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Semantics and Logical Form

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In his discussion of quantification and logical form, May (1977) claims that quantifier scope in logical form is determined only by surface syntax. He proposes a rule of quantifier raising, called QR, which (Chomsky)-adjoins a quantifier phrase to S, and which is subject only to certain syntactic restrictions on clause boundedness and binding.¹ What I hope to show is that such syntactic analyses are, in themselves, inadequate to characterize the nature of logical form. Rather, the semantics of quantifiers and opaque operators must also be considered.

More specifically, I will argue that scope assignment rules are sensitive to the semantic features of quantifier phrases, namely, to those with the feature [-def], and to a large semantic class of opaque operators, including epistemic modals, adjectives, and want-type verbs. I will show that it is in just these cases that May's QR rule makes the wrong predictions, and further, that once the semantics of quantified phrases and opaque contexts are taken into consideration, these data can be explained in a unified way by a 'scope bounding' restriction on well formedness at logical form, which is simply a special case of general conditions on variable binding.

The first problem with May's syntactic solution is illustrated below.

- (1) Mary wants to try a raw egg in her beer.
- (2) An earthquake is likely to occur in California.
- (3) California might {have
 {experience}
an earthquake soon.

In each the result is the same: the opaque operator induces a narrow scope interpretation on the indefinite quantified phrase. For example, in (1) the narrow scope interpretation would be that Mary wants there to be a raw egg such that she try it in her beer. However, May's QR rule predicts narrow scope correctly only for (1), in which QP adjoins to the embedded S (i.e. since the QR rule is clause bounded, it cannot adjoin to the matrix S).

In (2), on the other hand, QR incorrectly predicts straightforward ambiguity. The subject quantifier phrase, an earthquake, may either adjoin to the matrix

S, allowing wide scope, or lower to the embedded S, allowing narrow scope.² And in (3), QR incorrectly predicts only a wide scope reading, since the matrix S is the only available adjunction site for the quantifier. The obvious problem is that a wide scope, referential reading for (2) and (3) is impossible: there is no sense in which there exists a particular earthquake such that it is likely to occur, or that it might be experienced in California.

These examples should be compared with the transparent contexts in (4).

- (4) a. An earthquake struck last night.
 b. A storm damaged the crops.

In other words, a wide scope reading of indefinite QPs such as these is clearly permitted, just in case they are not in the scope of an opaque operator like those in (1-3). Therefore, in (4) we get the wide scope interpretation that there was an earthquake such that it struck last night, and there was a storm such that it damaged the crops.³

A second problem with ignoring these semantic aspects is that, conversely, narrow scope is sometimes predicted when only a wide scope reading is possible. In both (5a) and (5b) below, narrow scope is predicted for the indefinite QP someone, since both sentences have identical, embedded syntactic structures.

- (5) a. Bill wanted someone to help him type
 the paper.
 b. Bill persuaded someone to help him type
 the paper.

But unlike want, persuade is not an opaque verb, and therefore only wide scope is actually possible in (5b). The same is true for other complement taking verbs like advise, report, and so on, which are not opaque operators. Likewise, the narrow scope reading in (6) gives further evidence that it is the semantic inter-relationship of the opaque operator and the indefinite QP, and not the syntax alone, which accounts for this phenomenon.

- (6) John wants a raisin.

The solution I propose has two parts. The first is to revise QR so that it (Chomsky)-adjoins to any major category, and not just to S. That is, so that it may adjoin to an S, a VP, an NP, and so on, as defined within X-bar theory.⁴ The second part is to include

a well formedness condition on logical form configurations. This proposal is illustrated in (7) and (8).

- (7) a. Adjoin Q to S (QR rule, May (1977))
 b. Adjoin Q to \bar{X} (QR rule, revised)

- (8) In the (LF) configuration, $[\beta \dots \alpha \dots]$
 α must be bound in β

Where: α = a variable with the feature $[-def]$
 β = the c-command domain of an opaque operator⁵

(7a) is May's QR rule, and (7b) is the revision I propose. (8) is a scope bounding condition on logical form. In effect, it is an instruction to the interpretive rules to interpret this configuration as anomalous, unless α is bound within β .

To illustrate, look again at (1-3). Each sentence contains an opaque operator: want, likely, and might. In (1) the indefinite quantified phrase can only raise and adjoin to the embedded S; if it adjoins to the matrix S, it will not be bound within the c-command domain of the opaque operator, want. Likewise in (2), the indefinite QP an earthquake can only lower and adjoin to the embedded S. And in (3), it can only adjoin to the VP. In each case, then, we get only the correct, narrow scope interpretation.

On the other hand, in (4a) and (4b) there is no opaque operator, the restriction in (8) will not apply, and only the wide scope reading is possible. This is the correct result, and just the one we want. Likewise, in (5) it will apply in (a), but not in (b).

Now consider (6). By the QR rule in (7b), the indefinite QP can adjoin to its own NP category. Adjunction to the VP or to the matrix S is ruled out by (8), and again we get the correct narrow scope interpretation. The same holds for (9), in which the indefinite QP can adjoin to the PP, in California, but not to the S node.

To sum up thus far, this solution gives the right results in all of these cases, regardless of the differences in syntax. It captures the semantic similarities of various opaque operators, a generalization which May's analysis fails to account for. In effect, it restricts indefinite QPs to narrow scope, since both the QP and the variable it binds must be c-commanded in logical form by an opaque operator, if present. Otherwise, the interpretation results in anomaly. Other QPs, like every, each, and the like,

are not affected, because they do not carry the feature -definite.

With respect to complications in the grammar, my solution amounts to a trade-off. The QR rule is in effect less restricted, but the burden of restriction is shifted to the scope bounding properties of opaque operators.

There is another part of May's claim that needs to be addressed here. He claims that in cases like (1) and (5a) and (5b)--though oddly enough, not in (2), (3), or (6), for example--the narrow scope reading is simply the 'unmarked' reading, and that a later movement rule, QR', can still assign the 'marked' wide scope reading (see May (1977) for detailed discussion). However, not only is this solution wrong for (2), (3), and (6), but data like those in (10) and (11) show that it is wrong for the other cases as well.⁶

- (10) Mary wants to try a raw egg in her beer.
 a. ???It is fresh and tender.
 b. She wants it to be fresh and tender.
- (11) An earthquake is likely to occur in California.
 a. ???It is a big one.
 b. It is likely to be a big one.

In (10a) and (11a) the problem is that if the marked wide scope reading of the QP were in fact available, there should be nothing to prevent the specific, wide scope reading of a raw egg or of an earthquake, from being chosen, in order to 'match up' with the specific pronoun it in the following transparent context. Yet (10a) and (11a) are decidedly strange. The nonspecific indefinite QP and the specific pronoun are semantically incompatible.⁷

In contrast, (10b) and (11b) show that if the QP/pronoun pairs both occur in opaque contexts, in which both are assigned narrow scope, an anaphoric 'identity of sense' reading is allowed. Therefore, the narrow scope reading is possible, just as predicted by the restriction in (8).

Finally, I would like to discuss briefly those contexts in which a wide scope reading can sometimes be forced. This is illustrated in (12), with the continuations in (12b).

- (12) John wants to catch a fish.
 a. ???It is slimy. (???I see it.)
 b. ?{It is } over there under that
 {I see it}
 lily pad.

Nevertheless, if we compare the (a) and (b) continuations, it becomes clear that in (b) it is the type of contextual modifier--not the logical form of the sentence--which allows the inference of the existence of a particular object, since it is located both spatially and temporally in the immediate situation, namely, over there under that lily pad. But if we control for this pragmatic inference from context--if we delete it, as in (12a)--we get the same effect as in the anomalous continuations in (10) and (11) above.

Therefore, the wide scope reading in sentences like (12b) is simply a matter of invited inference, available by certain discourse level pragmatic principles, and not by sentence level logical forms.⁸ In other words, they are irrelevant, with respect to QR and the scope bounding restriction.

In the analysis I am arguing for here, there is one further, rather obvious implication for linguistic theory. Since Quine's discussion of opaque contexts in Word and Object (1960), there has been a widely held assumption in both philosophy and linguistics that indefinite QPs in opaque contexts are ambiguous with respect to wide and narrow scope interpretations. But if my analysis is correct, it indicates that this assumption is unfounded. Instead, only a single, narrow scope representation is possible in logical form, and any wide scope interpretation is simply a matter of invited inference, based on discourse level pragmatic principles, and not on interpretive rules which have access to logical form.

Ultimately, however, such conclusions ought to be based on data from various languages, and not--as in the past--on just English. Consider, for instance, the sets of data in (13-15), which are typical of a wide variety of languages. The Russian data are from Dahl (1970).⁹ ((13) is Russian, (14) Farsi, (15) Turkish)

- (13) a. Ona xočet vyjti zamuž za kogo-nibud.
 'She wants to marry someone.' (nonspecific)
 b. Ona xočet vyjti zamuž za kogo-to.
 'She wants to marry someone.' (specific)

- (14) a. Ali bir avukat ariyor;
 Ali a lawyer is looking for
 ???onu ben de taniyorum.
him I too know
 'Ali is looking for a lawyer (nonspecific);
 I know him too.'
- b. Ali bir avukat-i ariyor;
 Ali a lawyer is looking for
onu ben de taniyorum.
him I too know
 'Ali is looking for a lawyer (specific);
 I know him too.'
- (15) a. Ma-en mixam ba yek ma-eleke ezdavaj dona-em,
 I want with a queen marriage do
 ???va-eli ma-eno-o ga-ebul na-edare.
 but I accept she doesn't
 'I want to marry a queen (nonspecific),
 but she won't have me.'
- b. Ma-en mixam ba yek ma-eleke-i ezdevaj dona-em,
 I want with a queen marriage do
va-eli ma-eno-o ga-ebul na-edare.
 but I accept she doesn't
 "I want to marry a queen (specific),
 but she won't have me.'

For one thing, the data in (13-15) show at a glance that such languages--and there are very many of them--require explicit grammatical markers for indefinite NPs. These markers clearly and overtly specify the features specific and nonspecific on indefinite NPs. The result is that they preclude even the possibility of ambiguity in opaque contexts, with respect to wide and narrow scope readings.

For example, look at (13). In (13a), 'She wants to marry someone' (nonspecific), the -nibud suffix marks the QP as nonspecific. It can only mean that she wants to marry just anyone at all. But in (13b), 'She wants to marry someone' (specific), the -to suffix marks the QP as specific. It can only mean that there is some particular person that she wants to marry.

What is especially interesting about these data, is that the -nibud suffix, the nonspecific one, appears only in opaque contexts, and does not allow a wide scope reading. It never appears in transparent contexts. It is only those QPs with a specific -to suffix which are interpreted as wide scope in opaque contexts.¹⁰ In

other words, they are similar to definite QPs in English, as in a certain NP. For example, in English we have sentences like She wants to marry a certain man, which can only mean that there is a particular individual whom she wants to marry.

Similar remarks apply to the Turkish data in (14) and the Farsi data in (15). Notice also that in (14a) the specific pronoun onu 'him' in Turkish cannot be anaphorically related to bir avukat 'a lawyer', the nonspecific indefinite QP. In short, an anaphoric reading with a specific pronoun is blocked unless the indefinite QP has the specific marker, the -i suffix, as in (14b). The Farsi data are exactly analogous in this respect.¹¹ Furthermore, Engin Sezer and Shahrzad Mahootian have pointed out to me, for Turkish and Farsi, respectively, that when the indefinite QP is nonspecific, a wide scope reading is impossible (barring contrastive stress), regardless of context. That is, there is no context whatever which can force a wide scope reading.

In sum, the scope bounding restriction in (8) is strongly supported by evidence from other languages, indicating that it is correct, and that it is very likely based on a universal principle.

Footnotes

1. May assumes that QR is clause bounded, and is subject to general binding conditions. One is the Predication Condition: every argument position of a predicate must either be a referring expression or a properly bound variable. (A variable is "properly bound" by a binding phrase if and only if the variable is c-commanded by that phrase. Cf. footnote 5 below for a definition of c-command.) A further condition is that every variable in an argument position of a predicate must be properly bound, and that every quantified phrase must properly bind a variable.

2. This is possible because the subject QP, an earthquake, is not in an argument position. According to his definition, a position in which pleonastic it may occur is not an argument position (as in It is likely that an earthquake will occur in California). Therefore, the variable need not be properly bound, in that it need not be c-commanded by its binding phrase.

3. Incidentally, while considerations of tense are

of course important, they are not the relevant factors here. Compare, for instance, the past tense in Mary wanted to try a raw oyster in her beer, which still receives the narrow scope interpretation.

4. This revision has been suggested recently in Stowell (1981), for entirely independent reasons.
5. Informally, this c-command domain may be defined as everything dominated by the first branching node up from the operator. See Reinhart (1976) for a formal definition of c-command. For detailed discussion of general binding conditions (of which (8) may be considered a special case), see Chomsky (1981) and references cited there.
6. Underlining indicates an anaphoric relationship between the NP and the pronoun, and '???' indicates semantic anomaly.
7. See DeCarrico (1980a) and (1980b) for discussion of restrictions on indefinite anaphora, based on semantic incompatibility.
8. For extensive discussion of discourse level invited inferences and of the pragmatic principles on which they are based, see DeCarrico (1982).
9. I am grateful to Engin Sezer for bringing the Turkish data to my attention, and to Shahrzad Mahootian for providing me with the Farsi data. For further discussion of similar data, see Mahootian (1979) and Sezer (1972).
10. See also Ioup (1977) for discussion of these data, with respect to the specific/nonspecific dichotomy.
11. See Givón (1981) for a description of similar markers of specificity for a wide variety of languages, including, for instance, all Creoles, (street) Hebrew, various Amerindian and Austronesian languages, Mandarin, Sherpa, Hungarian, and so on. In each case, the interpretation options of specific/nonspecific are the same as those discussed above.

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