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## **Economy, Scope and Semantic Interpretation – Evidence from VP Ellipsis\***

Danny Fox

M.I.T.

In this paper I will provide evidence that the syntactic scope of quantifiers is affected by economy considerations. In particular, I will argue that altering this scope at LF incurs a cost which economy considerations seek to minimize.

There are basically two operations which have the determination (and the altering) of scope as their sole purpose. One is Quantifier Raising; the other is Quantifier Reconstruction (or Quantifier Lowering). I will claim that these scope shifting operations are restricted by economy considerations. What could be the content of such a claim? In general, economy considerations choose the most optimal derivation from a set of competitors (a “reference set”). The content of the claim is, therefore, that reducing instances of scope shifting operations enters among the considerations that choose the most optimal derivation from the reference set.

Here a highly controversial issue arises. How is the reference set constructed, and what are its members? This issue comes up in every approach to economy, and, in fact, is the central question of optimality in general (cf. Chomsky (1994), Grimshaw (1993) and Pesetsky (in progress) among others). This paper will argue that the reference set (at least the one relevant for the operations I discuss) includes only *derivations that end up with the same semantic interpretation*. In this respect I follow Golan (1993) and Reinhart (1993) who have also argued for a semantic determination of the reference set.

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I will show that Economy chooses the derivation with the fewest instances of scope shifting operations. In other words, I will show that an instance of a scope shifting operation is blocked if there is a competing derivation in the reference set (i.e. a derivation that ends up with the same semantic interpretation) which does not involve the scope shifting operation. Put simply, a scope shifting operation can apply only if it yields a semantic interpretation which would be impossible without its application. Informally we can say that scope shifting operations are ambiguity driven.

This paper will concentrate on the scope of quantifiers in VP ellipsis constructions. These constructions will provide evidence that both quantifier raising and quantifier reconstruction are ambiguity driven. Further evidence for this conclusion will come from co-ordinate structures and from the interpretation of bare plurals.

## 1. VP Ellipsis and QR

It is widely known that ellipsis sometimes disambiguates constructions involving multiple quantification. More specifically, a construction involving multiple quantification, which would normally show scopal ambiguity, sometimes loses this ambiguity when it serves as an antecedent for ellipsis. This section argues that the disambiguation exists when and only when the sentence including the elided material cannot show an ambiguity parallel to that of its antecedent. To be more precise:

**Ellipsis Scope Generalization (ESG):** The relative scope of two quantifiers, one of which is in an antecedent VP of an ellipsis construction, may differ from the surface c-command relation, only if the parallel difference will have semantic effects in the elided VP.

The ESG is shown to follow from Economy together with a condition on parallelism in ellipsis construction. The condition on parallelism, which is independently needed (and in fact assumed) by any theory of ellipsis, requires identity in the structure of elided material and its antecedent. From this condition it follows that a quantifier in an antecedent VP undergoes QR over the subject, if and only if the same QR applies in the elided VP.

Suppose that QR is restricted by economy considerations, and that the reference set for these considerations includes only derivations which end up semantically equivalent. It follows that a quantifier makes the shortest movement needed for a given interpretation; longer movements are always “ambiguity driven”. Restricting attention to the sentence including the elided VP in an ellipsis construction, QR over the subject will be allowed only if this instance of QR will provide an interpretation unavailable with a shorter movement. If QR doesn’t have semantic effects in the sentences including the elided VP, it is not licensed. Given the constraint on parallelism QR over the subject is not licensed in the sentence including the antecedent VP. The ESG thus follows.

Consider the fact (originally noted by Sag (1976) and Williams (1977)) exemplified in (1). The standard scopal ambiguity in a sentence like *some boy admired every teacher* disappears when the sentence is the first conjunct of a VP ellipsis construction like (1). For (1) to be true, there must be a single boy that admires all of the teachers, whereas when the first conjunct appears on its own the boys can vary with respect to the teachers.

- (1) Some boy admires every teacher and Mary does too. (unambiguous)

A family of accounts has been suggested for this fact, all basically following Sag (1976) and Williams (1977) (cf. May (1985)). These accounts are based on theories of

reconstruction (for elided material) whereby moving the object over the subject in (1) yields a VP that cannot be reconstructed. If these accounts are right, ambiguities should always disappear in VP ellipsis constructions. Hirschbühler (1982) showed that this consequence is false. Despite ellipsis, the sentences in (2) allow the object to have wide scope with respect to the subject.

- (2) a. A Canadian flag is in front of every building and an American flag is too.  
 b. One guard is standing in front of every building and one policeman is too.  
 b. Some boy admires every teacher and some girl does too.

As noted by Hirschbühler, the sentences in (2) cannot be analyzed as involving across-the-board-scope, an analysis that, under a certain set of assumptions, could perhaps salvage the original approach to (1).<sup>1</sup> This is demonstrated by the sentences in (3). (3a) can be true when there is no building which has both an American and a Canadian flag on it, as long as there are two sufficiently big subsets of buildings (one with a Canadian flag on each of its members and one with an American flag). For this truth to hold, the LF of (3a) must be something like (3'a<sub>1</sub>) and not like (3'a<sub>2</sub>). The same can be shown for (3b) though it requires considering a more complicated situation. (See Hirschbühler (1982).)

- (3) a. A Canadian flag is in front of many buildings and an American flag is too.  
 b. A Canadian flag is in front of most buildings and an American flag is too.
- (3') a<sub>1</sub>. many buildings<sub>1</sub> [a Canadian flag is [VP in front of t<sub>1</sub>]] and  
 many buildings<sub>2</sub> [an American flag is [VP in front of t<sub>2</sub>]].  
 a<sub>2</sub>. \* many buildings<sub>1</sub> [[a Canadian flag is [VP in front of t<sub>1</sub>]] and  
 [an American flag is [VP in front of t<sub>1</sub>]].

We therefore confront a puzzle: what is the difference between (1) and (2)? Why can't (1) have wide scope for the object quantifier while (2) can? In other words, why is (1') an impossible LF for (1) and (2') a possible LF for (2)?

- (1') \*every teacher<sub>1</sub> [some boy admires t<sub>1</sub>] and  
 every teacher<sub>2</sub> [Mary admires t<sub>2</sub>].
- (2') every teacher<sub>1</sub> [some boy admires t<sub>1</sub>] and  
 every teacher<sub>2</sub> [some girl admires t<sub>2</sub>].

Previous attempts to deal with this puzzle (e.g. Diesing (1992) and Cormack (1984)) assumed that the relevant difference between (1) and (2) has to do with the syntactic properties of the subject of the second conjunct. In (1) the subject of the second conjunct is a referring expression. In (2), by contrast, the subject is a quantifier.

However, this assumption is wrong. Although the relevant difference does concern properties of the second conjunct, it has nothing to do with the syntactic properties of the subject. Rather, as we shall see, it relates to a semantic property of the conjunct as a whole. I will argue that the crucial difference concerns the fact that in (1) the second conjunct *Mary admires every teacher* does not display any semantically relevant scope ambiguity, whereas its counterpart in (2) *some girl admires every teacher* does. In other words, the truth conditions of *Mary admires every teacher* are the same whether *Mary* has wide scope with respect to *every teacher* or vice versa. In contrast, the

<sup>1</sup> For this precise reason the observation was problematic for the analysis proposed by Hirschbühler. Hirschbühler left this observation as an unsolved problem for his analysis.

two possible scopal relations yield different truth conditions for *some girl admires every teacher*.

To see that this is the relevant difference between (1) and (2), consider the paradigm in (4-10). This paradigm is constructed by varying minimally the semantic properties of the second conjunct. Scopal ambiguity is once more possible in the first conjunct only when a similar ambiguity is possible in the second conjunct. In the (a) sentences in (4-5) the first conjunct is unambiguous, because the second conjuncts (*the organizer of the film festival admires every movie* (4a) or *the principal knows the capital of every country* (5a) have the same meaning under both scopal relations. The second conjuncts of the (b) sentences, by contrast, have different truth conditions under the two scopal relations. To see this, consider the second conjunct of (4b). Under one scopal relation (subject wide scope) the sentence can be true only if there is a single director that admires all of the movies. Under the other scopal relation (object wide scope) the directors can vary with respect to the movies.<sup>2</sup> Because of the ambiguity of the second conjunct, the first conjunct can be ambiguous as well.<sup>3</sup>

- (4) a. One of the film reviewers admires every movie and the organizer of the film festival did too. (unambiguous)  
 b. One of the film reviewers admires every movie and the director/the audience did too. (ambiguous)
- (5) a. One student (in the school) knows the capital of every country and the principal (of the school) does too. (unambiguous)  
 b. One student knows the capital of every country and the prime minister (of that country) does too. (ambiguous)

One might argue that there is a syntactic difference between the subjects of the second conjuncts in the (a) and the (b) sentences in (4-5). However, this is the wrong way to go. To see this consider (6). In (6) the subject of the second conjunct is a bona fide quantifier. Nonetheless, contrary to Diesing and to Cormack, the first conjunct is unambiguous. The reason for the lack of ambiguity is that the second conjunct *every girl admires every teacher* doesn't show a parallel ambiguity.<sup>4</sup> (The relative scope of two universal quantifiers doesn't affect truth conditions.)

- (6) Some boy admires every teacher and every girl does too. (unambiguous)

Now consider (7-8).

- (7) a. One of the film critics admired every movie and everyone in the film festival did too. (unambiguous)  
 b. One of the film critics admired every movie and everyone in the audience did too. (ambiguous)

<sup>2</sup> I will not go into the syntax and semantic of the definite description in (4b) and (5b) that allows for this reading. It is probably the case that the nominal predicates *director* and *prime minister* contain a variable that can be determined by context. For some discussion see Partee (1989).

<sup>3</sup> The status of (4b) and (5b) raise some interesting questions regarding the interaction of grammar and world-knowledge. Unfortunately, space limits don't allow me to go into these questions. For discussion see Fox (in progress).

<sup>4</sup> I thank Kyle Johnson for suggesting this line of research.

- (8) a. One student (in the school) knows the capital of every country and every teacher (in the school) does too. (unambiguous)  
 b. One student knows the capital of every country and every minister (in that country) does too. (ambiguous)

The (a) sentences in (7-8) are just like (6) in that the second conjuncts involve two universal quantifiers, and are thus not semantically ambiguous. The second conjuncts of the (b) sentences involve two universal quantifiers as well. However, in these cases wide scope for the object allows the domain of quantification of the subject universal quantifier to be determined by the elements that the object quantifies over. In other words, in (7b) wide scope for the object allows the audiences to vary with respect to the movies.<sup>5</sup> Similarly, in (8b) wide scope for the object allows the ministers to vary with respect to the countries. In both (7b) and (8b), there are semantic consequences to object wide scope in the second conjunct, and, thus, object wide scope is possible in the first conjunct as well.

The sentences in (9-10) differ minimally from (5) and from the (a) sentences in (7-8). The difference is that the semantic properties of the subject quantifier in the second conjuncts in (9-10) make the truth conditions different under the two different scopal relations. Thus in the (a) sentences the fact that we inserted the modifier *almost* into the second conjunct's subject allows for scopal ambiguity within this conjunct. When, for example, the subject in (9a) has wide scope, the sentence can be true only if there is a set of people in the film festival that is sufficient in cardinality to be considered 'almost everyone', and that each member of this set admires all of the movies. However, when the object of (9a) has wide scope, the sentence can be true also when the set of admiring people varies with respect to the movies. In other words, the sentence can be true even when there is no single sufficiently large set of people that admires all of the movies. All that is required is that for each movie there would be a sufficiently large set of admirers. The second conjunct is thus semantically ambiguous and therefore allows for the first conjunct to be ambiguous as well. The other sentences in (9-10) are parallel to (9a) and again the first conjunct can be ambiguous.

- (9) a. One of the film critics admired every movie and almost everyone in the film festival did too. (ambiguous)  
 b. One of the film critics admired every movie and most visitors to the film festival did too. (ambiguous)
- (10) a. One student (in the school) knows the capital of every country and almost every teacher (in the school) does too. (ambiguous)  
 b. One student knows the capital of every country and most/many teachers do too. (ambiguous)

To summarize, (4-10) demonstrate that the first conjunct of a VP ellipsis construction can show a scopal ambiguity only if the second conjunct can show a parallel ambiguity. To make this point clear, I list the second conjuncts that disambiguate the first conjunct in (A) and those that do not in (B). The difference is that in (A) wide scope for the object does not affect truth conditions, while in (B) it does.

- (A) a. Mary likes every teacher. (unambiguous)  
 b. The organizer of the film festival praised every movie. (unambiguous)  
 c. Everyone in the film festival enjoyed every movie. (unambiguous)

<sup>5</sup> In the (b) sentences of (7-8), just like in the (b) sentences of (4-5), there is probably a variable within the nominal predicate. (See note 2).

- (B) a. Some girl likes every teacher. (ambiguous)  
 b. The audience/the director admires every movie. (ambiguous)  
 c. Everyone in the audience admires every movie. (ambiguous)  
 d. Almost everyone in the film fest. admires every movie (ambiguous)  
 e. Most visitors to the film festival admires every movie (ambiguous)  
 f. An American flag is in front of many buildings. (ambiguous)

(4-10) demonstrate the correctness of the ESG which is repeated in (11).

- (11) **Ellipsis Scope Generalization (ESG):** The relative scope of two quantifiers, one of which is in an antecedent VP of an ellipsis construction, may differ from the surface c-command relation, only if the parallel difference will have semantic effects in the elided VP.

What are the principles from which the ESG follows? The ESG seems to have two parts. One part follows from a well known constraint which requires parallelism between elided/reconstructed material and its antecedent. (See, among many others, Tancredi (1992) and Fiengo and May (1994).) The other part follows from the principle of Economy to which I alluded at the start of this paper. The two principles interact in the following way to yield the ESG. From Economy it follows that the object can move by QR over the subject only if the movement yields an interpretation which would be unavailable otherwise. From parallelism it follows that the object moves by QR over the subject in one of the conjuncts, if and only if a parallel instance of QR applies in the other conjunct.<sup>6</sup> The ESG is derived from these two principles in the following way. If the second conjunct is ambiguous, Economy is not at stake, and the first conjunct can have both scopal interpretations as long as parallelism is maintained. If, on the other hand, the second conjunct is not ambiguous, then

- (a) Economy doesn't allow long QR in the second conjunct. Therefore,  
 (b) parallelism doesn't allow long QR in the first conjunct. And consequently,  
 (c) the first conjunct cannot be ambiguous.<sup>7</sup>

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<sup>6</sup> There are many ways to define parallelism such that parallel scopal relations would be required in the two conjuncts. (One possibility is to use the notion of I-identity defined by Fiengo and May (1994).) What is clear is that the requirement of parallel scopal relations is necessary in every theory of ellipsis. That this is the case, can be seen independently of the issue of disambiguation in ellipsis. In (i) and (ii), for example, (where the second conjunct does not disambiguate the first one) there must still be parallelism in scope. Thus, one of the conjuncts of (i) and (ii) allows the boys to vary with respect to the teachers iff the other conjunct does too.

- (i) I introduced one of the boys to every teacher and Bill did too.  
 (ii) One of the boys was introduced to every teacher and one of the girls was too.

<sup>7</sup> This analysis crucially assumes that QR in one conjunct can never be licensed in order to allow an interpretation of the other conjunct which would otherwise be impossible. The basic idea is that the reference set for Economy is based on the interpretation of clauses and not of bigger constituents. (As noted by Alec Marantz (p.c.), the idea that Economy is limited with respect to the size of the constituents it looks at is needed in Chomsky (1994) as well.) Interesting evidence for this idea in the context of scope comes from the interaction of the LF cycle (Bures (1993), Bobaljik and Jonas (to appear) and Tsai (1994), among others) and the considerations of economy I propose. (cf. Fox (in progress) where the idea is defended and formalized.) An alternative approach would be to claim that the Parallelism requirement is operative outside the computational system (Chomsky, Class lecture (Fall (1994))). If this is the case, it is conceivable that the reference set includes also derivations that do not obey parallelism. These derivations are ruled out at later levels in which parallelism is operative. Suppose that only one of the conjuncts is ambiguous and that the reference set is constructed with the designated interpretation of wide scope for the object in that conjunct. In such a case the most economical derivation would be the non-parallel one.

Let us illustrate how Economy and parallelism interact to explain the ESG by a look at the way they affect (1) and (2). Consider first (2) and its four conceivable LFs in (12). Since the two conjuncts are ambiguous, Economy allows QR in both. Parallelism rules out non-parallel QR; thus (c) and (d) are ill-formed.

- (12) a. some boy<sub>1</sub> [every teacher<sub>2</sub> [t<sub>1</sub> admires t<sub>2</sub>]] and  
           some girl<sub>1</sub> [every teacher<sub>2</sub> [t<sub>1</sub> admires t<sub>2</sub>]]<sup>8</sup>  
 b. every teacher<sub>2</sub> [some boy<sub>1</sub> [t<sub>1</sub> admires t<sub>2</sub>]] and  
       every teacher<sub>2</sub> [some girl<sub>1</sub> [t<sub>1</sub> admires t<sub>2</sub>]]  
 c.\* some boy<sub>1</sub> [every teacher<sub>2</sub> [t<sub>1</sub> admires t<sub>2</sub>]] and  
       every teacher<sub>2</sub> [some girl<sub>1</sub> [t<sub>1</sub> admires t<sub>2</sub>]]  
 d.\* every teacher<sub>2</sub> [some boy<sub>1</sub> [t<sub>1</sub> admires t<sub>2</sub>]] and  
       some girl<sub>1</sub> [every teacher<sub>2</sub> [t<sub>1</sub> admires t<sub>2</sub>]]

Consider now (1) and its four potential LFs in (13). Parallelism rules out the non-parallel scopal relations (c,d) just as in (12). Economy now takes over and disallows QR of the object over the subject in the second (unambiguous) conjunct, thus ruling out (13b).

- (13) a. some boy<sub>1</sub> [every teacher<sub>2</sub> [t<sub>1</sub> admires t<sub>2</sub>]] and  
           Mary<sub>1</sub> [every teacher<sub>2</sub> [t<sub>1</sub> admires t<sub>2</sub>]]  
 b.\* every teacher<sub>2</sub> [some boy<sub>1</sub> [t<sub>1</sub> admires t<sub>2</sub>]] and  
       every teacher<sub>2</sub> [Mary<sub>1</sub> [t<sub>1</sub> admires t<sub>2</sub>]]  
 c.\* some boy<sub>1</sub> [every teacher<sub>2</sub> [t<sub>1</sub> admires t<sub>2</sub>]] and  
       every teacher<sub>2</sub> [Mary<sub>1</sub> [t<sub>1</sub> admires t<sub>2</sub>]]  
 d.\* every teacher<sub>2</sub> [some boy<sub>1</sub> [t<sub>1</sub> admires t<sub>2</sub>]] and  
       Mary<sub>1</sub> [every teacher<sub>2</sub> [t<sub>1</sub> admires t<sub>2</sub>]]

The ESG provides strong evidence that QR is restricted by the particular consideration of Economy outlined in the beginning of this paper. The evidence is strong because parallelism is needed independently of the ESG and because Economy is exactly what is needed to fill in the gap between the results of parallelism and an account of the ESG (i.e. the ruling out of LFs such as (13b)).

Before I go on to demonstrate that quantifier lowering (or reconstruction) is restricted by the same economy principle, let me show how other cases of VP ellipsis further support the thesis that QR is restricted by Economy. Consider (14a), which involves movement of material from the VP followed by VP ellipsis. As we see from (14a) there is ambiguity in the first conjunct when there is ambiguity in the second conjunct. (14a) further demonstrates that there must be parallelism between the two conjuncts with respect to the relative scope of the two quantifiers. If (14a) allows the boys to vary with respect to the professors it must also allow the girls to vary with respect to the parents. Similarly, if variance is disallowed for the boys it is disallowed for the girls. Consider now (14b) and (14c). In both cases the subject must have wide scope over the object. The reason should by now be clear. In both sentences the second conjunct is unambiguous (*a girl was introduced to Jane* in (14b) and *a girl was introduced to some parent* in (14c)). Thus, according to (8), the first conjunct cannot be ambiguous as well. These examples are important because they show decisively that the relevant difference

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Given Economy, the only way to get object-wide-scope would be by a non-parallel derivation. This derivation would then be ruled out by Parallelism, thus deriving the ESG.

<sup>8</sup> In the LFs I suggest, I assume that a quantifier must be above VP at LF. Assuming the VP internal subject hypothesis and a semantic theory whereby a quantifier is a second order predicate (type  $\langle\langle e,t\rangle,t\rangle$ ), this is the lowest position where a quantifier can be interpreted. However, the claims made in this paper will not be affected if one assumes that quantifiers can remain in-situ and move only when they have wide scope with respect to a SS c-commanding quantifier. I thank Tanya Reinhart for pointing this out to me.

between (1) and (2) cannot be traced to properties of the subject of the second conjunct. All of the sentences in (14) have the same subject and yet some group with (1) and some with (2).

- (14) a. A boy was introduced to every professor and a girl was to every parent.  
(ambiguous)
- b. A boy was introduced to every professor and a girl was to Jane.  
(unambiguous)
- c. A boy was introduced to every professor and a girl was to some parent.  
(unambiguous)

Next consider the sentences in (15). Both sentences are ambiguous with respect to the relative scope of the object quantifier and of negation. To illustrate with (15a), the meaning could be either that it is not the case that there are more than three languages that I speak or, alternatively, that there are more than three languages that I do not speak. Although both sentences are ambiguous, there is a difference between them which has to do with our knowledge of the world, and which helps us in conducting an important experiment. The sentence in (15a) is true no matter what the relative scope of the object and of negation is. The sentence in (15b), by contrast, is true only if the object has wide scope over negation. We can thus examine the truth value of (15b) in ellipsis constructions and know which of its readings are available.

- (15) a. I don't speak more than 3 languages. (True)
- b. Ken Hale doesn't speak more than 3 languages. (True or False)

Compare the two sentences in (16). While (16a) is true, (16b) must be false. This indicates that the first conjunct must be interpreted with the object having narrow scope with respect to negation. Why should this be the case? Again, Economy and parallelism provide the answer: The second conjunct is unambiguous. For this reason Economy blocks QR to a position over NegP in the second conjunct, and parallelism blocks QR over NegP in the first conjunct. In (16c), where both conjuncts are ambiguous, QR over NegP is possible in both conjuncts and thus the sentence could be either true or false.<sup>9,10</sup> (I assume Tom to be more or less like Ken Hale.)

- (16) a. I don't speak more than 3 languages and Tom does. (True)
- b. Ken Hale doesn't speak more than 3 languages and Tom does.  
(False)
- c. Ken Hale doesn't speak more than 3 languages and Tom also doesn't  
(True or False)

<sup>9</sup> I thank Noam Chomsky for suggesting that I test the ESG in the context of the relative scope of negation and object quantifiers. As he pointed out to me, the fact in (16) eliminates certain imaginable alternatives for the explanation of the facts in (1-15). See Fox (in progress) for some discussion.

<sup>10</sup> Recent attempts to eliminate QR assume that all scopal ambiguities are achieved by Quantifier reconstruction. Given a checking theory of case, objects move out of the VP independently of scope. Thus narrow scope for the subject can be achieved by reconstruction. (c.f. Hornstein (1994), Pica and Snyder (1994) and Kitahara (1994)). The facts in (1-14) could be explained under these approaches with the assumption that quantifier reconstruction is restricted by economy consideration, an assumption that, as we will see shortly, is needed on independent grounds. However, the fact in (16) can be explained only on the assumption that QR exists and is restricted by Economy. Further, at this point I see many problems with eliminating QR via a checking theory of case. One obvious problem is that this requires the stipulation that all PPs move to a case position. Further, it is not clear how (even independently of (16)) it can account for the scopal ambiguity that arises from the interactions of object quantifiers and heads such as modals, negation and attitude verbs. Yet another problem is that it cannot deal with certain cases in which QR is not clause bound. (For a few more arguments against the elimination of QR, see Fox (in progress).)

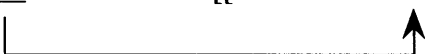
## 2. Economy and Quantifier Reconstruction

In the previous section we have seen evidence that Quantifier Raising is restricted by Economy considerations and is allowed only when it yields an interpretation which would be unavailable otherwise. In this section we will see the same for Quantifier Lowering.

**2.1. VP Ellipsis:** Consider the sentence in (17). This sentence is ambiguous with respect to the relative scope of the subject quantifier and of the attitude verb *seems*. If the subject quantifier has wide scope, the sentence can be true only if Bill has some American runner in mind, and only if it seems to Bill that that particular American runner won a gold medal. If the attitude verb has wide scope the sentence merely requires that Bill have the belief that some American runner or other won a gold medal. Bill need not have any particular American runner in mind. The sentence would be true in a situation in which Bill sits in the Olympic cafeteria hearing the American anthem and concludes that an American runner won the medal.

(17) An American runner seems to Bill to have won a gold medal.

The two readings of the sentence in (17) are the result of the two positions in which the subject can be interpreted. If the subject is interpreted in its SS position, it has wide scope with respect to the attitude verb. However, if it is reconstructed to its trace position at LF, the attitude verb has wide scope. (See among others May (1985) and Diesing (1992).)<sup>11</sup> The two LFs for (17) are thus represented in (18).

- (18) a. An American runner<sub>1</sub> seems to Bill [t<sub>1</sub> to have won a gold medal].  
 b. \_\_ seems to Bill [[An American runner] to have won a gold medal].
- 

Consider now what happens if we embed (17) in a VP ellipsis construction such as (19). (19) is ambiguous, just as (17) is. However, since parallelism must be maintained, the relative scope of the subject and the attitude verb must be the same in the two conjuncts. Bill could know the identity of the Russian and the American runner, or alternatively he could be sitting in the cafeteria hearing the consecutive playing of the two anthems. What is important, however, is that if Bill is required to know the identity of the American runner, he must also know the identity of his Russian colleague and vice versa. (20a,b) are possible LFs for (19) while (20c,d) are impossible.

(19) An American runner seems to Bill to have won a gold medal and a Russian athlete does too. (ambiguous, with parallelism)

- (20) a. An American runner<sub>1</sub> seems to Bill [t<sub>1</sub> to have won a gold medal] and a Russian athlete<sub>1</sub> seems to Bill [t<sub>1</sub> to have won a gold medal].  
 b. \_\_seems to Bill [[An American runner] to have won a gold medal] and \_\_seems to Bill [[a Russian athlete] to have won a gold medal].  
 c. \* An American runner<sub>1</sub> seems to Bill [t<sub>1</sub> to have won a gold medal] and \_\_seems to Bill [[a Russian athlete] to have won a gold medal].

<sup>11</sup> In this paper I remain agnostic as to whether the reconstructed interpretation is achieved via lowering, as suggested in May (1985), or by the LF interpretation of a copy, in the spirit of Chomsky (1993). (c.f. Hornstein (1994) as well as Pica and Snyder (1994).)

- (20) d. \* \_\_seems to Bill [[An American runner] to have won a gold medal] and a Russian athlete<sub>1</sub> seems to Bill [t<sub>1</sub> to have won a gold medal].

Consider now (21). (21), contrary to (19), is not ambiguous. For the sentence to be true, Bill must know the identity of the American runner.

- (21) a. An American runner seems to Bill to have won a gold medal and Sergey does too. (unambiguous)

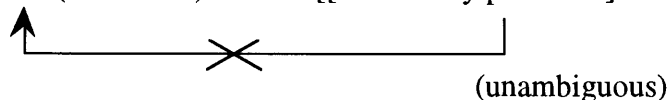
This follows naturally from the assumption that quantifier reconstruction is restricted by Economy considerations. If quantifier reconstruction, just like quantifier raising, is a costly operation, it can apply in a structure only if it has semantic consequences. Since in a sentence such as (22) the meaning remains the same whether or not quantifier reconstruction takes place, quantifier reconstruction is impossible. For the same reason quantifier reconstruction cannot apply to the second conjunct in (21), and because of parallelism it cannot apply to the first conjunct. (23c,d) are ruled-out by parallelism and (23b) is ruled out by Economy.

- (22) Sergey seems to Bill to have won a gold medal.

- (23) a. An American runner<sub>1</sub> seems to Bill [t<sub>1</sub> to have won a gold medal] and Sergey<sub>1</sub> seems to Bill [t<sub>1</sub> to have won a gold medal].
- b. \* \_\_seems to Bill [[An American runner] to have won a gold medal] and \_\_seems to Bill [[Sergey] to have won a gold medal].
- c. \*An American runner<sub>1</sub> seems to Bill [t<sub>1</sub> to have won a gold medal] and \_\_seems to Bill [[a Russian athlete] to have won a gold medal].
- d. \* \_\_seems to Bill [[An American runner] to have won a gold medal] and Sergey<sub>1</sub> seems to Bill [t<sub>1</sub> to have won a gold medal].

**2.2. Co-ordinate structures:** May (1985) and Ruys (1993) (among others) have argued that QR obeys the co-ordinate structure constraint. One of the arguments is based on the observation that an object quantifier within a co-ordinated VP cannot have scope over the subject. Thus, the quantifier scope ambiguity in (24a) disappears in (24b).

- (24) a. A different student likes every professor.  
b. A (#different) student [[likes every professor] and [hates the dean]]



This observation supports the claim that QR obeys the co-ordinate structure constraint, and, thereby supports the claim that QR is a syntactic movement.<sup>12</sup> However, when we consider quantifier reconstruction and VP internal subjects, there is a gap in the

<sup>12</sup> Further support for the claim was offered by Ruys' observation that Quantifiers behave like in-situ WH-operators. Thus in-situ WH operators, just like quantifiers, are incapable of raising outside of a co-ordinated VP:

- (i) \*What student likes what professor and hates Mary

For more on this topic, see Ruys (1993) and Fox (in progress).

explanation of (24). We understand why in (24b) the object can't raise by QR over the subject, but we don't understand why the subject can't reconstruct under the object.

In order to deal with this one might want to seek a principle that in general blocks the subject in co-ordinate structures from re-constructing to its VP internal position. Example (25), however, shows this to be a wrong strategy. In (25), although the object quantifier is within a co-ordinated VP, it can have scope over the VP external subject. Assuming that QR obeys the coordinate structure constraint, the subject must be reconstructed under the object. Further, we can see directly from the interpretation of (25) that it is the subject that reconstructs under the object and not the object that QRs over the subject. To see this, we must first observe that in order for the subject to have narrow scope with respect to the object of one of the VPs, it must have narrow scope with respect to the other object as well. Putting aside the co-ordinate structure constraint, there are two principled ways for the subject to have narrow scope with respect to both objects. One would be by moving both objects over the subject as in (26a) and the other would be by a combination of VP-level QR in both conjuncts and a reconstruction of the subject across-the-board (ATB) to the two VP internal subject positions, as in (26b).<sup>13</sup>

- (25) A guard is standing in front of every church and sitting at the side of every mosque.
- (26) a. every mosque<sub>1</sub> every church<sub>2</sub> [A guard is [standing in front of t<sub>2</sub>] and [sitting at the side of t<sub>1</sub>]]
- b. \_\_\_ is [VP every church<sub>1</sub> [VP [a guard] standing in front of t<sub>1</sub>]] and [VP every mosque<sub>1</sub> [VP [a guard] standing at the side of t<sub>1</sub>]]
- 

There is an obvious difference in the interpretation of the LFs in (26a) and in (26b). For the LF in (26a) to be true, each pair of a mosque and a church must have a single guard standing both in front of the church and in front of the mosque. For the LF in (26b) to be true, the guards can vary independently with respect to the churches and the mosques. (26b) is an LF equivalent to the one achieved by independent wide scope for the object in the two conjuncts of (27).

- (27) A guard is standing in front of every church and a guard is sitting at the side of every mosque.

Now, it is clear that the interpretation of (25) is that of (26b) and not that of (26a). We must conclude that the LF of (25) is achieved by ATB reconstruction and not by QR in both conjuncts. So (25) doesn't raise any problem for the claim that QR obeys the coordinate structure constraint. However, we want an explanation for the difference between (24) and (25). Why is ATB reconstruction allowed in (25) and not in (24)?

Economy offers an answer. But before demonstrating that this is the case, I must go over a feature that is common to most, if not all, explanations of the co-ordinate structure constraint. The feature I have in mind is the claim that each conjunct in a co-ordinate structure forms an independent structure with the material that is above it.<sup>14</sup>

<sup>13</sup> A possible alternative to VP level QR could be LF object movement for case.

<sup>14</sup> This claim is seen most clearly in recent theories that assume that the two conjuncts in a coordinate structure belong to two different planes and that these two different planes share (under certain

Given the existence of two independent structures, it follows that all grammatical constraints must be obeyed independently in the two structures. Thus if an element is extracted from one conjunct without being extracted from the other, one of the structures will include an extracted element without a trace (this is shown in (28)). In other words, one of the structures will have vacuous quantification, or violate some other aspect of Full Interpretation. It follows that extraction can take place only across-the board (as in (29)).

- (28) \*Who do you think [[Mary likes t] and [Bill hates Sue]]  
 The two structures:  
 1. Who do you think Mary likes t  
 2. Who do you think Mary hates Sue (vacuous quantification)
- (29) Who do you think that [[Mary likes t] and [Bill hates t]]  
 The two structures:  
 1. Who do you think Mary likes t  
 2. Who do you think Bill hates t

Now let us return to reconstruction. First notice that from the existence of two independent structures as in (28) and (29) it follows that only ATB reconstruction is possible. To see this consider (26b). If reconstruction took place only in one of the conjuncts, the trace in the other conjunct will not have an antecedent.

If all grammatical constraints must be satisfied independently in the two structures, Economy considerations should be no exception. Consider the point in the derivation of (26) at which the object has already undergone QR to the pre VP position, but the subject has not yet undergone ATB reconstruction. The structure at this point is presented in (30). To determine whether reconstruction is allowed in both conjuncts we must first ask whether it would yield a distinct interpretation in the two conjuncts. Since Economy, like any other grammatical constraint, is checked independently in the two structures, reconstruction must yield a distinct interpretation in each conjunct. As we see in (30), both structures involve an interaction between an existential and a universal quantifier such that reconstruction alters the scope relation. As we know, altering the scope relation of a universal and existential quantifier has semantic effects. Thus, reconstruction is allowed in both structures.

- (30) a guard<sub>2</sub> is      [VP every church<sub>1</sub>      [VP t<sub>2</sub> standing in front of t<sub>1</sub>]] and  
    [VP every mosque<sub>1</sub>      [VP t<sub>2</sub> standing at the side of t<sub>1</sub>]]
- The two structures:  
 1. a guard<sub>2</sub> is      [VP every church<sub>1</sub>      [VP t<sub>2</sub> standing in front of t<sub>1</sub>]]  
 2. a guard<sub>2</sub> is      [VP every mosque<sub>1</sub>      [VP t<sub>2</sub> standing at the side of t<sub>1</sub>]]

In (24), by contrast, reconstructing the subject into the second conjunct will not yield a distinct interpretation within the second structure and is thus ruled out. Consider now the minimal pair in (31).

- (31) a. A guard is standing in front of every church and sitting at the side of every mosque.  
 b. # A guard is standing in front of every church and sitting at the side of this mosque.

---

circumstances) the structure that dominates or-c-commands the co-ordinate structures (Goodall (1987), Muadz (1991), Moltmann (1992), among others).

In (31a) (a repetition of (25)) ATB reconstruction is licensed in both structures in (30) and results in (26). In (31b), by contrast, reconstruction into the second conjunct is not allowed. Therefore, since the coordinate structure constraint doesn't allow the object to undergo QR, the subject cannot have narrow scope relative to the object. Consequently the sentence is semantically anomalous (since our knowledge of the world does not allow a single guard to be standing in front of every church).<sup>15</sup>

**2.3. A-Reconstruction and Diesing's Mapping Hypothesis:** I have argued that reconstruction is allowed only if it yields a semantically distinct pattern of scope relationships. If this conclusion is right, it allows us to re-examine certain aspects of Diesing's well known Mapping Hypothesis, in which reconstruction plays a major role.

If we assume a Heim/Kamp type analysis of quantification, involving tripartite structures, a bare plural can receive an existential interpretation only when it is within the nuclear scope (the domain of existential closure). Under Diesing's Mapping Hypothesis, the VP constitutes the nuclear scope. Thus, bare plurals receive an existential interpretation when and only when they are within VP at LF. With this in mind, consider Diesing's explanation of the contrast in the interpretation of (32a) and (32b). Diesing assumes that subjects of stage level predicates differ from those of individual level predicates in that only the latter have the option of reconstructing to spec VP at LF. Given this assumption, it follows that in (32a) the subject can optionally reconstruct to spec VP and receive an existential interpretation. In (32b), by contrast, the subject cannot reconstruct and is mapped to the restrictive clause where it receives a default generic interpretation.

- |      |                             |                           |
|------|-----------------------------|---------------------------|
| (32) | a. Firemen are available.   | (Existential, or Generic) |
|      | b. Firemen are intelligent. | (Only Generic)            |

Why can't the subjects of individual level predicates reconstruct to Spec of VP? Diesing's explanation is based on the suggestion that subjects of individual level predicates are assigned a thematic role by INFL and are associated with a PRO in spec VP. In this subsection, I will suggest a possible alternative.

In particular, it can be argued that Economy considerations allow reconstruction in (32a), but disallow reconstruction in (32b). Suppose we accept the standard assumption according to which stage level predicates differ from individual level predicates in involving an existential quantifier over stages, events or location arguments. Suppose further that this existential quantifier is located between the surface and base position of

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<sup>15</sup> This explanation predicts the following paradigm:

- |       |             |   |
|-------|-------------|---|
| (i)   | A guard is  | standing in front of every church and sitting at the side of every mosque.        |
| (ii)  | A guard is  | standing in front of every church and sitting at the side of almost every mosque. |
| (iii) | A guard is  | standing in front of every church and sitting at the side of most of the mosques. |
| (iv)  | A guard is  | standing in front of every church and sitting at the side of two of the mosques.  |
| (v)   | #A guard is | standing in front of every church and sitting at the side of one of the mosques.  |
| (vi)  | #A guard is | standing in front of every church and sitting at the side of this mosque.         |

Checking (i-vi) I found that all speakers accept (i) and reject (vi). With respect to (ii-v) I found some variation. About half the speakers I checked displayed judgments in accord with my predictions.

the subject (i.e. between spec of IP and spec of VP), perhaps in a Tense projection. In a sentence involving a stage level predicate, such as (32a), the plural subject will be allowed to reconstruct in order to have narrow scope with respect to the existential quantifier in the Tense projection (TP).<sup>16</sup> In a sentence involving an individual level predicate, there is no quantificational element in TP, and reconstruction is disallowed.<sup>17</sup>

This explanation makes a very surprising prediction: individual level predicates should be allowed to reconstruct if some other quantificational element intervenes between them and their surface subject position. Consider an individual level predicate that takes two arguments. Suppose the subject is a bare plural and that the additional argument is a universal quantifier. The universal quantifier will have to adjoin to VP for interpretation. Assume that movement from the VP adjoined position to a position above the subject is not cheaper than reconstruction of the subject to SPEC VP. It follows that the subject will be allowed to reconstruct to SPEC VP and get an existential interpretation. This prediction is right. The (a) sentences in (33-35) do not get an existential interpretation, because the subject can't reconstruct to SPEC VP. In the (b) sentences, however, the subject is allowed to reconstruct in order to have narrow scope with respect to the universal quantifier. The subjects of the (b) sentence can, thus, get an existential interpretation in addition to the generic one. Interestingly, as predicted, this existential interpretation is possible only when the subject has narrow scope with respect to the second argument.

- (33) a. MIT professors know about biology. (False)  
 b. MIT professors know about every field of science. (perhaps True)
- (34) a. MIT students know Chinese. (False)  
 b. MIT students know almost every foreign language. (perhaps True)
- (35) a. MIT professors practice Judaism. (False)  
 b. MIT professors practice almost every form of Judaism. (perhaps True)

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<sup>16</sup> Note that the relative scope of a plural NP and an existential quantifier affect truth conditions. Thus, reconstruction should be allowed.

<sup>17</sup> If this explanation is right, it will follow that not all questions of meaning are relevant for the construction of the "reference set". If all questions of meaning were relevant it would follow that a subject of an individual level predicate should be allowed to reconstruct to SPEC VP in order to get an existential interpretation. What I assume tentatively is that the only aspects of interpretation which are visible to the computational system, which constructs the reference set, are formal aspects of the interpretation of syntactic scope. Semantic information that comes from later performance systems, such as the one that is responsible for the mapping of LFs to tripartite structures, are invisible to the computational system.

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Department of Linguistics and Philosophy  
 20D-219  
 MIT  
 Cambridge, MA 02139

fox@mit.edu

