29') makes the same assertion as *There are many books that few people read.* (28) does not have this meaning. Therefore, (29') cannot be a deep structure for (28). But here a difficulty arises. According to my proposal, the same rules that will derive (28) from (29) will also apply to derive (28) from (29'). Since the rule of quantifier-lowering appears to be cyclical (see Carden, 1967), I know of no non-ad-hoc way to prevent (28) from being derived from the structure underlying (29').

Now consider (28'). A similar difficulty with my proposal arises here. (28') means *There are many books that are read by few people*; it cannot mean *There are few people by whom many books are read.* That is, (28') has the meaning of (29'), but not that of (29). But if (28') is to be derived from a deep structure like that of (29'), there is no non-ad-hoc way of keeping the same rules that apply to (29') from applying to (29), yielding (28'). This is the same difficulty that we saw above; my proposal predicts an ambiguity where none occurs. It should be noted, however, that these difficulties do not constitute counterexamples. They simply show that some additional constraint (of an unknown nature), which to my knowledge would not be independently motivated, would have to be added to make my proposal work in these cases. Partee, on the other hand, would need a surface structure interpretation rule (of an unknown nature), which to my knowledge would not be independently motivated. So far as I can tell, sentences like (28) and (28') seem to provide problems which are as difficult for Partee's proposal as for mine. I see no way of evaluating unknown transformational constraints vis-à-vis unknown surface interpretation rules.

Although Partee does not discuss it, sentences like (28) and (28') might lead some potential adherent of surface interpretation rules to make the following observation: If one assumes that (28) and (28') have (29) and (29') respectively as their underlying structures, then the leftmost quantifiers in (28) and (28') correspond to the 'highest' quantifiers in (29) and (29'). If the relative 'height' of the quantifiers in (29) and (29') directly reflects the relative height of the corresponding quantifiers in semantic representation, then the left-to-right surface order of quantifiers in (28) and (28') would determine the relative height of the quantifiers in semantic representation. Suppose this were true in general. Then one might argue that this was certain proof that surface structure order determined certain aspects of semantic representation and that, therefore, surface structure interpretation rules were necessary. Such an argument would be fallacious. It would show only that there was a

direct correlation between certain aspects of semantic representation and certain aspects of surface structure. It would not show that surface structure interpretation rules would be the correct way to capture this correlation. It might be possible that additional transformations or constraints on derivations might capture the generalizations involved as well or better. In the absence of specific proposals for surface structure interpretation rules, the matter could not be pursued and no conclusion could be reached.

In addition, the above claim is not even correct: the left-to-right order of quantifiers in surface structure does not directly determine the relative height of the quantifiers in semantic representation. Consider the following sentences:

(I) Fathers of many children read few books.

(II) Fathers with many children read few books.

In (I), the 'highest' quantifier is *many*;[10] in (II), the 'highest' quantifier is *few*. (I) has the reading *There are many children whose fathers read few books.* (II) cannot have such a reading; (II) can only have the reading *The books that fathers with many children read are few in number.* (I) and (II) have the same surface structure, discounting phonological forms. The only difference in surface structure is that (I) contains *of* where (II) has *with*. I cannot imagine how the difference in interpretation here could be "explainable quite naturally on the basis of surface structure".

Or consider these sentences:

(III) The assassinations of few presidents have solved many problems.

(IV) The assassination of few presidents has solved many problems.

In (III), *few* is the 'highest' quantifier, while in (IV), *many* is 'highest'. (III) has the reading *There are few presidents whose assassinations have solved many problems.* (IV) has the reading *There are many problems that have been solved by the fact that few presidents have been assassinated.* It is not at all clear how the singular/plural difference in the head noun in surface structure could explain naturally the difference in the interpretation of the quantifiers.

Or take these sentences:

(V) The destruction of many cities bothered few people.

(VI) Destroying many cities bothered few people.

(V) is ambiguous; either *many* or *few* may be the 'highest' quantifier. (V) may mean either *There are many cities whose destruction bothered few people* or

[10] Some people find (I) ambiguous in this respect. For these speakers, (I) can mean *There are few books that fathers of many children read.* (II), however, is not ambiguous in this respect, for any speakers I have found.

There are few people whom the destruction of many cities bothered. This is the case if the subject of *destruction* is understood to be unspecified. However, it is also possible in my speech for (V) to have a reading like (VI), where the subject of *destruction* is understood to be identical to the object of *bother.* With this reading, only *few* and not *many* can be the 'highest' quantifier. In this sense, (V), like (VI), cannot have the reading *There are many cities such that destroying them bothered few people.* Thus, the interpretation of the quantifiers in (V) depends on what the underlying subject of *destruction* is. This example shows clearly that the interpretation of quantifiers cannot be completely determined by surface structure.

So far, we have seen that only two of Partee's criticisms of my 1965 proposal are correct, and that Partee's proposal does no better than mine in dealing with the problems raised by those criticisms. Moreover, a detailed consideration of the sentences Partee brings up seems to provide evidence against her proposal. As we have just seen, sentence (V) seems to show that the interpretation of quantifiers cannot be completely determined by surface structure. And as we have seen above, Partee's proposal would miss a generalization in dealing with sentences like (17c) and (18c) and could not account for the fact that quantifiers following definite articles act like adjectives derived from nonrestrictive relative clauses.

Although Partee does not prove what she sets out to prove[11], her paper is very interesting. Though her criticisms of my proposal are not all valid, they nonetheless bring up new facts and raise serious issues. To this extent they are useful criticisms. However, Partee's paper also contains certain unfounded criticisms and claims which arise from one implicit assumption, namely, that two versions of the transformational component of the grammar of some language can be meaningfully compared without considering the corresponding versions of the semantic component of the grammar of that language. This assumption is false. The transformational component and the semantic component (and the lexicon, of course) together do the work of relating semantic representations to surface structures. In a theory of grammar with very abstract deep structures (like the one Ross and I advocated until the spring of 1967), much of the work previously thought to be done by the semantic component was done by the transformational component. In our present theory of grammar, where there is no semantic component (outside of logical equivalences and rules of inference), the work previously assigned to both components is done entirely by the transformational component. Since the work to be done by our version of the transformational

[11] In addition, she does not attempt to reply to Carden's arguments (1967) for the quantifier-as-predicates proposal. The only attempt at such a reply has been given by Jackendoff (1968), whose arguments are invalid (see Carden, 1968, 5.14, and Lakoff, 1968).

component is considerably more than the work to be done by Partee's version, it makes no sense to compare the two transformational components in terms of simplicity, difficulty of stating certain constraints, etc. Such comparisons may make sense for subparts of the transformational component that do the same work. But in general, it makes sense only to compare grammars as a whole, with the semantic and syntactic components taken together. What Partee did was compare two transformational components with unequal work loads. As might be expected, the one with less work to do avoided certain difficulties. Partee's proposal, taken as a whole, did not avoid these difficulties. It just shunted them into the semantic component, where they were forgotten. Now it might be possible that some account of surface structure interpretation rules would avoid some of the difficulties discussed above. But this can be shown only by a detailed discussion of such rules. Of course, such a discussion is difficult in the absence of any account, even a vague one, of what such rules would do. But an author who makes a positive claim to the effect that surface structure interpretation rules can do things that transformations cannot do has a responsibility to discuss, even vaguely, how such rules would work, and why *no* version of transformational rules (not just one that happened to have been proposed) could work. Partee has not done this.

It should be noted that even though no particular proposal for surface structure interpretation rules has been made, it is still possible to talk about certain aspects of such rules. One can discuss what the input to such rules would be like, since inputs would be stated in terms of surface structures. In the case of quantifiers, we know something about what the output of such rules would be like, since the treatment of quantifiers in semantic representation would not be wholly unlike their treatment in logic. Moreover, we can ask certain questions about the form of such rules. For instance, would they contain variables? Consider a surface structure interpretation rule that assigned the proper scope to quantifiers, which is the sort of rule that Partee has been discussing. It seems clear that such a rule would have to contain a variable, since the scope assigned to a quantifier may be indefinitely large. For example, consider the sentence *Bill believes that John likes many girls.* This can mean either *Bill believes that there are many girls that John likes* or *There are many girls who Bill believes that John likes.* Similarly, consider *Sam thinks that Bill believes that John likes many girls.* This can mean either *Sam thinks that Bill believes that there are many girls that John likes* or *Sam thinks that there are many girls that Bill believes that John likes*, or *There are many girls that Sam thinks that Bill believes that John likes.* Further embeddings of this sort will produce further ambiguities along this line. This seems to indicate that any surface interpretation rule that assigned a scope to the quantifier *many* would have to assign that scope over an indefinitely large range, which

means it would have to contain a variable. If one then asks whether this variable is constrained, one finds that it is. In fact, as McCawley pointed out (Linguistic Institute lectures, summer, 1968) the constraints are exactly those that Ross (1967) has shown to hold for movement transformations. For example, *Bill believes the claim that John likes many girls* can only mean *Bill believes the claim that there are many girls that John likes.* It cannot mean *There are many girls such that Bill believes the claim that John likes them.* Thus, the scope of the quantifier *many* could not be assigned by a surface interpretation rule outside of constructions like *the claim that.* And in general, such interpretation rules could only assign quantifier scopes inside of islands, as defined by Ross. Consider another example.

(VII) Did John condone the destruction of many cities?

(VIII) Did John condone America's destruction of many cities?

(VII) may have the reading *Were there many cities that John condoned the destruction of?* But (VIII) may not have the reading *Were there many cities such that John condoned America's destruction of them?* Thus, the scope of *many* may be assigned outside of *the destruction...*, but not *America's destruction....* This is exactly what one finds in movement transformations. Thus one can get *Which cities did John condone the destruction of?*, but not **Which cities did John condone America's destruction of?*

Moreover, Partee's surface interpretation rules would have to obey Ross' coordinate structure constraint. Compare the following sentences:

(IX) Abdul believes that many men like baba ganouze.

(X) Abdul believes that few women like baba ganouze.

(XI) Abdul believes that many men and few women like baba ganouze.

(XII) Abdul believes that many men like baba ganouze and few women like baba ganouze.

As we saw above, the rule that assigns scope to the quantifiers *many* and *few* must contain a variable, since the scope can be assigned either inside or outside the complement of *believe.* In the case where the scope can be assigned outside the complement of *believe*, (IX) and (X) would have the readings *There are many men who Abdul believes like baba ganouze* and *There are few women who Abdul believes like baba ganouze.* This is impossible in (XI) and (XII). (XI) and (XII) cannot have either of the readings: *There are many men such that Abdul believes that they and few women like baba ganouze* and *There are few women such that Abdul believes that they and many men like baba ganouze.* Thus, it is clear that Partee's surface interpretation rules for quantifiers would have to obey Ross' coordinate structure constraint.

Now let us ask what, minimally, a surface structure rule that assigns scope would have to do. It would have to either move the quantifier in question to a position in the tree at or near one of the occurrences of S dominating the quantifier. If the rule didn't actually move the quantifier, it would at least have to place a marker of some kind in such a position, deleting the quantifier in its original position.[12] That is the least that such a scope assignment rule would have to do. An operation of this sort would have to qualify as a kind of movement rule. It should be noted that the positions that the quantifier (or the special marker) would wind up in would always *command* the old position of the quantifier. That is, scope assignment in Partee's sense would be a kind of movement rule operating within islands, as defined by Ross.

It is not clear what it would mean for Ross' constraints to hold for semantic interpretation rules, since they are defined in terms of syntactic tree configurations and the types of operations that transformations perform on trees. It would make sense for Ross' constraints to apply to surface interpretation rules only if such rules operated on the same structures and had the same types of elementary operations as transformations, and if, furthermore, semantic representations are trees, which I believe is correct. If quantifiers are derived as Carden, McCawley, and I have proposed, by a quantifier-lowering transformation, then these facts follow automatically, since Ross' constraints apply to transformations.

Provided that one could come up with an actual proposal for surface interpretation rules, one such that it would make sense to speak of Ross' constraints as applying to them, then it might be possible for one to describe the above facts in the framework of Partee's proposal. The reason is, that in the above examples, it just happens to be the case that the structures defining Ross' constraints are present in surface structure as well as at that point in the derivation when quantifier-lowering would apply. According to Partee's proposal, this would be no accident. Partee would predict that Ross' constraints would come into play in exactly those cases where the appropriate structures were present in surface structure. According to my proposal, Ross' constraints would come into play only at that point in the derivation at which quantifier-lowering applied. Thus, there is an empirical issue here. If we could find a case where one of the structures defining Ross' constraints would not be present at the point in the derivation where quantifier-lowering would have to take place, but, because of the application of later transformations, would

[12] Exactly what such a rule would do would depend on one's assumptions about the nature of semantic representation. For example, McCawley, Carden, and I assume that *many*, *numerous*, *few*, etc. are to be represented semantically as predicates. On this view, scope assignment would make the quantifier the predicate of the S immediately above the S in question. Since Partee gives no indication as to her assumptions about the semantic nature of quantifiers, it is impossible for me to guess just what sort of output she has in mind.

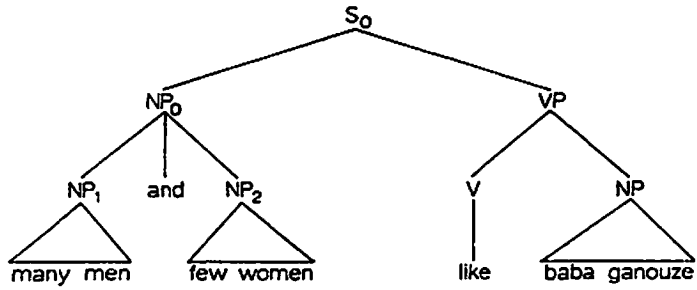
be present at the level of surface structure, then we could find evidence for or against one of the proposals, by asking where the constraints actually applied.

There does exist such a case. It involves conjunction. Consider (XIII):

(XIII) Many men and few women like baba ganouze.

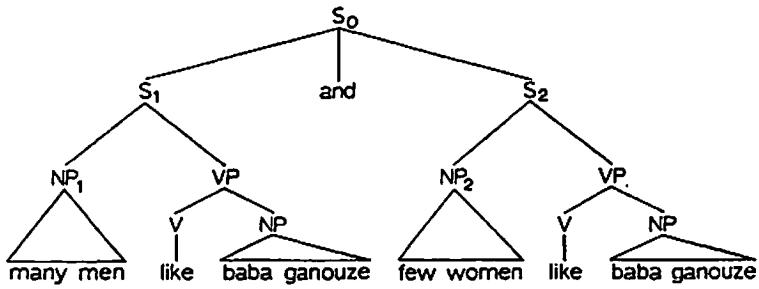
(XIII) would have a derived structure like that of (XIV).

(XIV)

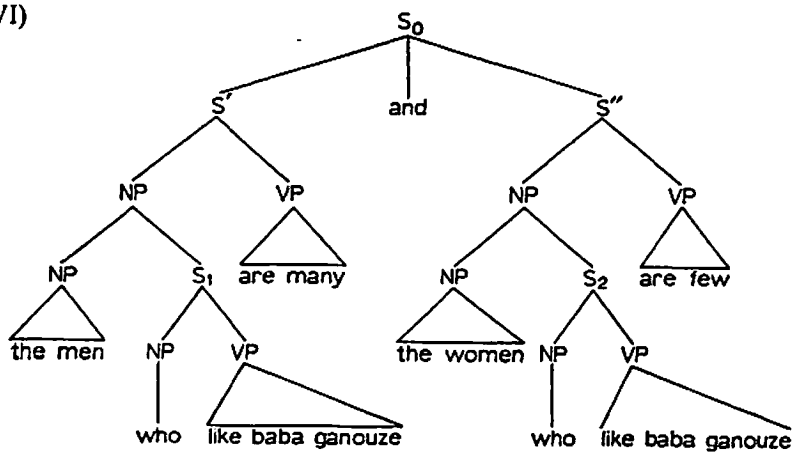


According to both Partee's proposal and mine, (XIV) would be derived by conjunction reduction from a structure like (XV). According to my proposal, but not Partee's, (XV) would be derived from a structure vaguely like (XVI).

(XV)



(XVI)



According to my proposal, quantifier-lowering, being cyclical, would apply separately on the S′ and S″ cycles. Since S′ and S″ do not contain coordinate structures, the coordinate structure constraint would not apply. After quantifier-lowering, (XV) would result. On the S_0-cycle, conjunction reduction would apply, yielding the coordinate NP of (XIV). Both Partee's proposal and mine would require the latter step. (XIV) would essentially be the surface structure. In (XIV) we find that the quantifiers, *many* and *few*, are inside a coordinate NP. According to my proposal, that coordinate NP would be derived *after* the application of quantifier-lowering; therefore, my proposal predicts that the coordinate structure constraint should not enter into the derivation of (XIII). Partee's proposal makes the opposite prediction. Her rule of scope assignment would have to apply to the surface structure, namely, (XIV). Since the quantifiers are inside of a coordinate NP, and since the rule scope assignment would have to move the quantifier out of that coordinate NP up to an S dominating the quantifier, the coordinate structure constraint should apply. As we saw in the case of (XI), it must apply in such structures, blocking the operation of scope assignment. Thus, Partee's proposal predicts that scope assignment should not apply to (XIV), and that with respect to quantification, (XIII) should be semantically ill-formed. This is false. (XIII) is semantically well-formed and synonymous to *Many men like baba ganouze and few women like baba ganouze*. Thus, proposals like Partee's would need to have the coordinate structure constraint both hold and not hold.

This is a clear contradiction. There would, however, be a way to get out of it, provided that Partee were willing to give up her insistence that the rule of scope assignment for quantifiers operate directly on surface structures. If she were to have a surface semantic rule of 'conjunction expansion' operating first and then to have scope assignment operate on the output of such a rule, then the paradox could be avoided. Conjunction expansion could apply to (XIV), yielding as output a semantic structure (whatever she might view that to be) containing two conjoined S's, in a configuration like that of (XV). Then the scope assignment rule could assign the scopes of the quantifiers to S_1 and S_2 (see (XV)) – within the coordinate node, not across it. There would, however, be a catch. The rule of conjunction expansion would be essentially the rule of conjunction reduction in reverse. That is, the same rule would be stated twice – once in the syntax and once in the surface semantics.[13] And the 'work' done by these two rules in relating meanings to surface forms would be exactly the 'work' done by the syntactic rule of conjunction reduction in

[13] It should be noted that in the case at hand, Partee's proposal would need to have both conjunction reduction applying in the syntax and conjunction expansion in the semantics, with the latter rule undoing the work of the former.

my proposal. Any such extension of Partee's proposal would miss a generalization.

So far as I can see, there would be only one way out of such a duplication, in the context of Partee's proposal – namely, to do away with conjunction reduction as a syntactic rule altogether and to generate conjoined constituents in the base. (In fact, such a proposal has been seriously entertained. See Dougherty, 1967.) The essential difficulty with such a proposal has long been known. Verb phrases that are conjoined in surface structure would have to appear conjoined in the base – even those verb phrases that had been assumed to have been derived transformationally, e.g., *Sam is likely to go*, *Max was shot by Sam*, *This book translates easily*, *Irv was believed by Max to have eaten the bagel*, *Moishe seems to be easy to please*, etc. Note that the same argument about scope assignment as applied to (XIII) would also apply to: *John was liked by many co-workers and was said to have seemed to few administrators to have been hard to please.* A surface semantic rule of conjunction expansion would be needed in order to assign scope to *many* and *few* in this sentence. To avoid duplication in the syntax, conjunction reduction would have to be eliminated from the syntax and the VPs in question would have to appear conjoined in the base. Thus, such VPs could not be transformationally derived. Since this would be true of all cases where a surface subject was derived by transformation, all transformational analyses that produced derived subjects would have to be given up. But this is not merely a question of accepting or rejecting particular analyses. The arguments on which such transformational analyses were originally based still stand. Such a proposal could be maintained only together with the claim that such arguments were not sufficient to justify postulating transformations. But these arguments are at the very heart of transformational analysis. They are among the very strongest arguments for transformations, and if they are abandoned, it is hard to see what sort of arguments could be brought forward to justify postulating transformations. So far as I can see, rejecting the validity of such arguments would be tantamount to giving up transformational analysis. From the postscript to her paper, it would seem that Partee is not prepared to give up such arguments. Thus, she must countenance either duplicating conjunction reduction in her semantic rules, or accept the contradiction that the coordinate structure constraint both must and cannot hold for any rule of scope assignment that she might try to state.

Now consider the following examples:

(XVII) John and Mary left.

(XVIII) John and Mary left together.

(XIX) Few men and many women left.

(XX) *Few men and many women left together.

(XXI) John and Mary are similar.

(XXII) John is similar to Mary.

(XXIII)*Few men and many women are similar.

(XXIV) Few men are similar to many women.

(XXV) Few men left with many women.

As Peters and I pointed out (Lakoff and Peters, 1969), (XVII) is ambiguous. It can be synonymous with (XVIII) or with *John left and Mary left. Together* disambiguates such cases, forcing the phrasal conjunction interpretation. Now note that (XIX), unlike (XVII), is not ambiguous in this sense. (XIX) is not subject to the phrasal conjunction interpretation; it can be interpreted only as a sentential conjunction, synonymous with *Few men left and many women left.* And (XX), where *together* forces a phrasal conjunction interpretation, is grammatically ill-formed. Clearly, the fact that (XIX) is not subject to a phrasal conjunction interpretation is not unrelated to the fact that (XX) is ill-formed. In a sense, they are the same fact, and should be accounted for in the same way. *Similar*, like *together*, forces a phrasal conjunction interpretation. As would be expected from the above discussion, (XXIII) is ill-formed. Now the question arises as to what is the cause of such ill-formedness. One proposal might be that it is due to some deep structure constraint forbidding indefinite quantifiers modifying the head nouns in phrasal conjunction subjects. (XXIV), which is derived by conjunct movement from a phrasal conjunction subject, does permit such quantifiers. Furthermore, the constraint would not be limited to the head nouns.

(XXVI) *Fathers of *few* children and women with many lovers are similar.

(XXVII) Fathers of *few* children are similar to women with many lovers.

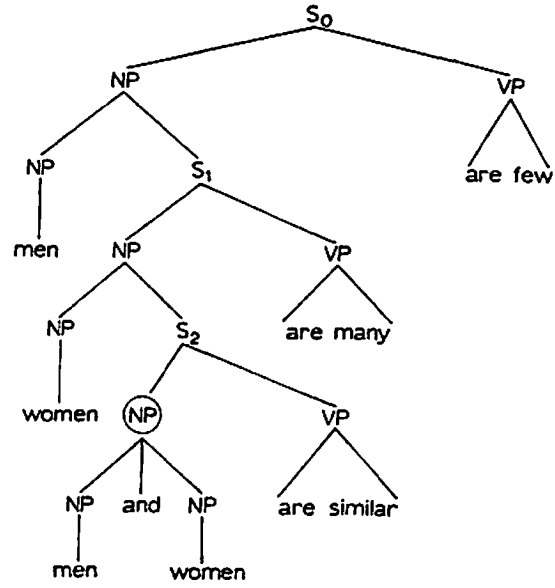
The ill-formedness of (XXVI) shows that quantifiers must be excluded not only from the head nouns but from certain other NPs as well. But not from all other NPs. Note (XXVIII).

(XXVIII) Fathers with *few* children and women with many lovers are similar.

Note that the difference in well-formedness between (XXVI) and (XXVIII) is parallel to the difference in interpretation between (I) and (II). In short, the quantifiers that would have to be excluded from phrasal conjunction subjects *are exactly those whose scope, in other contexts, would be assigned to a higher S.* Thus, the ill-formedness of (XXIII) and (XXVI) should follow from the scope-assignment process, not from deep structure constraints.

Under my proposal, the facts of (XVII)–(XXVIII) are accounted for automatically by Ross' coordinate structure constraint. Consider the following:

(XXIX)

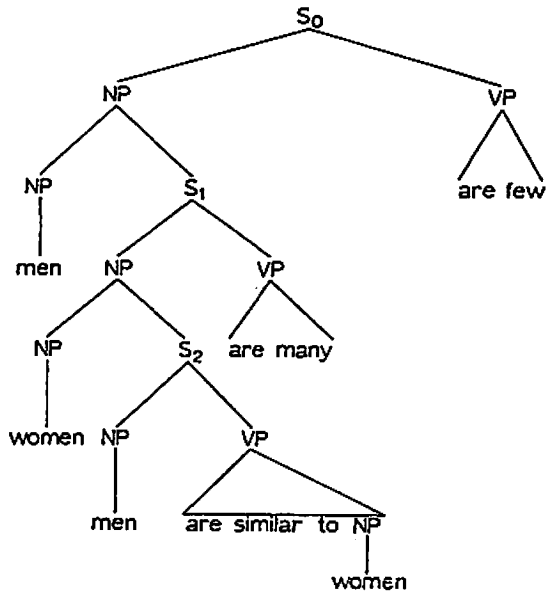


(XXIV) would have approximately the underlying structure of (XXIX).[14] Conjunct movement would apply on the S_2-cycle, yielding (XXX). At this point, the conjoined NP is broken up. On the S_1-cycle, quantifier-lowering applies to yield (XXXI). On the S_0-cycle, quantifier-lowering applies again, yielding (XXXII), the surface structure corresponding to (XXIV). Note that if conjunct-movement had not applied on the S_2-cycle, the encircled conjoined NP in (XXIX) would not have split up. Then on the S_1-cycle, Ross' coordinate structure constraint would have blocked quantifier-lowering, thus accounting for the ungrammaticality of (XXIII).

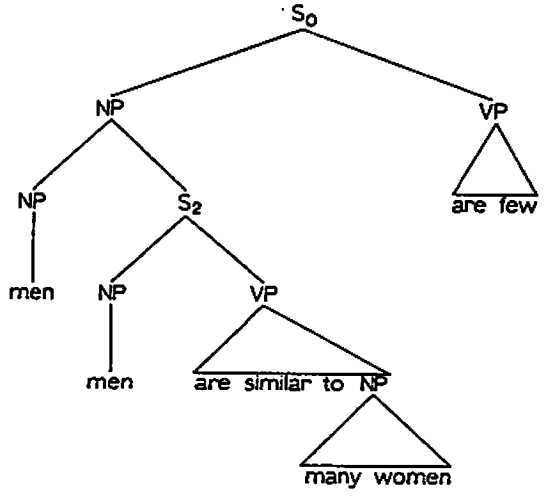
(XIX) has only the interpretation of a sentence conjunction. Its underlying structure would be essentially that of (XXXIII). Quantifier-lowering would apply on the S_1- and S_2-cycles independently, yielding (XXXIV). No conjoined NP would be present at the point at which quantifier-lowering took place, creating the conjoined NP of (XXXV). Note that (XIX) could not be derived from an underlying structure containing a phrasal conjunction. Such an underlying structure would have to look like (XXXVI), which contains a

[14] The proposed underlying structures are in accord with the proposal made in my dissertation, which is what Partee was criticising. They would differ in detail (though not in spirit) from the sort of representations that McCawley and I are entertaining at present. The difference does not enter into this argument.

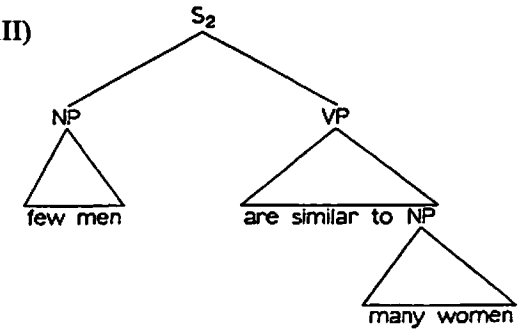
(XXX)


S0
NP
VP
NP
S1
are few
men
NP
VP
NP
S2
are many
women
NP
VP
men
are similar to NP
women

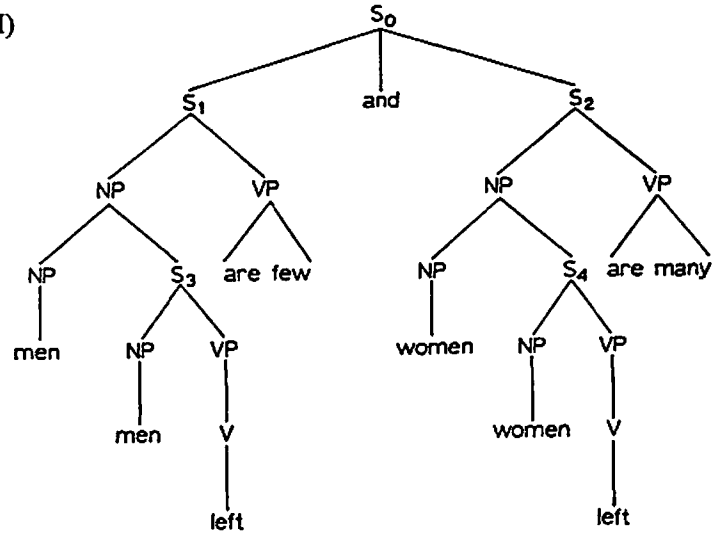
(XXXI)


S0
NP
VP
NP
S2
are few
men
NP
VP
men
are similar to NP
many women

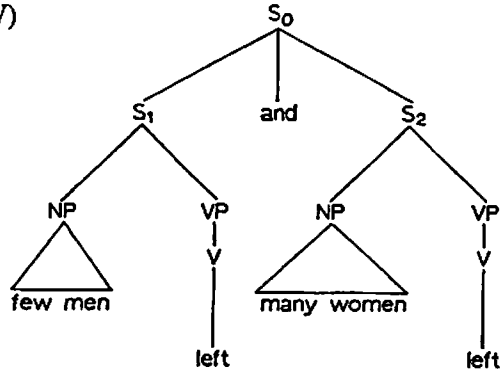
(XXXII)



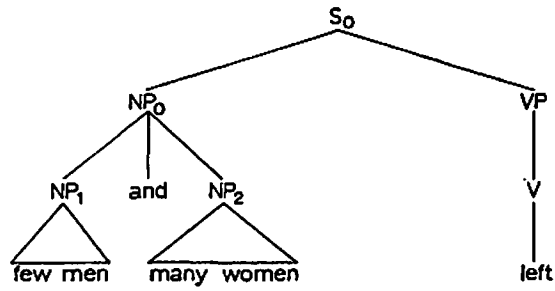
(XXXIII)



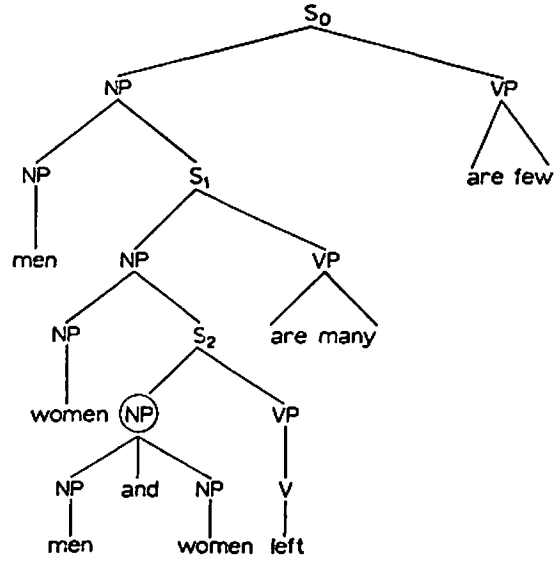
(XXXIV)



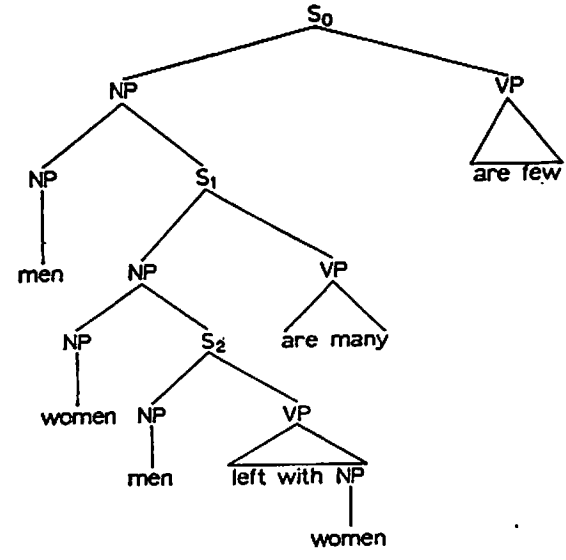
(XXXV)



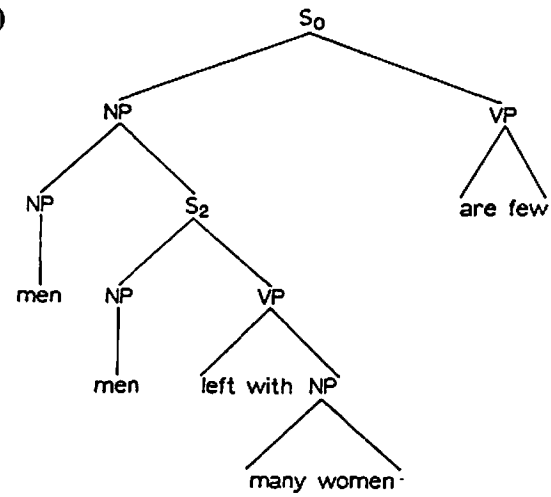
(XXXVI)



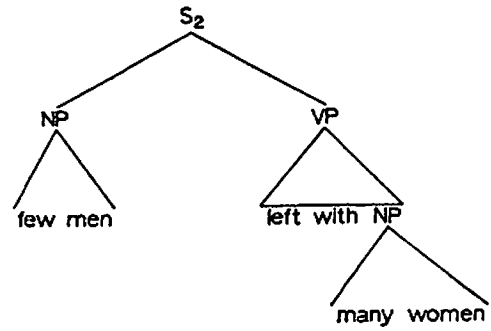
(XXXVII)



(XXXVIII)



(XXXIX)



coordinate NP (encircled) subject of *left*. On the S_1-cycle, quantifier-lowering would be blocked by the coordinate structure constraint. Thus, this constraint automatically predicts that no NP inside of a phrasal conjunction may contain a quantifier which is logically 'higher' than the coordinate node. Note that if conjunct movement were to apply to (XXXVI), breaking up the coordinate node to yield (XXXVII), the coordinate structure constraint would no longer prevent quantifier-lowering, which would apply on the S_1- and S_0-cycles, yielding (XXXVIII) and (XXXIX).

My proposal, taken together with the independently motivated difference between sentence conjunction and phrasal conjunction,[15] and the coordinate

[15] This argument does not depend on the reader's acceptance of all details of the analysis proposed by Peters and myself. It only requires that the reader accept the claims that phrasal conjunctions are not derived from sentence conjunctions and that (XXXVI) and (XXXVII) are differentiated by the end of the S_2-cycle. We know that this must be so from sentences like: *Max and Harry were believed by Sam to have left together* and *Max was believed by Harry to have left with Sam*. This follows from the fact that passive and subject-raising are cyclical rules. (See Lakoff, 1966.)

structure constraint, automatically accounts for the facts of (XVII)–(XXV). Thus, my proposal is able to *explain* the facts of (XVII)–(XXV), that is, it can account for them with no extra descriptive apparatus. Partee's proposal cannot account for these facts without extra descriptive apparatus; in fact, it is not obvious that a proposal like Partee's could account for these facts even with extra descriptive apparatus. Under Partee's proposal, quantifiers would be freely generated inside NPs. She could not prevent (XXIII) from being generated by using deep structure constraints, since the NPs where quantifiers must be excluded are in exactly the positions ((XXVI) as opposed to (XXVIII)) where in noncoordinate structures scope assignment to a higher S is possible ((I) as opposed to (II)). Thus, cases like (I) and (II) cannot be handled by deep structure constraints without missing a generalization. But, since (XXIII) and (XXVI) are syntactically ill-formed, they must be ruled out by some syntactic device or other. Whatever this device is, it must pick out exactly those NPs to which the surface semantic rule of scope assignment must apply. That is, under Partee's proposal, this set of NPs (which has a rather odd distribution) would have to be mentioned twice – once in the surface semantic rule of scope assignment and once in some unknown syntactic device which would be needed to block sentences like (XXIII) and (XXVI). In my proposal, this set of NPs would have to be mentioned only once – in the (still unknown) constraint on quantifier-lowering. The ungrammaticality of (XXIII) and (XXVI) would follow automatically from an independently-needed constraint on quantifier-lowering. In Partee's proposal, but not mine, syntactic constraints would have to be repeated in the semantic component.

The two difficulties that Partee found with my proposal were technical difficulties; they required that the proposal be patched up, not abandoned. But I think that the difficulties with Partee's proposal that I have just pointed out are inherent difficulties, problems of a sort that are endemic to all such proposals. The basic question at issue is whether or not the scope of a surface structure quantifier is determined by rules of syntax. My proposal says yes, Partee's says no. Thus, Partee's proposal makes certain predictions: (i) Rules outside of the syntactic component should have no effect on syntactic well-formedness. But (XXIII) and (XXVI) show that limitations on scope assignment do correspond to constraints on syntactic well-formedness. (ii) There is no necessity for rules that are not syntactic transformations to have the properties of syntactic transformations. However, Partee's surface interpretation rules have a property which is characteristic only of syntactic transformations. They must obey Ross' constraints on movement transformations containing variables, which are defined in terms of syntactic tree conditions and transformational operations (chopping, feature-chang-

ing). (iii) Rules of surface interpretation should do a portion of the 'work' of relating meanings to surface structures which does not overlap with the work done by the syntax. However, as we have seen, any proposal for surface structure interpretation rules would have to duplicate at least one syntactic rule (conjunction reduction) and at least one syntactic constraint that otherwise would not need to be duplicated. These facts seem to indicate that the job of relating the semantic scope of a quantifier to its surface structure position is done by the syntax.

The process of *gapping* provides an even clearer example of this. *Gapping* occurs in the (b) sentences below.

(XL) (a) John ate an apple and Sam ate a bagel.
(b) John ate an apple and Sam, a bagel.

(XLI) (a) John tried to eat an apple and Sam tried to eat a bagel.
(b) John tried to eat an apple and Sam, a bagel.

In the (b) sentences above, *ate* and *tried to eat* have been "gapped".

There is no doubt that *gapping* is a syntactic process. One might entertain another possibility, of course; namely, that gapped structures were generated by the base and interpreted by a surface structure interpretation rule. To make such a claim would be to say that the following sentences were syntactically well-formed, but semantically anomalous.

(XLII) (a) *John slept and Mary, Bill.
(b) *Max, a bagel and Sam ate a knish.
(c) *Sue, a bagel.
(d) *That I ate a bagel was denied by Sue and Max, a knish. Etc.

If the notion of syntactic well-formedness is to have any meaning at all, the sentences of (XLII) must be considered syntactically ill-formed. Thus, gapped structures cannot be generated by the base and then interpreted by a surface interpretation rule. Instead, gapped structures must be produced by a gapping transformation, along the lines discussed by Ross (1967). Such a transformation (with appropriate constraints) would be needed to account for the syntactic ill-formedness of (XLII).

Given that a gapping transformation is needed on independent grounds, let us consider how it interacts with the assignment of scope to quantifiers. Consider (XLIII):

(XLIII) John tried to date many rich girls.

(XLIII) is ambiguous. It can mean that there were many rich girls that John tried to date. (They may have all refused him.) Or it can mean that his aim was to date a lot of rich girls. (He may have succeeded with only a few.) This

is an ambiguity of scope. The scope of the quantifier can either be understood as being inside the sentential complement object of *try* or outside it. Thus, Partee's scope assignment rule would have to pick out two appropriate points in the surface structure to assign the scope in (XLIII).

Now consider (XLIV) and (XLV):

(XLIV) John tried to date many rich girls and Bill, many poor girls.

(XLV) Bill tried to date many poor girls.

(XLV) has the same ambiguity as (XLIII). This ambiguity appears on the right-hand side of (XLIV): *Bill, many poor girls.* But in this surface structure, Partee's general rule of scope assignment could not apply, since there are no longer two appropriate points in the surface structure to which the scope could be assigned.

As in the case of conjunction, there is a possible way out for Partee. If she were to give up on having the rule of scope assignment applying directly to surface structure, she could add another rule of surface structure interpretation which would apply before scope assignment. Such a rule could rebuild the structure wiped out by the *gapping* rule, so that the appropriate structure would be present when scope assignment applied. Let us call this rule *anti-gapping* (Ross has suggested the name *plugging*). *Anti-gapping* would be exactly the rule of *gapping* in reverse, and its job would be to undo the work of the gapping rule, just to preserve the possibility of surface structure interpretation rules.

In effect, the rule of *gapping* would be stated twice, once in the syntax and once in the surface semantic rules. As in the case of conjunction reduction, a generalization would be missed. Just as there should be only one rule of conjunction reduction, so there should be just one rule of gapping. For the reasons mentioned above, these rules should be in the syntax, not in any surface semantic component. (In addition, as Ross has pointed out (personal communication), the same difficulty arises with the proposal made by Jackendoff, 1968.)

In the above discussion, I have attempted to take Partee's proposal seriously and to discuss its consequences. Considering the vagueness of her proposal, this is not easy, but it is possible to a limited extent. At the very least, I think this discussion shows the following: It is not valid to invoke semantics as a kind of magic wand. One cannot simply say "That can be handled by a surface interpretation rule" and assume that the problem will obligingly vanish. When one claims that certain phenomena can be 'handled' by rules of semantic interpretation, whether deep, surface, or in-between, one has the obligation to ask and try to answer certain questions: What will such rules look like? What will their input be? What will their output be? What

changes will they effect? What form will they have? What assumptions would such rules make about the nature of semantic structure? What kinds of constraints would have to be placed on such rules? Would such rules have variables? Would they have exceptions? Would they have to perform operations radically different than those performed by transformations? Would they duplicate any of the work done by the syntax? Would they require any blocking devices? If so, what kind? And dozens of others... In short, before one has the right to say "That can be handled by a surface interpretation rule", he must make his proposal as precise as possible and then subject it to the same rigorous scrutiny that has hitherto been reserved for syntactic proposals.

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BIBLIOGRAPHY

Carden, Guy: 1967, 'English Quantifiers'. Harvard master's thesis.
Carden, Guy: 1968, 'English Quantifiers', in Report NSF-20, Harvard Computation Laboratory, Cambridge, Mass. This is a revised version of Carden (1967).
Donnellan, Keith: 1966, 'Reference and Definite Descriptions', *Philosophical Review*, July.
Dougherty, Ray: 1967, 'Coordinate Conjunction'. MIT mimeo.
Jackendoff, Ray: 1968, 'On some Incorrect Notions about Quantifiers and Negation', in *Studies in Transformational Grammar* (ed. by S. J. Keyser *et al.*), Air Force document AFCRL-68-0032, Waltham, Mass.
Lakoff, George: 1965, *On the Nature of Syntactic Irregularity*. Report NSF-16, Harvard Computation Laboratory, Cambridge, Mass.
Lakoff, George: 1966, 'Deep and Surface Grammar'. Harvard mimeo. Also in *Linguistic Institute Packet of Papers*, 1968.
Lakoff, George: 1968, 'Pronominalization, Negation, and the Analysis of Adverbs', in *Linguistic Institute Packet of Papers*, Urbana, Ill.
Lakoff, George and Peters, Stanley: 'Phrasal Conjunction and Symmetric Predicates', in *Modern Studies in English* (ed. by Reibel and Shane), Prentice-Hall, Englewood Cliffs, N.J.
McCawley, James D.: 1967, 'The Role of Semantics in a Generative Grammar'. Texas Conference on Universals. Mimeo.
Partee, Barbara H.: 1968, 'Negation, Conjunction, and Quantifiers: Syntax vs. Semantics'. UCLA mimeo, July.
Ross, J. R.: 1966, 'Adjectives as Noun Phrases'. MIT mimeo.
Ross, J. R.: 1967, *Constraints on Variables in Syntax*. MIT dissertation.