On the Relative Scope of Quantifiers and INFL Movement

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0. Introduction

Various papers have been written concerning the quantifiers such as *every*, *some* and *all*, and the relative scope of these quantifiers is made clear at L(ogical) F(orm), as suggested in May (1985) and others. But the scope of negation and those quantifiers has received relatively little attention. The goal of this paper is to give an account for such problems. We postulate NegP as a maximal projection, and explain the scope ambiguity between negation and quantifiers.

1. The order of quantifiers and negation at SS and LF

As for the relative scope of quantifiers and negation, we may say that the orders at SS (S-structure) decide which has the wider scope.

For example :

(1) John didn't kiss a woman at the party.

(2) John didn't kiss every woman at the party.

(Hornstein (1984, 27-8))

(3) Not all of them came.

In (1) *a woman* may have narrower scope than negation, and (1) can be paraphrased as in (1′) :

(1′) There exists no woman such that John kissed her at the party.

In (2) negation may have wider scope than *every woman*, and (2) may have a partial negation reading : John kissed some, but not all the women. In the same way (3) may be read as : Some of them came, but not all. In the cases (1) to (3) negation c-commands[1] the quantifiers[2].

On the other hand, when the quantifier is in the subject position, a clear ambiguity arises :

(4) All the men didn't go.

(5) Everyone doesn't know the fact.

In (4) *all*, and in (5) *every* may or may not take scope over negation. To account for the ambiguity let us assume the Q (uantifier) R (aising) and INFL movement at LF[3], and give the LF-representation (4′) and (5′) :

(4′) $[_{C'}$ [didn't]$_1$ $[_{IP}$ all the men$_2$ $[_{IP}$ t_2 $[_{I'}$ t_1 $[_{VP}$ go]]]]]

(5′) $[_{C'}$ [doesn't]$_1$ $[_{IP}$ everyone$_2$ $[_{IP}$ t_2 $[_{I'}$ t_1 $[_{VP}$ know the fact]]]]]

Using the Scope Principle due to Aoun and Li (1989), we can account for the ambiguities of (4) and (5) :

(6) The Scope Principle

A quantifier A has a scope over a quantifier B in case

A c-commands a member of the chain containing B.

(Aoun and Li (1989, 151))

In (4′) *didn't* c-comands *all the men*, so the former may have scope over the latter. On the other hand, *all the men* c-commands t_1, the trace of *didn't*, so it may have wider scope than *didn't*. In (5′), likewise, *everyone* may or may not have scope over negation.

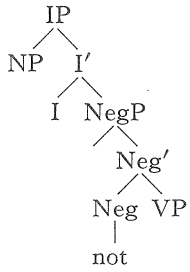
Here one may question : Is negation really generated in I^0 and moved into C^0 at LF ? That is to say, is negation generated originally in INFL ? In Imai et al. (1989) it is assumed that *not* is in VP-spec position, as in (7a), and if it is contracted as *n't* it is adjoined to INFL position (7b) :

(7) a. you [$_{I}$] [$_{VP}$ not [eat fish]]

b. you [$_{I}$ do+n't] [$_{VP}$ [$_{V'}$ eat fish]]

In this paper, following Chomsky (1988) and Pollock (1989), we assume that negation is a category which heads its own projection. The structure of a sentence is roughly as follows :

(8)



(7a) can be rewritten in the following way :

(9) [$_{IP}$ you [$_{I}$ [$_{NegP}$ not [$_{VP}$ eat fish]]]]

When *not* is contracted to *n't* and moved into INFL, in which *do*-insertion takes place, (9) is further changed into (10) :

(10) [$_{IP}$ you [$_{I}$ don't [$_{NegP}$ [$_{VP}$ eat fish]]]]

The reason for thinking that *not* is in the head position of NegP is that *not* is moved into X^0 category, INFL. It is generally assumed that X^0 elements move into another head position, so *not* is thought to be in the head position of NegP[4]. *Don't* moves into C^0 position at LF, as in (11) :

(11) [$_{C}$ don't$_1$ [$_{IP}$ you [$_{I}$ t$_1$ [$_{NegP}$ [$_{VP}$ eat fish]]]]]

2. QR and the scopal ambiguities between quantifiers

For a sentence containing multiple quantifiers, there exist two possible LF representations. Consider (12b, c), the LF representations for (12a) :

(12) a. Every student abmires some professor.

b. [$_{S'}$ [$_{S}$ every student$_2$ [$_{S}$ some professor$_3$ [$_{S}$ e$_2$ admires e$_3$]]]]

c. [$_{S'}$ [$_{S}$ some professor$_3$ [$_{S}$ every student$_2$ [$_{S}$ e$_2$ admires e$_3$]]]]

(May (1985, 33))

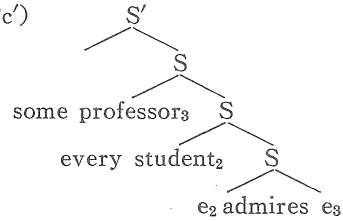
In (12b), however, e_2 is not properly governed, and that each chain, namely (*every student*$_2$, e_2) and (*some student*$_3$, e_3) overlaps[6]. So only (12c) and not (12b), can be the LF representation for (12a). However, (12a) is ambiguous depeding on which of *every* or *some* takes scope over the other. Following Aoun and Sportiche (1983), May defines *c-commands* as (13):

(13) α c-commands β = every maximal projection dominating α dominates β, and α does not dominate β.

(Maximal projections are NP, VP, AP, PP and S′)

Keeping this in mind, let us illustrate (12c) like (12c′) :

(12c′)



In (12c′), *some professor* and *every student* c-command each other, and the scopal ambiguity arises.

As for the definition of *c-command*, we adopt not (13) but that in Note 1, and we give the following LF representation for (12a) :

(14) a. [IP every student$_2$ [IP e_2 [IP some professor$_3$ [VP admires e_3]]]]

b. [IP some professor$_3$ [IP every student$_2$ [IP e_2 [VP admires e_3]]]]

In (14a) *every student* has scope over *some professor* and is paraphrased as (15a), while in (14b) *some professor* has wider scope than *every student* and (15b) is a paraphrase for (14b) :

(15) a. Every student admires non specific professor, and the professor is not necessarily the same person.

b. There exists only one, specific professor such that every student admires him (or her).

3. Quantifiers that don't occur in the scope of negation

It is argued in Lasnik (1975) that such quantifiers as *several, some* and *certain* must be outside the scope of negation. To begin with, let us consider the following examples :

(16) a. I could't solve many of the problems.

b. I couldn't solve {several / certain} of the problems.

(Lasnik (1975, 280))

In (16a) *many* may or may not be in the scope of negation. (17a, b) are the possible parahrases for (16a) :

(17) a. I could solve few of the problems. (negation>many)

b. There were many of the problems that I could't solve.

(many>negation)

(Lasnik (1975, 280))

On the other hand, *several* and *certain* have scope wider than negation. This is confirmed by the fact these quantifiers do not occur in the position where they will apparently be in the scope of negation :

(18) a. Not many of the problems were solved.

b. *Not {several / some} of the problems were solved.

(Lasnik (1975, 281))

Hornstein (1988) gives the example containing *a certain* :

(19) a. John didn't kiss a woman.

b. John didn't kiss a certain woman. (Hornstein (1988, 104))

In (19a) *a woman* must be in the scope of negation, whereas in (19b) *a certain woman* takes scope over negation. We can say that quantifiers such as *several, some, certain* and *a number of*[6] do not occur in the scope of negation. On the other hand, such quantifiers as *many, all* and *every* are those which occur in the scope of negation. In the next section we examine the scope ambiguities between quantifiers and negation.

4. Scope ambiguity between negation and quantifiers

Let us first reconsider (4) and (5), repeated here as (20), (21) :

(20) All the men didn't go.

(21) Everyone doesn't know the fact.

The SS representations for each sentence are (20′) and (21′) :

(20′) $[_{IP}$ all the men $[_{I}$ did $[_{NegP}$ not $[_{VP}$ go]]]]

(21′) $[_{IP}$ everyone $[_{I}$ does $[_{NegP}$ not $[_{VP}$ know the fact]]]]

Not is moved into INFL, and by QR and INFL movement we obtain the LF representations (4′) and (5′).

Let us next examine a more complex sentence, which contains multiple quantifiers and negation :

(22) a. Everyone doesn't love someone.

b. $[_{IP}$ everyone $[_{I}$ does $[_{NegP}$ not $[_{VP}$ love someone]]]]

As was discussed in section 3, *someone* does not enter the scope of negation, and if it has scope over *everyone*, the LF representation for (22b) after QR and INFL movement is (23) :

(23) $[_{IP}$ someone$_3$ $[_{C}$ doesn't$_2$ $[_{IP}$ everyone$_1$ $[_{IP}$ e_1 $[_{I}$ e_2 $[_{VP}$ love e_3]]]]]]

None of the chains overlap in (23), and *someone* has the widest scope. (24a, b) are the possible reading for (23) :

(24) a. There exists a specific person such that all the peaple dislike him (or her). (some>every>negation)

b. It is not the case that all the people dislike a specific person. (some>negation>every)

These different interpretations are due to the scope ambiguity between negation and *everyone*.

There exists another possible LF representation for (22b), in which *everyone* takes wider scope than *someone* :

(25) $[_{IP}$ everyone$_1$ $[_{IP}$ e_1 $[_{IP}$ someone$_2$ $[_C$ doesn't t_3 $[_I$ e_3 $[_{VP}$ love$_2$]]]]]]

In (25) none of the chain overlap. (25) indicates that everyone dislikes one person, but this person is not necessarily the same one.

Next consider (26a) :

(26) a. Someone doesn't have many books.

b. $[_{IP}$ someone$_1$ $[_{IP}$ e_1 $[_{IP}$ many books$_2$ $[_C$ doesn't t_3 $[_I$ e_3 $[_{VP}$ have e_2]]]]]]

In (26b), the LF representation for (26a), *many books* c-commands *doesn't*, and at the same time *doesn't* c-commands e_2, the trace of *many books*, so the ambiguity between *negation* and *many* arises. (27a, b) show the two readings :

(27) a. A specific person has few books. (some>negation>many)

b. There are many books that a specific person doesn't have. (some>many>negation)

In each case, *some* has wider scope than *many*.

(28) is another possible LF representation for (26a), in which *many* has scope wider than *some* :

(28) $[_{IP}$ many books$_1$ $[_{IP}$ someone$_2$ $[_{IP}$ e_2 $[_C$ doesn't$_3$ $[_I$ e_3 $[_{VP}$ have e_1]]]]]]

(28) indicates that there exist many books such that a specific person doesn't have them.

In the same way (29a) is three ways ambiguous. That is, if *some rewards* have the widest scope, they indicate specific rewards, and an ambiguity arises as to whether *all of them* or negation has wider scope than the other. On the other hand, when *all of them* has scope wider than *some rewards*, the latter dose not have a specific interpretation. (29c) is the LF representation in which *all of them* has the widest scope, and in

(29b) *some rewards* has the widest scope :

(29) a. All of them don't get some rewards.

b. $[_{IP}$ some rewards$_1$ $[_{IP}$ all of them$_2$ $[_{IP}$ e_2 $[_C$ don't t_3 $[_I$ e_3 $[_{VP}$ get $e_1]]]]]]$

c. $[_{IP}$ all of them$_1$ $[_{IP}$ e_1 $[_{IP}$ some rewards$_2$ $[_C$ don't t_3 $[_I$ e_3 $[_{VP}$ get $e_2]]]]]]$

To sum up, in sentences with multiple quantifiers and negation, these are multiple ways ambiguous. When there exist two quantifiers and one is a quantifier which occurs in the scope of negation and the other which does not, the sentence may be said to be three ways ambiguous. This is simplified in the following way :

(30) a. [−neg]>∼>[+neg]

b. [−neg]>[+neg]>∼

c. [+neg]>[−neg]>∼

[+neg] indicates the quantifiers which may occur in the scope of negation, and [−neg] those which may not. ∼indicates negation.

Finally let us briefly consider the case which involves two [+neg] quantifiers :

(31) a. All the people didn't read nany books.

b. $[_{IP}$ all the people$_1$ $[_{IP}$ e_1 $[_{IP}$ many books$_2$ [c didn't$_3$ $[_I$ e_3 $[_{VP}$ read $e_2]]]]]]$

c. $[_{IP}$ many books$_1$ $[_C$ didn't$_2$ $[_{IP}$ all the people$_3$ $[_{IP}$ e_3 $[_I$ e_2 $[_{VP}$ read $e_1]]]]]]$

In (31b) *all the people* has the widest scope and (31b) is ambiguous as to whether *many books* or negation may take wider scope, while in (31c) *many books* has the widest scope and (31c) is ambiguous as to whether *all the people* or nagation may take wider scope. These ambiguities are simplified as follows :

(32) a. $[+\text{neg}]^1 > [+\text{neg}]^2 > \sim$

b. $[+\text{neg}]^1 > \sim > [+\text{neg}]^2$

c. $[+\text{neg}]^2 > [+\text{neg}]^1 > \sim$

d. $[+\text{neg}]^2 > \sim > [+\text{neg}]^1$

In this way, the relative scope of quantifiers and negation is clarified by LF representations which invlove QR and INFL movement.

5. Concluding Remarks

In this paper we have examined how LF representations account for the scope ambiguity between quantifiers and negation. We have postulated NegP as a maximal projection that has *not* as its head. *Not* is moved into another head position, namely INFL and undergoes INFL movement at LF. By representing both quantifier phrases and negation at LF, the scope ambiguity between them can be made clear. Any remaining problems, such as the division of quantifiers into [+neg] features, should be studied more extensively.

Notes

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(1) The definition of c-command is given as follows :
A c-commands B iff the first branching node dominating A also dominates B. cf. Reinhart (1976).

(2) If the quantifier does not occur immediately in the scope of negation, it may not enter the scope of negation. cf. Lasnik (1975) and others.

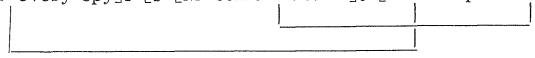
(3) The idea adopted here is mainly due to Homma (1990).

(4) It is assumed in Ouhalla (1990) that *not* is in the head position of NegP and the specifier position of NegP is filled with an abstract operator in English. For a contrasting view, cf. Rizzi (1990).

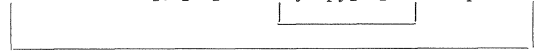
(5) Let us consider the LF representations for (ia) :

(i) a. Every spy suspects some Russian.

b. [s [NP every spy]$_2$ [s [NP some Russian]$_3$ [s e_2 suspects e_3]]]



c. [s [NP some Russian]$_3$ [s [NP every spy]$_2$ [A e_2 suspects e_3]]]



(May (1985, 14))

In (ib) the chain overlaps, and (ib) is not a possible LF for (ia). On the other hand the chains do not overlap in (ic), and (ic) is a possible LF for (ia). We can say that proper chains do not overlap, but embed the other.

(6) Cf. Lasnik (1975, 288).

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