Economy and Scope: A Modification of Hornstein's A-movement Approach

Masakazu Kuno
University of Tokyo

masakazu-kuno@nifty.com

1. Introduction

Fox (1995; 1999) discusses a wide variety of phenomena that indicate that economy clearly plays a crucial role in semantic interpretation, especially in the application of scope shifting operations (SSO) such as quantifier raising/lowering (QR/QL). His claim is that SSOs cannot be semantically (scopally) vacuous. In other words, SSOs cannot apply without having a semantic effect. This generalization is referred to as Scope Economy. It is important to notice that Scope Economy is given a room to play a part only when SSOs are defined as optional operations. Suppose contra Fox that SSOs per se do not exist and relative scope is determined as a by-product of some obligatory operation. Then, Scope Economy will not be formulable. Actually, Hornstein (1995) abandons QR/QL in light of the Minimalism and proposes a way to derive relative scope as a consequence of obligatory feature checking in forming A-chains. I will refer to this theory as A-movement approach. It seems to me that A-movement approach is superior to QR/QL approach on conceptual grounds since the former is more minimalistic (parsimonious) in that it can handle relative scope without assuming any specialized mechanism for it. However, Hornstein's A-movement approach is empirically inferior to QR/QL approach to the extent that it cannot account for a large part of the data Fox draws in arguing for Scope Economy. The goal of this paper is to modify Hornstein's A-movement approach on the proposal made in Kuno (2000) so that Fox's data can be accounted for without resorting to QR/QL.

2. Economy and Scope

It is well known that some sentences are scopally informative, i.e., conveying two distinct truth conditions in terms of scope while others are not. Among the following three sentences, only the first one yields different interpretations when the subject takes wide scope over the object and when the object takes wide scope over the subject.

(1) some girl admires every teacher

Linguistic Research 17(2000) 167-174

(2) Mary admires every teacher
(3) every girl admires every teacher

In (2-3), on the other hand, the interpretations under two scopal relations are identical. Here a question shows up: Are there really two structurally distinct representations that result in the same interpretation for (2-3)? Fox's answer is negative; he proposes an economy principle that precludes applications of semantically vacuous SSOs and attempts to establish the generalization that scopally uninformative sentences are restricted to surface scope. The principle is formulated as in (4).

(4) Scope Economy
SSOs that are not forced for type considerations must have a semantic effect.

In addition to (4), Fox proposes a locality condition *Shortest Move* as in (5) on applications of SSOs in order to ensure in particular that a QP in the object position would not raise over the subject position via QR in scopally uninformative sentences.

(5) Shortest Move
QR must move a QP to the closest position in which it is interpretable. In other words, a QP must always move to the closest clause-denoting element that dominates it.

Given Scope Economy and Shortest Move, (1-3) can be analyzed as in (1'-3').

(1') a. [$_{TP}$ some girl$_1$ [$_{VP}$ every teacher$_2$ [$_{VP}$ t_1 admires t_2]]] (QR for type mismatch repair)
b. [$_{TP}$ some girl$_1$ [$_{VP}$ **every teacher$_2$** [$_{VP}$ t_1 admires t_2]]] (QR of the object)
c. [$_{TP}$ **some girl$_1$** [$_{VP}$ every teacher $_2$[$_{VP}$ t_1 admires t_2]]] (QL of the subject)

(2') a. [$_{TP}$ Mary$_1$ [$_{VP}$ every teacher$_2$ [$_{VP}$ t_1 admires t_2]]] (QR for type mismatch repair)
b. [$_{TP}$ Mary$_1$ [$_{VP}$ **every teacher$_2$** [$_{VP}$ t_1 admires t_2]]] (QR of the object)
c. [$_{TP}$ **Mary$_1$** [$_{VP}$ every teacher$_2$ [$_{VP}$ t_1 admires t_2]]] (Lowering of the subject)

(3') a. [$_{TP}$ every girl$_1$ [$_{VP}$ every teacher$_2$ [$_{VP}$ t_1 admires t_2]]] (QR for type mismatch repair)
b. [$_{TP}$ every girl$_1$ [$_{VP}$ **every teacher$_2$** [$_{VP}$ t_1 admires t_2]]] (QR of the object)

c. [$_{TP}$ **every girl**$_1$ [$_{VP}$ every teacher$_2$ [$_{VP}$ t_1 admires t_2]]] (QL of the subject)

In each of (a) representations, the QP in the object position undergoes QR to VP-adjoined position, the closest clause-denoting element in obedience to Shortest Move, for type mismatch repair. These representations will be mapped into surface scope. Then how do we obtain inverse scope? There are two ways: one is QR of the object above the subject and the other is QL of the subject below the object, as illustrated in each of (b-c) representations. Scope Economy predicts that these optional covert movement operations are allowed in scopally informative (1'), but not in scopally uninformative (2'-3').

In order to testify this prediction, Fox employs Parallelism as "a detector of scopal relationships of scopally uninformative sentences." Parallelism ensures that in certain environments (environments involving phonological reduction or ellipsis) two sentences receive isomorphic syntactic representations at LF. In such environments, one sentence S_1 can indicate the LF structure of another, S_2. Specifically (for scope), if S_1 is scopally informative, it can inform us of the scopal relationships in S_2, even if the latter is scopally uninformative. More specifically, if S_2 is scopally uninformative and if it is restricted to surface scope, we can detect this restriction by looking at S_1. Keeping this logic in mind, let us see (6-8).

(6) some boy admires every teacher. some girl does, too. ($\exists>\forall$, $\forall>\exists$)
(7) some boy admires every teacher. Mary does, too. ($\exists>\forall$, $*\forall>\exists$)
(8) some boy admires every teacher. every girl does, too. ($\exists>\forall$, $*\forall>\exists$)

In (6-8), the antecedent sentence is scopally informative. Parallelism ensures that the possible ranges of scope interpretation in the antecedent sentence expose the allowable syntactic representations in the ellipsis sentences. Thus, the unavailability of inverse scope in the antecedent sentence in (7-8) shows that only surface scope is obtainable in the ellipsis sentences, as is predicted by Scope Economy. If semantically vacuous QR/QL were allowed in the ellipsis sentences in (7-8), their antecedent sentence would be scopally ambiguous, just like (6) where the ellipsis sentence is scopally informative and Scope Economy allows optional QR/QL.

Though Fox offers many other interesting data, (6-8) suffice to show that economy does enter into scopal interpretations and that (at least some applications of) SSOs must be optional to make room for economy to play a part.

3. A-movement Approach

I will start out this section by a brief sketch of Hornstein's A-movement approach and then

show that this theory needs modifying since it will wrongly predict that the antecedent sentence in (7-8) would be scopally ambiguous on a par with (6). He assumes that LF is the sole interface level that connects narrow syntax with Conceptual-Intentional Systems. Furthermore, he claims that at this level A-chains cannot exist because the concept of chains violates the inclusiveness condition in the sense of Chomsky (1995). So he argues that all the chain links must delete except one. Against these backgrounds, he claims that scope relations are mapped from c-command relations between A-chain links that have survived deletion. Let me illustrate this theory using (1) for an instance.

(9) a. [$_{TP}$ some girl T [$_{AGRoP}$ FF(every teacher) AGRo [$_{VP}$ $t_{\text{some girl}}$ admires $t_{\text{every teacher}}$]]]
b. [$_{TP}$ **some girl** T [$_{AGRoP}$ FF(**every teacher**) AGRo [$_{VP}$ $t_{\text{some girl}}$ admires $t_{\text{every teacher}}$]]] (∃>∀)
c. [$_{TP}$ **some girl** T [$_{AGRoP}$ ~~FF(every teacher)~~ AGRo [$_{VP}$ $t_{\text{some girl}}$ admires $t_{\text{every teacher}}$]]] (∃>∀)
d. [$_{TP}$ ~~some girl~~ T [$_{AGRoP}$ ~~FF(every teacher)~~ AGRo [$_{VP}$ $t_{\text{some girl}}$ admires $t_{\text{every teacher}}$]]] (∃>∀)
e. [$_{TP}$ ~~some girl~~ T [$_{AGRoP}$ FF(**every teacher**) AGRo [$_{VP}$ $t_{\text{some girl}}$ admires $t_{\text{every teacher}}$]]] (∀>∃)

(9a) is a representation prior to chain-link deletion. (9b-e) display representations that have undergone chain-link deletion (the strikeout stands for "being deleted"), exhausting the logical possibilities.[1] Since relative scope is determined by c-command relations between chain-links, (9b-d) are the representations that will be mapped into surface scope and (9e) is the one that will yield inverse scope.

The vantage point of this approach is that relative scope is correctly captured without assuming specialized mechanism for it, because A-chain formation and chain-link deletion are motivated independently of scopal interpretation by the necessity of feature checking and the inclusiveness condition, respectively. However, this vantage point in fact turns out to be a problem. If A-chain formation and chain-link deletion are obligatory processes, there would be no difference in the possible set of LF representations between scopally informative sentences and scopally uninformative ones. Thus, scopally uninformative (2-3) would have the following representations in (10-11), respectively.

(10) a. [$_{TP}$ Mary T [$_{AGRoP}$ FF(every teacher) AGRo [$_{VP}$ t_{Mary} admires $t_{\text{every teacher}}$]]]
b. [$_{TP}$ **Mary** T [$_{AGRoP}$ FF(**every teacher**) AGRo [$_{VP}$ ~~t_{Mary}~~ admires ~~$t_{\text{every teacher}}$~~]]]
c. [$_{TP}$ **Mary** T [$_{AGRoP}$ ~~FF(every teacher)~~ AGRo [$_{VP}$ ~~t_{Mary}~~ admires $t_{\text{every teacher}}$]]]
d. [$_{TP}$ ~~Mary~~ T [$_{AGRoP}$ ~~FF(every teacher)~~ AGRo [$_{VP}$ t_{Mary} admires $t_{\text{every teacher}}$]]]
e. [$_{TP}$ ~~Mary~~ T [$_{AGRoP}$ FF(**every teacher**) AGRo [$_{VP}$ t_{Mary} admires ~~$t_{\text{every teacher}}$~~]]]

[1] Hornstein does not take care of type mismatch. Therefore, (9c-d) in which the object QP remains in situ are considered to be interpretable. If one feels strong distance for such a treatment, it is possible to rule out these representations on semantic grounds and to assume that the object QP is always interpreted at AGRoP. See Snyder and Pica (1995) for such a proposal.

(11) a. [$_{TP}$ every girl T [$_{AGRoP}$ FF(every teacher) AGRo [$_{VP}$ $t_{\text{every girl}}$ admires $t_{\text{every teacher}}$]]]
b. [$_{TP}$ **every girl** T [$_{AGRoP}$ FF(**every teacher**) AGRo [$_{VP}$ ~~$t_{\text{every girl}}$~~ admires ~~$t_{\text{every teacher}}$~~]]]
c. [$_{TP}$ **every girl** T [$_{AGRoP}$ ~~FF(every teacher)~~ AGRo [$_{VP}$ ~~$t_{\text{every girl}}$~~ admires $t_{\text{every teacher}}$]]]
d. [$_{TP}$ ~~every girl~~ T [$_{AGRoP}$ ~~FF(every teacher)~~ AGRo [$_{VP}$ $t_{\text{every girl}}$ admires $t_{\text{every teacher}}$]]]
e. [$_{TP}$ ~~every girl~~ T [$_{AGRoP}$ FF(**every teacher**) AGRo [$_{VP}$ $t_{\text{every girl}}$ admires ~~$t_{\text{every teacher}}$~~]]]

All of the representations in (10b-e) and (11b-e) are legitimate under Hornstein's A-movement approach. Most importantly, the representations in (10e) and (11e) that will be mapped into inverse scope are allowable on this approach. Consequently, it would falsely predict that the antecedent sentence in (7-8) would be scopally ambiguous just like that in (6).

(6) some boy admires every teacher. some girl does, too. ($\exists>\forall$, $\forall>\exists$)
(7) some boy admires every teacher. Mary does, too. ($\exists>\forall$, $*\forall>\exists$)
(8) some boy admires every teacher. every girl does, too. ($\exists>\forall$, $*\forall>\exists$)

If (10e) and (11e) come out as LF representations of the ellipsis sentences in (7-8), then Parallelism will force the antecedent sentence to have a representation that will yield inverse scope. This is not the case, however. Therefore, A-movement approach should be modified in order that scopally uninformative sentences will be restricted to surface scope, precluding representations such as those in (10e) and (11e).

4. Modification of A-movement Approach

As we saw in the previous section, there is an empirical problem with Hornstein's A-movement approach, though conceptually parsimonious and intriguing. The problem is that it provides no natural place for economy to play a role since A-chain formation is an obligatory process, unlike optional QR/QL. However, if we abandon the widely held view that syntactic movement always leaves a trace, there will be a chance to incorporate economy of semantic interpretation into Hornstein's A-movement approach. In relation to this matter, Kuno (2000; To appear) has claimed that syntactic movement optionally leaves a trace; this is named Optional Trace Hypothesis (OTH). In this section, first I will sketch out the OTH and then show how it enables A-movement approach to rule out inverse scope for scopally uninformative sentences.

Though the OTH in principle allows that each instance of syntactic movement freely chooses to leave a trace or not, the choice is not arbitrary. Suppose α is moved n times. Then there will be 2^n patterns of chains for α in terms of whether α leaves a trace or not at each lading site and some of them would meet all the interface requirements. If the optimal derivation is to be singled out among the convergent ones through comparison, it will require

global computation, a nuisance that increases computational complexity quite a lot. In order to avoid this problem, Kuno (2000; To appear) has proposed a local economy condition stated in (12):

(12) Economy Condition on the OTH
Movement can leave a trace only when it encodes locally unrecoverable information,

where "locally recoverable" is defined as in (13):

(13) Definition of "locally recoverable"
When α and β c-command each other and are immediately dominated by γ, the information that α encodes at the extraction site is locally recoverable iff all of that information can be derived by inspection of β.

In addition to (12), I append another economy condition (14), which is indeed implicitly assumed in Kuno (2000) by referring to the principle of Full Interpretation.

(14) Traces cannot be vacuous (i.e., must have a semantic effect).

Given (12) and (14), it follows that a QP can leave a trace only when it will be a link that will enter into interpretation. Now the sentences in (1-3) can be reanalyzed as in (15-17) on the revised A-movement approach.[2]

(15) a. some girl admires every teacher
b. [$_{TP}$ some girl T [$_{AGRoP}$ FF(every teacher) AGRo [$_{VP}$ admires]]] ($\exists > \forall$)
c. [$_{TP}$ some girl T [$_{AGRoP}$ FF(every teacher) AGRo [$_{VP}$ $t_{some\ girl}$ admires]]] ($\forall > \exists$)
d. *[$_{TP}$ some girl T [$_{AGRoP}$ FF(every teacher) AGRo [$_{VP}$ $t_{some\ girl}$ admires]]] ($\exists > \forall$)

In (15b) surface scope results because (the chain-link of) the subject QP c-commands (the chain-link of) the object QP. In (15c), where the subject QP leaves a trace, inverse scope must obtain to meet the economy condition (14), whereas (15d) is out because the trace of the subject QP dose not have a semantic effect, in violation of (14).[3]

---

[2] If we assume that object QPs cannot be interpreted at base positions, we do not have to postulate their traces. (See note 1.) Indeed, the information that a certain item has a quantificational force is not locally recoverable and the economy principle (12) allows object QPs to leave a trace. However, if an object QP is by assumption not interpretable in the base position, its trace is semantically vacuous in an obvious sense and its presence will violate the economy principle (14). Therefore, I will omit the cases in which object QPs leave a trace.

[3] It is worthwhile noting that we can dispense with chain-link deletion on the modified A-movement

(16) a. Mary admires every teacher

b. [$_{TP}$ Mary [$_{AGRoP}$ FF(every teacher) AGRo [$_{VP}$ admires]]]

c. *[$_{TP}$ Mary T [$_{AGRoP}$ FF(every teacher) AGRo [$_{VP}$ t_{Mary} admires]]]

(17) a. every girl admires every teacher

b. [$_{TP}$ every girl [$_{AGRoP}$ FF(every teacher) AGRo [$_{VP}$ admires]]]

c. *[$_{TP}$ every girl T [$_{AGRoP}$ FF(every teacher) AGRo [$_{VP}$ $t_{every\ girl}$ admires]]]

Turning now to scopally uninformative sentences, (16b) and (17b) display LF representations that result when the subject does not leave a trace. These are unproblematic. By contrast, (16c) and (17c) are disallowed. In (16c) there is no reason for which the proper name ***Mary*** leaves a trace at Spec-VP, since all the information that must be encoded at this position by the non-quantificational expression is thematic information and it is locally recoverable: the information that ***Mary*** is an external argument of ***admire*** can be derived by looking at its sister, the bar-level projection of ***admire***, hence (16c) is ruled out by the economy principle (12). In (17c), on the other hand, (12) allows the universally quantified NP to leave a trace at Spec-VP since the information about quantificational force is evidently locally unrecoverable. However, the economy condition (14) rules out such a computation because this sentence does not have different truth conditions whether the subject QP leaves a trace or not, and in this sense the trace of the subject QP is semantically vacuous, hence ruled out by (14).

So far I have demonstrated that A-movement approach can preclude inverse scope for scopally uninformative sentences, in combination with the economy conditions stated in (12) and (14). Then let us return to (6-8), which constitute an unmanageable problem for Hornstein's original approach.

(6) some boy admires every teacher. some girl does, too. ($\exists>\forall$, $\forall>\exists$)

(7) some boy admires every teacher. Mary does, too. ($\exists>\forall$, $*\forall>\exists$)

(8) some boy admires every teacher. every girl does, too. ($\exists>\forall$, $*\forall>\exists$)

As was just seen above, derivations that will produce inverse scope are excluded in scopally uninformative sentences such as those in the ellipsis sentences in (7-8). Under the modified A-movement approach, this means that the subject cannot leave a trace in the derivations thereof. Given Parallelism, it follows that the subject QP must not leave a trace at Spec-VP in the derivation of the antecedent sentence either, thus correctly predicting the possible scope

---

approach. In case there are more than two members in a chain, the economy condition (14) requires the lowest one to get interpreted.

interpretations.[4] To the extent that the modified A-movement approach is successful in deriving the generalization that scopally uninformative sentences are restricted to surface scope, we can go without QR/QL.

5. Summary

In this paper I have shown that Hornstein's A-movement approach, if modified on the proposal made in Kuno (2000), can accommodate some of the central data Fox draws to argue for Scope Economy. Of course, there remain many instances that need close examination under the modified A-movement approach and in fact some of them are more recalcitrant. However, to the extent that the modified A-movement approach is empirically supported, not only can we dispense with specialized scope shifting operations such as QR/QL, but also lend further support to the underlying assumption that syntactic movement leaves a trace only when it encodes locally unrecoverable, non-vacuous information.

References

Chomsky, Noam (1995) *The Minimalist Program*. MIT Press, Cambridge, Mass..

Fox, Danny (1995) "Economy and Scope," *Natural Language Semantics* 3, 283-341.

Fox, Danny (1999) *Economy and Semantic Interpretation*, MIT Press Cambridge, Mass..

Hornstein, Norbert (1995) *Logical Form: From GB to Minimalism*, Blackwell, Oxford.

Kuno, Masakazu. (2000) *A-movement and Scrambling: Why does Movement Sometimes Leave a trace and Sometimes not?* Master thesis, University of Tokyo.

Kuno, Masakazu (To appear) "Why does Movement Sometimes Leave a trace and Sometimes not?" *The Proceedings of the Second Tokyo Conference on Psycholinguistics*, Hitsuji Publisher, Tokyo.

Pica, Pierre, and William Snyder (1995) "Weak Crossover, Scope, and Agreement in a Minimalist Framework," *WCCFL* 13, 334-349.

[4] It should be noted that though Fox assumes that Parallelism ensures isomorphic representations at LF, I assume that it ensures isomorphism on deviations/computations at narrow syntax. As far as I can see, no problem arises from treating Parallelism this way. I will leave open the question of which view on Parallelism is correct.