I Quantifier Lowering: Some History

Quantifier Lowering (QL), the phenomenon whereby a quantificational expression that has undergone A-movement has its scope interpreted as if it were in a pre-moved position, has been a major topic of investigations since May (1977). (1) is May's original example.

(1) Some politician is likely to address John's constituency

May observes that "[(1)] may be taken as asserting either (i) that there is a politician, e.g., Rockefeller, who is likely to address John's constituency, or (ii) that it is likely that there is some politician (or other) who will address John's constituency." May also gives (2).

(2) Many people were thought to have sold IBM shares

This time May gives no explication or paraphrases, but (2) does seem to have both kinds of readings that May indicates for (1). May's final example is (3).

(3) Everyone seems to like Cecil's playing

May again gives no explication. This time the meaning differences are harder to pin down. I will return to that fact.

May proceeds to provide an account of QL: "... the reason that sentences like [(1), (2), (3)], containing raising predicates, are ambiguous is that they can be associated with two distinct logical forms..." [p. 189] One arises from a standard (raising) instance of May's Quantifier Rule (QR):

(4) \[ \text{[s[some politician],[s} \alpha \text{ is likely [s t to address John's constituency]]] \]

Another, the QL reading, arises from a lowering instance of QR, as QR "applies freely":

(5) \[ \text{[s} \alpha \text{ is likely [s[some politician],[s t to address John's constituency]]]} \]

May proposes that "In [(4)] and [(5)] \( \alpha \) and 't' represent occurrences of the same variable, since they both arise from movement of the same noun phrase; hence they are both bound by this phrase." [p. 192] Then,

"In [(4)], the quantifier 'some' has scope wider than the matrix predicate 'likely'; it corresponds to the (i) reading of this sentence as described above. In [(5)], on the other hand, the quantifier has scope narrower than 'likely'; this logical form corresponds to the (ii) reading above."

Finally, in effect, \( \alpha \) in (5) can be ignored as it is not an argument position.

May (1985) returns to the phenomenon of QL, discussing (6).

(6) A hippogryph is likely to be apprehended

The explication of the quantifier ambiguity this time is somewhat curious;
“On [one] interpretation, [(6)] can be truthfully uttered without any supposition regarding the existence of hippogryphs. This contrasts with another construal under which it could not be truthfully uttered without this supposition.” [pp. 97-98]

Apparently, the claim is that (6) can be truthfully uttered with a [presupp.} supposition of the existence of hippogryphs or without such a presupposition. Is that a scope ambiguity? Is that an ambiguity at all, rather than, say, a vagueness? It’s hard to say.

May’s (1985) account is very like the (1977) one, just slightly modernized in terminology:

“LF-movements are instances of ‘Move a’, and thus ... their application is free, in the sense that derivationally a moved phrase may be adjoined to any S node. In particular, there is nothing to prevent the derivation of (23)b alongside (23)a; the former is derived by ‘raising’ the S-Structure matrix subject to the matrix S, the latter by ‘lowering’ it to the complement S:

(23)a. a hippogryph[ez][e2 is likely [e2 to be apprehended]]

b. e2 is likely [a hippogryph[ez][e2 to be apprehended]]

It is apparent that the structures in (23) represent the relevant ambiguity, at least as far as scope of quantification is concerned. In (23)a the quantified phrase stands outside the scope of the matrix predicate likely; in (23)b it is inside the predicate’s scope.” [p. 99]

Finally, the matrix e2 in (23)a is an expletive, while the embedded e2, being locally A-bound by an operator, is a variable.

II QL: Some Alternative Treatments

Sauerland & Elbourne (2002) suggest another sort of account of the phenomenon of Quantifier Lowering. Discussing (7)

(7) [An Austrian], is likely to t, win the gold medal.

they propose that

“The analysis of the narrow scope interpretation of [(7)] we argue for is that an Austrian undergoes movement from the trace position t, but that this movement operation is purely phonological and therefore does not affect interpretation.” [p. 286]

This is a PF analogue of the LF movement widely assumed in Principles and Parameters theorizing. LF movement (potentially) affects semantic interpretation, but never phonetic interpretation. The “purely phonological” movement proposed by Sauerland and Elbourne (potentially) affects phonetic interpretation but never semantic interpretation.

Another kind of account, implicit in much minimalist work and explicit in Hornstein (1995), relies on the copy theory of movement. In Hornstein’s specific approach, a lower copy of an A-moved quantifier can be activated and used to determine the scope of that quantifier. For Hornstein, that essentially competes the analysis as he eschews QR, relying instead on A-positions alone for scope. A variant analysis might rely on a lower copy, but have it undergo QR.

Sloan & Uriagereka (1988) suggest another interestingly different account of the phenomenon. Rather than having a lowering operation largely undoing the effects of raising, or a movement with no
semantic effect, or activation of a copy left behind by movement, they propose, roughly in the spirit of Lasnik (1972), that quantifier scope is determined cyclically, but as part of the syntactic cycle, not as part of a later LF cycle. This is an obvious precursor of the multiple spell-out of Uriagereka (1999), which shortly led to single-cycle syntax. I will return to this sort of approach and try to show that, contrary to initial appearances, it actually blocks QL, and that this is an empirically desirable outcome.

III The Empirical Difficulty: QL is much less general than it is expected to be

None of these accounts predicts any limitation on lowered interpretations. Whenever there is a raising construction, “lowered” readings should be possible. But, as first observed by Partee (1971), and as I discussed in detail in Lasnik (1998) and Lasnik (1999) among other places, such readings are very often unavailable, as indicated by the standard test of paraphrase by the it ... [finite clause] alternant. Below, I provide a sampling of examples from those works, as well as some new ones, and some brief discussion. (I use \( \not\equiv \) to indicate that the first example cannot be paraphrased by the second.)

The first example I discuss was first presented by Partee (1971) in a paper concerned with whether transformations “preserve meaning”, that is, with whether a pair of sentences differing only in the application of a particular transformation invariably have the same meaning. Based on several examples, Partee’s tentative conclusion is that they do not always. One of her examples is directly relevant to the point at issue here;

(8) a. Nobody is (absolutely) certain to pass the test \( \not\equiv \)
    b. It is (absolutely) certain that nobody will pass the test Partee (1971)

Partee’s observation is that subject-raising here clearly has an effect on interpretation, assuming that the underlying form of (8)a is much like (8)b. The same paradigm clearly illustrates that QL is not available in (8), pretty much the modern analogue of her point.

I have presented a variety of additional examples in Lasnik (1998, 1999, 2001). Some of them involve negative quantifiers, like Partee’s example. Consider (9).

(9) a. No large Mersenne number was proven to be composite \( \not\equiv \)
    b. It was proven that no large Mersenne number is composite

(9)a asserts that there is no large Mersenne number (a number of the form \( 2^n - 1 \)) such that that number was proven to be composite (false in fact), while (9)b asserts that there is a proof that no large Mersenne number is composite (wildly false). (10) is very similar to Partee’s example. (10)a describes a situation where the problem under discussion is of at least middling difficulty, and the potential problem solvers aren’t omniscient. (10)b, on the other hand, is a sentence about either an impossible problem or a hopelessly inept group of solvers.

(10) a. No one is certain to solve the problem \( \not\equiv \)
    b. It is certain that no one will solve the problem

Failure of QL doesn’t just show up with negative quantifiers. In (11), if we have 5 coins, the b.
reading (i.e., the lowered one) would be far more plausible. That is, if the coins are fair, (11)b is true (after rounding to the nearest per cent). Yet it is unavailable as a reading for (11)a, which has only the wildly improbable reading that each coin is absurdly unbalanced.

(11) a. Every coin is 3\% likely to land heads ≠
b. It is 3\% likely that every coin will land heads

There is a possible interfering factor. Boeckx (2001) argues that unlike *likely*, 3\% *likely* is not a raising predicate. Then the only source for (11)a would be control, and lowering is not expected with a control structure. Boeckx presents (12) as evidence.

(12) * There is 30\% likely to be a man in the garden [p.541]

If (12) has a raising predicate, nothing should block the example, given that it is standardly accepted that expletives can raise. In fact, Partee had used exactly the same line of reasoning to argue that certain in her (8)a is a raising predicate, given the acceptability of (13).

(13) There is certain to be an argument over that

In fact, a number of my consultants agree with Boeckx’s judgment on (12). But not all of them do. Yet even the ones who accept (12) still strongly reject the lowered reading for (11)a. Further, there are examples abstractly like (12) that are judged acceptable by many speakers (in fact, nearly all of my consultants). (14)a is one such, and (14)b, using the “idiom chunk” test provides further confirmation.

(14) a. There is quite likely to be an investigation
   b. The cat is quite likely to be out of the bag

Significantly, here again we find failure of lowering:

(15) a. Every student is quite likely to pass the exam ≠
b. It is quite likely that every student will pass the exam

That is, (15)a could easily be true while (15)b is false. Additional examples with the same cluster of properties are as follows:

(16) a. There is fairly certain to be a storm today
   b. The shit is fairly certain to hit the fan (when this news breaks)

(17) a. Everyone is fairly certain to pass the exam ≠
b. It is fairly certain that everyone will pass the exam

Another phenomenon plausibly described as failure of “lowering” comes from an observation about scope that Zubizarreta (1982) in a footnote attributes to Chomsky, and that is discussed again by Chomsky (1995). It is a standard, even if ill understood, observation that clausal negation in English (and, I expect, many other languages) can scope over a universal quantifier in subject position. Chomsky gives the following example, in which a very salient reading is the one where not everyone is there.

(18) (it seems that) everyone isn’t there yet
(19) is a very familiar example.
(19) All that glisters [glitters] is not gold
The intended meaning, obviously, is that not everything that glitters is gold (rather than the outlandish "if something glitters it isn’t gold"). Note, in passing, that whatever this universal-negative scope inversion is, it does not seem to be a straightforward reconstruction (or Q-lowering) effect, as it is limited to universal quantifiers. (20) doesn’t have a reading like “Not many people are there yet”.

(20) Many people aren’t there yet

With this much as background, we can now see the additional kind of QL failure I alluded to above. Chomsky’s observation was that raising examples, like (21), with a raised universal quantifier don’t allow readings with the quantifier inside the scope of clausal negation in the lower clause.

(21) Everyone seems [t not to be there yet]

Chomsky (p. 327) reasons as follows: “Negation can have wide scope over the Q in [(18)]... but not in [(21)]”, concluding that “...reconstruction in the A-chain does not take place, so it appears.” This kind of example might still be compatible with May style literal lowering (as in fact Chomsky suggests), but would still be incompatible with purely PF raising or with activation of a lower copy in a movement chain (a point that Chomsky also makes).

It must be acknowledged that Hornstein (1995), in effect, rejects Chomsky’s line of reasoning, claiming that the missing reading of (21) has nothing to do with any kind of failure of lowering because “There is an empirical flaw in this argument...” [p. 239] The purported empirical flaw is centered around Hornstein’s examples (22)a and (22)b.

(22) a. John would prefer for everyone not to leave
b. John wanted very much for everyone not to leave

Hornstein states that “These sentences do not allow neg to scope over everyone either. But if these do not allow this, we do not expect [Chomsky’s example] to allow it either. Thus, even if lowering is permitted, the ambiguity Chomsky &. Lasnik [sic] point to is not expected.” It is not clear what Hornstein takes to be involved here, but, plausibly, he is assuming that the scope inversion of (18) arises only in finite clauses. While this might be true for some speakers, it certainly isn’t true for all. As a matter of fact, Chomsky in his discussion provided an infinitival version of the complement in (18), claiming that it does allow the same scope inversion found in the finite one. His example is (23).

(23) I expected [everyone not to be there yet]

Many of my consultants agree with Chomsky’s judgment on (23). Yet they also agree with his judgment on (21). Thus, at least for those speakers, the key property of (21) cannot be that the complement is infinitival. The best guess at present is then Chomsky’s; A-movement is crucial.

Kayne (1985) first discussed a very interesting verb-particle construction, later analyzed by John-

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[1] Hornstein attributes the argument that he criticizes to “Chomsky & Lasnik (1991)”. To the best of my knowledge, there is no such publication, and this reference does not appear in Hornstein’s bibliography. “Chomsky (1991)” does appear, but there is no such argument in that work. I will assume that Hornstein actually intends to refer to Chomsky (1995), the only place I am aware of where Chomsky discusses this phenomenon.
son (1991) in terms relevant to the present discussion. Johnson provides an insightful account of examples like (24) involving overt raising of the ECM subject *John*.

(24) Mary made John out to be a fool

Both Kayne and Johnson convincingly treat (24) as an infinitival counterpart of (25).

(25) Mary made out that John is a fool

The question now arises as to the behavior of ECM constructions with respect to universal-negation interaction. The makeout ECM construction behaves exactly as now expected. When the word order makes it clear that a universal ECM subject has raised, that subject cannot be interpreted inside the scope of negation in the complement clause, as seen in (26).

(26) The mathematician made every even number out not to be the sum of two primes

The only reading is the highly implausible one where the mathematician was engaged in the futile activity of trying to falsely convince someone that no even number is the sum of two primes (and not the far more plausible one where she is merely trying to convince someone that Goldbach’s conjecture is false). Thus, even with strong pragmatic bias towards wide scope for the negation, it still isn’t available, consistent with the raising analysis combined with Chomsky’s claim. The alternative word order for (26), with *every even number* unraised, does allow narrow scope for the universal, for those speakers who accept the word order in the first place;

(27) The mathematician made out every even number not to be the sum of two primes

(27) has the plausible reading missing in (26).

Examples abstractly like Chomsky’s (23) show the same pattern. As mentioned already, many speakers allow the scope inversion in examples with that structure;

(28) I believe everyone not to have arrived yet

(29) I proved every Mersenne number not to be prime

Those same informants (along with everyone else, I believe) disallow narrow scope for the universal when it undergoes passive/raising to subject position;

(30) Everyone is believed not to have arrived yet

(31) Every Mersenne number was proved not to be prime

In (31), there is strong pragmatic bias towards narrow scope, but it is still not available. Only the wildly false wide scope reading exists.

IV Towards a Theory?

Before actually attempting a theory, we must see what we want a theory of. There seem to be at least two possibilities;

(32) QL exists, as it would under any of the accounts alluded to earlier. Then we need an account of why it is so often blocked (basically, with anything except indefinites).

OR

(33) QL doesn’t exist. Then we need an account of why it doesn’t. And we also need an account of why it looks like it does with indefinites.
In some of my earlier work referenced above, I proposed that A-movement, unlike A-movement, doesn’t leave a trace/copy. Then classic literal lowering would leave the Q with no variable to bind. And copy activation would obviously be impossible, there being no copy. As for the indefinites, I noted two things. First, in the standard examples, even though there is the strong feeling of two readings, it is very difficult to separate them in terms of truth conditions. On the other hand, in the negative and universal examples, where lowering fails, the two sets of truth conditions for each example are relatively easy to distinguish.

Second, I appealed (vaguely) to known special properties of indefinites that might provide two readings without an actual scope difference— for example, the specific/non-specific ambiguity discussed in detail by Fodor & Sag (1982). Taking this second point first, Wurmbrand & Bobaljik (1999) justifiably observe that while the Fodor and Sag approach to indefinites might allow us to explain apparent wider than expected scope (exactly what it was designed to do), it can’t possibly tell us anything about narrower than expected scope.

Returning to the first point, there are some examples in the literature that are intended to highlight the semantic difference between lowered and non-lowered readings. One famous example is due to Fox (1999):

(34) Someone from New York is very likely t to win the lottery

Fox explicates the situation as follows.

“One interpretation results when the quantifier takes scope in the final landing site. For the sentence to be true under this interpretation, there must be a person from New York who is very likely to win the lottery (e.g., a person who bought enough tickets to make winning a likely outcome). Under the second interpretation, in which the quantifier has scope in the position of t, the truth conditions are much less demanding; they merely require that there be enough ticket buyers from New York to make it likely that the city would yield a winner.” [p. 160]

As is so often the case, the discussion suggests that one of the readings entails the other. That also seemed to be true in May’s discussion of his hippocraph example, (6) above, I will put that matter aside. Instead, consider strengthening the situation in Fox’s example, changing likelihood to certainty:

(35) Someone from New York is certain t to win the lottery

Now imagine that a particular New Yorker bought all the tickets. Or, alternatively, imagine that only New Yorkers bought tickets. (35) is a good description of either situation, parallel to what was seen with the Fox example. And, as in that example, it is tempting to implement the second reading via lowering, with someone from New York below certain at LF. But now imagine the exact same pair of situations concerning ticket purchasers (and the speaker’s knowledge thereof). And suppose the drawing has taken place, but the winner has not yet been announced. Suppose the speaker were to utter (36).

(36) Someone from New York won the lottery

It seems to me that (36) could be an accurate and felicitous report of either situation, just as in
the case of Fox's (34) or my modification in (35). Recall that for (34) and (35), the standard story about the situation where most/all of the tickets were bought by New Yorkers has someone lowering to a position below likely/certain (or else a low copy being activated). But (36) is a completely transparent extensional context. If the "lowered reading" is to be instantiated by lowering of someone, what operator does that expression lower below?

Another phenomenon often claimed to implicate syntactic lowering of some sort is "trapping", where a bound pronoun in the matrix precludes a lowered reading. May (1985) presented an early example:

(37) No agent, was believed by his superior to be a spy for the other side

May observes that (37) cannot be paraphrased by (38), concluding that lowering is syntactic; the lowered reading here would result in failure of binding of the attempted bound variable pronoun.

(38) *It was believed by his superior that no agent, was a spy for the other side

There are, however, two interfering factors here: Negatives don't lower in the first place, as discussed above. Even controlling for that, what can we really conclude from the fact that a particular sentence cannot be paraphrased by an ungrammatical sentence (one violating weak crossover)?

(39) a. Some agent, was believed by his superior to be a spy for the other side
   b. *It was believed by his superior that some agent, was a spy for the other side

Hornstein (1995) gives a similar example:

(40) Someone, seemed to his, boss to be reviewing every report (V cannot scope over \exists)

The same point are again relevant. Thus, one of the most promising potential tests for lowering is generally unavailable. However, Fox (1999) has a paradigm that possibly evades this problem:

(41) a. [A student of David,'s] seems to him, to be at the party
   b. [A student of his,] seems to David, to be at the party

Fox claims that in (41)a, there is no lowered reading (i. e., where the surface subject takes scope under seem). In (41)b, on the other hand, the reading is reported to exist. The point is that in the former case, but not the latter, lowering of the subject would put David in the c-command domain of him, thus triggering a Condition C violation. And in this instance, a paraphrase might potentially be as in (42).

(42) It seems to David, that a student of his, is at the party

The logic of the argument seems exactly correct, but I have to confess that I have no clear judgments. I am willing to believe that Fox is right, but I just can't tell. I am even less sure that (41a) contrasts with (43), where the pronoun is embedded in a larger NP, in the predicted way (with the lowered reading available in the latter, since his would not c-command out of his colleague).

(43) [A student of David,'s] seems to [his, colleague] to be at the party

Another widely reported argument for lowering involves potential scope ambiguities. May (1977) presents the following examples and associated judgments:

(44) Some politician is likely [t to address every rally in John's district] (V can scope over \exists)
(45) Some politician promised [PRO to address every rally in John's district] (V cannot
scope over $\exists$

Aoun & Li (1993) present a very similar pair:

(46) Someone seems [t to love everyone] ($\forall$ can scope over $\exists$)

(47) Someone wants [PRO to kiss everyone] ($\forall$ cannot scope over $\exists$)

Only in (46) is reconstruction expected, since only in that example was there raising. The assumptions, fairly common ones articulated by May (1977), are that scope is clause bound and that, subject to this, quantifiers freely interchange in scope. It actually does not seem to me entirely clear that the first assumption is correct. That is, it is not clear to me that $\forall$ can scope over $\exists$ even in a simple example like (48).

(48) Someone loves everyone

Further, to the extent that scope inversion is possible with (48) and (46), it is not clear that it is impossible with (47). This is another issue that I will put aside here, accepting the standard judgments at face value.

Note that for the issue at hand, it does not suffice to show that $\forall$ can scope over $\exists$. Rather, it must also be true that seem scopes over both of them. I am willing to believe that that is true, but I am not certain. The following example is relevant:

(49) Two women seem to each other to be expected to dance with every senator

Lebeau (1998)

The idea is that raising of the predicate seem (instead of lowering of the subject) couldn’t explain why there is no lowered reading in (49). May (1985) had already made exactly the same point about (37). As I observed above, there is an interfering factor in that example, but the point carries over to the modified version in (39). Two women must be high (to license each other). $\forall$ cannot scope over Two women. Thus, one should conclude that in (46) also, the scope of $\forall$ is limited to the embedded clause, and hence that the scope of $\exists$ is the lower clause. Of course, the classic test for lowering once again cannot really be run. If paraphrase by It ... S is the test (and it is the only one standardly offered) definitely lowering fails:

(50) * It seems to each other that two women are expected to dance with every senator

But the devil is in the * . It is not merely that (49) cannot be paraphrased as (50). Nothing can be paraphrased as (50), since (50) is ungrammatical, a difficulty we have seen before.

For the remainder of this discussion, I will put aside the difficulties I have noted for establishing lowering, and provisionally adopt the standard view. The question then will be how to block lowering in general, but to allow it in the very few circumstances where it is generally claimed to exist.

V A New Approach: one excluding lowering in general, but allowing genuine low scope where it does seem to exist

Recall the Sloan & Uriagereka (1988) approach to lowering phenomena, one that fits neatly into single cycle syntax. And suppose that scope is generally achieved via QR, where QR is always an $\overline{A}$ raising operation. Then, to get embedded scope, QR would have to operate on the embedded cycle.
Consider the derivation of Partee’s example (8)a, repeated as (51).

(51) Nobody is (absolutely) certain to pass the test

QR on the embedded clausal cycle would yield something like.

(52) [\(IP\) nobody [\(IP^t\) to pass the test]]

But then subsequent raising to matrix subject position would constitute an instance of “improper movement” from A-position (adjoined to lower IP) to A-position (Spec of matrix IP):

(53) [\(IP\) is certain [\(IP\) nobody [\(IP^t\) to pass the test]]]

Matrix scope would cause no such problem. Its derivation would involve perfectly standard A-movement (raising) followed by A-movement (QR);

(54) [\(IP\) nobody [\(IP^t\) is certain [\(IP^t\) to pass the test]]]

But what of the low readings of indefinites in raising constructions (if they exist)? For these we can rely on a special property of indefinites (that Mamoru Saito reminded me of): that they are, or can be, variables rather than quantifiers, an idea developed by Heim (1982). These variables are then provided with binders by existential closure, with no movement at all involved (in particular, no QR, so no danger of improper movement). Following Reinhart (1997) among others, I would take existential closure to be available in all clausal domains, not just the matrix. If closure is introduced in the lower clause in the examples at issue (the standard QL cases), we get low scope. And no constraint on improper movement would prevent subsequent A-movement of the indefinite up to subject position of the higher clause (though the raising would be semantically vacuous, rather in the spirit of Sauerland & Elbourne (2002)). An alternative derivation would have subject raising to subject position, then closure in the higher clause. This gives high scope.

The May, Lebeaux, and Hornstein type of examples with high binding and no possibility of low scope fall out as well, as low scope implicates low closure. But then the high pronoun or variable could not be in the scope of the introduced existential.

The remaining task (possibly a big one): Develop a principled theory of improper movement that would be effective here. As far as I know, no one has until now claimed that improper movement might block raising of the subject of a raising complement.

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