Quantifier Scope in Single Output Syntax*

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1. Introduction

In a short paper on binding theory, Lidz and Idsardi (1998) argue that the syntactic computation has a single output: "Phono-Logical Form".[1] Phono-Logical Form feeds directly into both the CI and SM interfaces. If Phono-Logical form determines the order of pronuncation at the Sensory-Motor (SM) interface, we expect that the same ordering relations should also be visible for interpretation at the Conceptual-Intentional (CI) interface. This chapter explores the hypothesis that order fixes scope at CI. I assume that ordering relations are computed cyclically in the style of Fox and Pesetsky (2005). This permits the relation between scope and linear order to be relaxed in a controlled manner, so that certain mismatches between scope and surface precedence can be accommodated.

The theory of scope and linearization which I will outline in this chapter has the following key components:

(i) The output of linearization is interpreted at both the CI and SM interfaces.

(ii) Linearization applies cyclically at each strong phase. (I will assume that CP and vP are strong phases, but that DP is not.)

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[1] Other advocates of "single output" models include Bobaljik (2002) and Brody (1995). This sort of architecture is reminiscent of the Extended Standard Theory prior to the introduction of LF.

(iii) Within each phase, lower copies are ignored for the purposes of linearization.

(iv) The output of linearization is a set of statements of the form $[\alpha \prec \beta]$, where α, β are either terminals or previously-linearized phases.

(v) Before interpretation/pronunciation can proceed at CI/SM, it is necessary to integrate the outputs of linearization for each phase.

(vi) A statement of the form $[a \prec b]$, where a and b are both terminals, implies that a precedes b at SM, and implies that a scopes over b at CI. A statement of the form $[a \prec B]$, where a is a terminal and B a phase, implies that a precedes everything in B at SM, and that a scopes over everything in B at CI.

(vii) There is a difference in how statements of the form $[A \prec b]$ and $[A \prec B]$ are interpreted at the SM and CI interfaces (for A, B phases and b a terminal). At SM, a statement of the first kind implies that everything in A precedes b, and a statement of the second kind implies that everything in A precedes everything in B. In contrast, such statements are ignored at CI.

(viii) As a result of (vii), once linearization statements from separate phases have been integrated at the CI and SM interfaces, CI has a partial ordering of terminals determining scopal precedence, while SM has a total ordering of terminals determining linear precedence.

(ix) A certain lack of correspondence between scope and linear order is permitted via the addition of Quantifier Raising and Quantifier Lowering operations.

(x) QR must proceed in "one fell swoop" (i.e., there is no successive-cyclic QR).

These hypotheses have the following consequences:

(i) A derivation of the "almost c-command" constraint on scope relations.

(ii) An account of certain Weak Crossover (WCO) effects which appear to be partially determined by linear order.

(iii) An account of why A-movement typically does not reconstruct for scope in English.

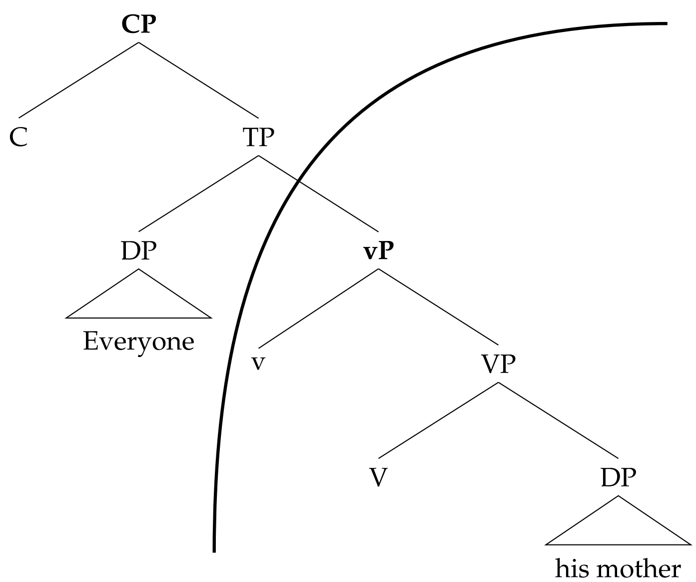
(iv) An analogue of Holmberg's generalization for QR.

The chapter is organized as follows. Section 2 describes the linearization mechanism in detail. Section 3 presents evidence from WCO and extraposition phenomena that linear order is directly related to scope. Section 4 considers how the linearization mechanism should be modified in order to permit movement via escape hatches. Section 5 discusses certain mismatches between scope and linear order which pose prima facie problems for the theory outlined in this chapter. Section 6 considers the question of whether it is vP or VP which is a phase. Section 7 argues that A-movement does not reconstruct, and that the present theory provides a principled explanation of this generalization. Finally, section 8 discusses a restriction on QR which is akin to Holmberg's generalization under Fox & Pesetsky's analysis.

2. How linearization works

Let us begin by considering the operation of linearization in some simple configurations. For the moment we will ignore the vP-internal subject, returning to the issues it raises in section 6. In a simple sentence such as (1), linearization has the following outputs for the CP and vP phases:

(1) Everyone$_1$ loves his$_1$ mother



Output for CP phase:
C $\prec$ everyone
C $\prec$ vP

everyone $\prec$ vP

Output for vP phase:
v $\prec$ V
v $\prec$ his
v $\prec$ mother

V $\prec$ his
V $\prec$ mother

his $\prec$ mother

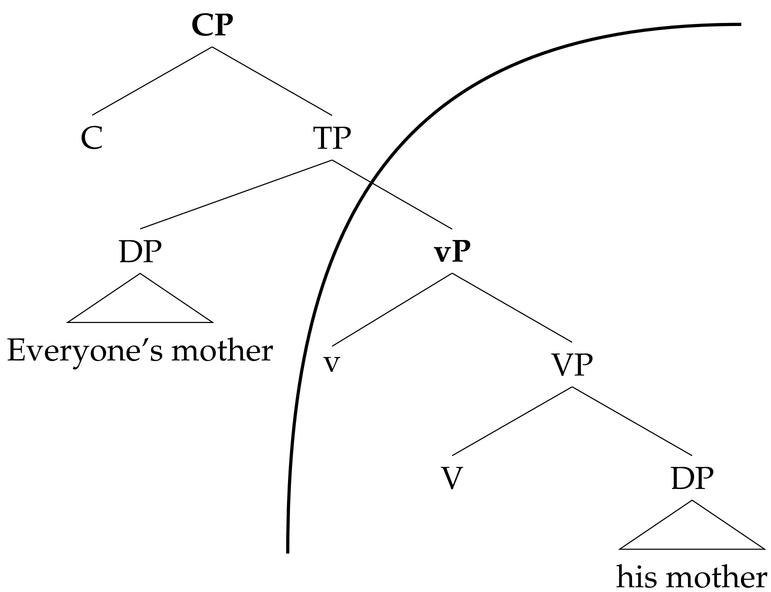
From [everyone $\prec$ vP], it follows both that *everyone* precedes *his* and that *everyone* scopes over *his* (so that *his* may be interpreted as a variable bound by *everyone*). More generally, there is a complete correspondence in (1) between linear precedence and scopal precedence:

(2) C $\prec$ everyone $\prec$ v $\prec$ V $\prec$ his $\prec$ mother

I will assume that, like linear precedence, scopal precedence is ultimately a relation between terminals. So for example, if a complex DP such as *every boy* scopes over another such as *some girl*, this is in virtue of the relation [every $\prec$ some] between the two quantificational heads.

We also find a complete correspondence between linear precedence and scopal precedence in examples such as (3):

(3) Everyone$_1$'s mother loves him$_1$.



Output for CP phase:[2]

C $\prec$ everyone $\prec$'s $\prec$ mother $\prec$

vP

Output for vP phase:[2]

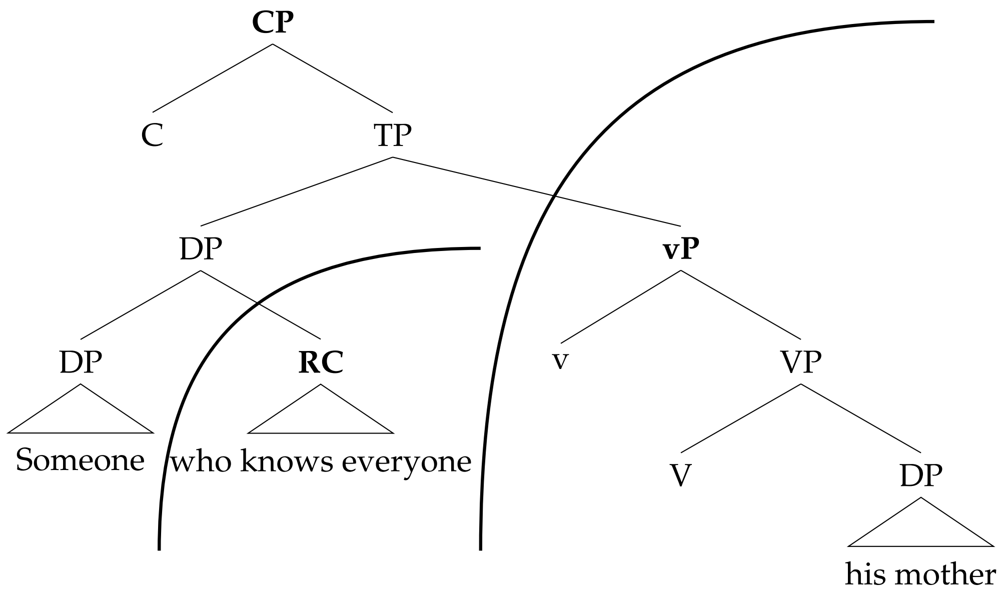
v $\prec$ V $\prec$ his $\prec$ mother

However, if another phase is embedded inside the subject DP, linear precedence and scopal precedence begin to pull apart:[3]

[2]Here, the outputs are written in a shorthand form. Aside from this notational difference, they are are identical those of (1), but for the addition of *'s* and *mother*.

[3]To simplify the tree, the relative clause is shown here as a DP adjunct. Nothing relevant would change if the RC were attached somewhere inside the DP (e.g. as

(4) *Someone who knows everyone$_1$ loves his$_1$ mother.



Output for CP phase:
C $\prec$ someone $\prec$ RC $\prec$ vP

Output for RC phase:
who $\prec$ knows $\prec$ everyone

Output for vP phase:
v $\prec$ V $\prec$ his $\prec$ mother

The statement which is responsible for the divergence between scopal and linear precedence is [RC $\prec$ vP]. Recall point (vii) of section 1. At SM, the statement [RC $\prec$ vP] implies that everything in the RC precedes everything in VP, but at CI it is simply ignored.[4] Thus, although the relative clause precedes vP, nothing within the RC scopes over anything in the vP. Hence, *everyone* does not scope over *his*, and a bound variable reading is not available. SM has the total order in (5), and CI the partial order diagrammed in (6):

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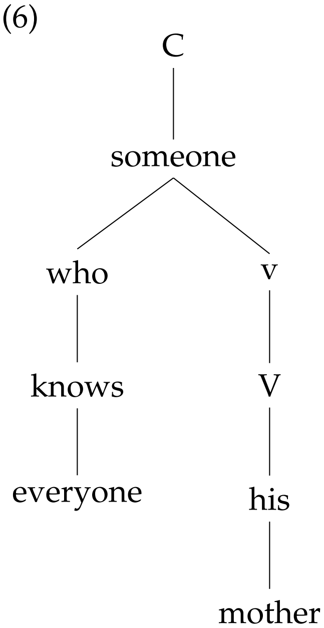
an adjunct to NP).

[4]Point (vii) will be given a more precise statement in Rule 3 of (26).

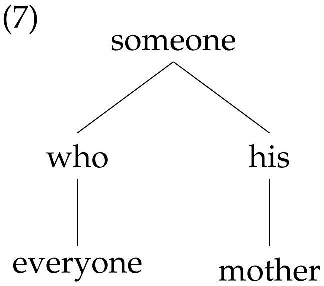
(5) C $\prec$ someone $\prec$ who $\prec$ knows $\prec$ everyone $\prec$ v $\prec$ V $\prec$ his $\prec$ mother

(6)



I will assume that ordering relations which involve a non-scope-bearing element are ignored at CI. For example, (6) is "pruned" to (7):

(7)



I will argue in section 8.2 that pruning has some empirical consequences.

2.1. Almost c-command

The range of permissible scope relations is essentially that captured by Hornstein's (1995) notion of "almost c-command":

(8) a. Everyone$_1$ loves his$_1$ mother.

b. Everyone$_1$'s mother loves him$_1$.

c. The people [every young man chooses to hang out with]$_1$ worry his$_1$ mother.

d. ??A friend of everyone$_1$ loves him$_1$.

e. *Someone who knows everyone$_1$ loves him$_1$.

(9) a. Everyone loves someone. ($\forall > \exists$)

b. Everyone's mother loves someone. ($\forall > \exists$)

c. A friend of everyone loves someone. (?? $\forall > \exists$)

d. A person who knows everyone loves someone. (* $\forall > \exists$)

One might ask why we should not account for instances of binding under almost c-command via QR. For example, (8b) may have the LF in (10), in which *everyone* c-commands *him*:

(10) LF: Everyone$_1$ ... [[t_1's mother] loves him$_1$]

There are two significant problems with the QR analysis. First, not everything which can scope out of a subject DP is QR-able. Adjectives, for example, cannot undergo QR, but their scope is restricted by almost c-commmand. This is illustrated by the contrast between (11a) and (11b). The former can have the reading "Occasionally, a sailor walked by," but the latter cannot:

(11) a. An occasional sailor walked by.

b. #A man who saw an occasional sailor walked by.

The second problem is that the structure in (10) arguably ought to induce a WCO violation. Although QR of the quantifier does not literally "cross over" the pronoun, it is nonetheless the case that the pronoun is A′-bound but not A-bound (Reinhart 1983). Thus, the QR analysis faces the additional problem of explaining the absence of a WCO violation in (10).

3. WCO and linear order

In a fairly wide range of extraposition structures, we find that WCO effects are conditioned on linear order in both the default and extraposed word orders: [5]

(12) *Default order*

a. ??I gave a picture of his$_1$ mother to [every boy]$_1$.

b. I gave a picture of [every boy]$_1$ to his$_1$ mother.

(13) *Extraposed order*

a. ??I gave a picture to his$_1$ mother of [every boy]$_1$.

b. I gave a picture to [every boy]$_1$ of his$_1$ mother.

(14) *Default order*

a. ??They explained the way he$_1$ should dress to [every male applicant]$_1$.

b. They explained the way [every male applicant]$_1$ should dress to his$_1$ mother.

[5] Bresnan (1995) presents examples similar to those in this subsection, some of which are based on hers. Some of the discussion in Guéron (1980) is also relevant.

(15) *Extraposed order*

a. ??They explained to his$_1$ mother how [every male applicant]$_1$ should dress.

b. They explained to [every male applicant]$_1$'s mother how he$_1$ should dress.

It would be difficult to account for this pattern in structural terms. (14) appears to show that the DP internal argument of *explain* is higher than the PP internal argument in the default order. (15) appears to show that extraposition of the DP internal argument places the DP internal argument lower than the *to* PP. The only way to account for this pattern without analyzing extraposition as downward movement would be a "stranding" derivation along the following lines:

(16) *Hypothetical derivation of default order:*

... PP .. DP

DP ... PP ... t_{DP}

explain ... DP ... PP

(17) *Hypothetical derivation of extraposed order:*

... PP ... DP

... explain ... PP ... DP

The claim would be that the underlying complement order for *explain* is PP DP, but that this is usually obscured by leftward movement of the DP. Extraposition occurs when for some reason the DP fails to undergo this movement, leaving it "stranded" below the PP. Although the stranding analysis seems somewhat plausible in simple cases, it faces two significant problems.

3.1. *Problem 1: Case adjacency*

The DP internal argument of *explain* behaves like an ordinary direct object with regard to Case adjacency:

(18) I explained (*yesterday) the idea (yesterday) to John.

If *explain* and the DP did not begin the derivation adjacent to each other, it would be difficult to ensure, by non-ad-hoc means, that they always ended up adjacent to each other.

3.2. *Problem 2: Interaction of DP and PP extraposition*

Consider a ditransitive verb, such as *give*, and the ordering possibilities given extraposition of the direct object and extraposition of PP out of the direct object:

(19) a. I gave [a picture of X] to Y.
b. I gave to Y [a picture of X].
c. I gave [a picture] to Y of X.

In all cases, WCO effects follow linear order:

(20) a. ??I gave a picture of his$_1$ mother to [every boy]$_1$.
b. I gave a picture of [every boy]$_1$ to his$_1$ mother.

(21) a. ??I gave to his$_1$ mother a picture of [every boy]$_1$.
b. I gave to [every boy]$_1$ a picture of his$_1$ mother.

(22) a. ??I gave a picture to his$_1$ mother of [every boy]$_1$.
b. I gave a picture to [every boy]$_1$ of his$_1$ mother.

To ensure that hierarchical order corresponds to linear order in these cases, we would have to construct a derivation in which each of the following three things is at some point c-commanded (or almost-c-commanded) by the other two: (i) the object DP, (ii) the indirect object PP, and (iii) the *of* PP. This may be possible in principle, but it is difficult to see how such a complex derivation could be independently motivated.

4. Escape hatches

As stated above, the theory does not permit movement via escape hatches. This is shown by the following abstract example:

(23) X Y ... $[_{HP}$ t_X H ... $t_X]$ (where HP is a phase)

(24) Linearization of inner phase:

$X \prec H$

Linearization of outer phase:

$X \prec Y \prec HP$

If [Y $\prec$ HP] implies that Y precedes everything in HP, then it implies [Y $\prec$ X]. But then we have both [X $\prec$ Y] and [Y $\prec$ X], which is a contradiction. Fox and Pesetsky address this problem by assuming that linearization statements apply to chains rather than copies.[6] I will adopt a different solution. Informally, the idea is as follows. Suppose we have two phases such as the following:

[6] If I understand correctly, the idea is roughly that [X > Y] means "the head of the chain to which X belongs precedes the head of the chain to which Y belongs" (but F&P couch this in terms of multiple dominance).

(25) $[_{\text{Phase1}}$ a...b...c...$[_{\text{Phase2}}$ t_{a} d e]]

Linearization of phase 1:

a $\prec$ b $\prec$ c $\prec$ Phase2

Linearization of phase 2:

a $\prec$ d $\prec$ e

As we have seen, there will be a contradiction if [c $\prec$ Phase2] implies that c precedes everything in Phase 2. I suggest that the implication of this statement is actually slightly weaker: [c $\prec$ Phase2] implies that c precedes everything in Phase2 which does not precede c in Phase1. Since a precedes c in Phase1, it is not inferred from [c $\prec$ Phase2] that [c $\prec$ a], and there is no contradiction.

Let us now make the rules for interpreting and integrating ordering statements more precise. We will be dealing with a number of different sets of ordering statements: those for each phase, and the final sets derived at CI and SM by combining these sets. To indicate that an ordering statement $[a \prec b]$ is in the set of ordering statements $\mathcal{L}(P)$ for a phase P, we write $[a \prec b] \in \mathcal{L}(P)$, or $[a \prec b]^P$ for short. Similarly, $[a \prec b]^{\text{SM}}$ and $[a \prec b]^{\text{CI}}$ indicate that an ordering statement is in the final set derived at SM and CI respectively. To indicate that an ordering statement $[a \prec b]$ is not in a phase P, we write $\mathcal{L}(P) \nvdash [a \prec b]$. There are three rules of inference:

(26) *Rule 1:*

For phases P_1, P_2, if $[P_1 \prec a]^{\mathrm{P}_2}$, then $[b \prec a]^{\alpha}$ for each terminal b in P_1.

Rule 2:

For phases P_1, P_2, P_3, if $[P_1 \prec P_2]^{\mathrm{P}_3}$, then $[a \prec b]^{\alpha}$ for each pair of terminals a, b in P_1, P_2.

Rule 3:

For phases P_1, P_2, if $[a \prec P_1]^{\mathrm{P}_2}$, then $[a \prec b]^{\alpha}$ for each terminal b in P_1 such that $\mathcal{L}(P_2) \nvdash [b \prec a]$.

Rules 1-2 are available for $\alpha = \mathrm{SM}$.

Rule 3 is available for $\alpha \in \{\mathrm{SM}, \mathrm{CI}\}$.

Rules 1 and 2 are stated in a simplified form, on the assumption that there are no violations of the proper binding constraint. (This amounts to the assumption that there is no sideward or remnant movement.)

5. Mismatches between scope and linear order

5.1. Quantifier raising and quantifier lowering

As it stands, the theory predicts too close a relation between scope and surface order: it does not allow for quantifier raising or quantifier lowering. Since there is good evidence that both QR and QL exist, the theory must be modified to permit them. To this end, I adopt the following pair of hypotheses. (i) Covert movement (in particular, QR) occurs when only the semantic and formal syntactic features of a DP are copied. (ii) Reconstruction (in particular, QL) occurs when only the phonological features of a DP are copied.[7] These hypotheses interact with the linearization mechanisms proposed earlier to make the following prediction:

(27) Covert movement and QR are impossible within a minimal phase.

To see this, consider a case of covert movement internal to a phase:

(28) $X_{\text{SYNSEM}} \ldots Y \ldots X_{\text{SYNSEM+PHON}}$

The output of linearization for this phase is as follows:

(29) $X_{\text{SYNSEM}} \ldots \prec \ldots Y$

At CI, this output indicates that X scopes over Y, and at SM, it indicates that X precedes Y. However, since X has no phonological content, the effect at SM is simply that nothing is pronounced. Covert movement within a phase leads to what is in effect non-recoverable deletion (which I will assume to be illicit). The same logic applies for reconstruction, but in reverse. The moved phrase will not enter into any scopal relations.[8]

This problem does not arise when the movement is cross-phasal. This is illustrated in (30) for covert movement:

[7] For related ideas see e.g. Sauerland and Elbourne (2002), Cormack and Smith (1997) on "split signs" and Chomsky (1995) on movement of FF(α).

[8] If the moved phrase is not a scopal element, there may be no crash at CI if it fails to stand in a scope relation to anything else. However, QR of a non-scopal element generally has no effect (and it may be ruled out in any case on economy grounds). One possible consequence relates to ACD. In principle, ACD involving a non-quantificational DP should be possible via short phase-internal QR, whereas ACD involving a quantificational DP should be possible only via cross-phasal QR. It is unclear whether this would have any testable consequences in practice.

(30) X_{SYNSEM} ... Y ... $[_{\text{HP}}$ ... Z ... $X_{\text{SYNSEM+PHON}}$] (where HP is a phase)

Output for embedded phase: $Z \prec X_{\text{SYNSEM+PHON}}$

Output for higher phase: $X_{\text{SYNSEM}} \prec Y \prec \text{HP}$

The statements $[X_{\text{SYNSEM}} \prec Y]$ and $[X_{\text{SYNSEM}} \prec \text{HP}]$ in the higher phase have no consequences for pronunciation, since X_{SYNSEM} has no phonological content. However, this does not lead to unrecoverable deletion of X, since we also have $[Z \prec X_{\text{SYNSEM+PHON}}]$ in the lower phase. X is therefore pronounced, but pronounced in a position distinct from that in which it scopes. The inverse effect (reconstruction) obtains when only the phonological features of X are copied.

Note that movement in "one fell swoop" is necessary to make covert movement/reconstruction possible. If X had moved first to the edge of HP in (30), it could not have been pronounced in its base position. This will have some important consequences later, since fell-swoop movement always runs a high risk of inducing a linearization conflict. Indeed, if Z is a scope-bearing element in (30) then a conflict will arise at CI in this instance, since we have $[X \prec \text{HP}]$ from the linearization of the higher phase giving $[X \prec Z]$ via Rule 3 of (26), which contradicts $[Z \prec X]$ from the linearization of HP.

Although covert movement and reconstruction require at least one long movement, there is nothing to prevent subsequent successive-cyclic movement via phase edges. For example, in the following abstract derivation, the moved phrase could reconstruct to its base position:

(31) X ... $[_{\text{PHASE}}$ X ... $[_{\text{PHASE}}$ X ... $[_{\text{PHASE}}$ $[_{\text{PHASE}}$ X ...]]]]

5.2. OV word order

Languages in which the canonical order has the object preceding the verb present an obvious potential counterexample to the claim that quantifier scope is closely related to linear order. However, there are some analyses of OS word order which are straightforwardly compatible with the present analysis. Consider for example Pearson's (1998) analysis of VOS order in Malagasy. Pearson (1998) argues that VOS order has a "predicate raising" derivation:

(32) $[_{\text{vP}}$ ... V ... Obj$]_1$ ... Subj ... t_1

The subject typically scopes over the object in Malagasy. If the raised predicate in (32) is a phase, this falls out as desired. The ordering statement [vP $\prec$ Subj] has no implications for scope. Thus, the subject and object can only stand in a scope relation if the vP reconstructs, in which case the statement [Subj $\prec$ vP] causes the subject to scope over the object. This example illustrates the point that it is not inherently problematic for the present analysis that subjects are sometimes able to scope over objects in OS languages. Everything hangs on the precise sequence of movements responsible for deriving OS order in any given instance. I leave it as an open question whether all instances of OS word order can be assigned plausible derivations deriving the attested scope relations.

6. vP or VP?

Fox and Pesetsky's account of Object Shift works only on the assumption that it is VP rather than vP that is a phase. If the subject were in the same minimal phase as the verb and the object, Object Shift would force the subject to raise together with the verb. A similar issue arises in connection with QR. If the object starts out in the same minimal phase as the subject, then the relative scope of the subject and the object will be frozen.[9] The theory presented here is compatible with the assumption that VP rather than vP is a phase in English. However, since this is a rather non-standard assumption, I would like to propose a way of reconciling the theory (and F&P's analysis of Object Shift) with the more standard assumption that it is vP which is the phase. The key idea is a reworking of the "visibility' theory of Case (Chomsky 1986):

(33) **Visibility Criterion:** Only +Case DPs are visible to linearization.

Given (33), linearization proceeds as if the as-yet-un-Case-marked vP-internal subject does not exist. The condition in (33) subsumes the effects of the Case Filter. If a DP never receives Case, it will never be linearized, leading to unrecoverable deletion. For this reason, adopting (33) does not obviously complicate the overall theory,

[9] Fox (2000, 59) argues that one way for an object to scope over a subject is for the subject to lower to its thematic position while the object undergoes "short" QR targeting the verb phrase. If is VP which is a phase, then short QR is available to vP on the present analysis. If vP is a phase, short QR is available if we assume that there is a projection between TP and vP which can be targeted by QR. An alternative means of permitting a form of short QR if vP is a phase would be to allow QPs to adjoin to TP prior to merger of the specifier of TP. On a single-cycle model this is possible without any violation of extension or cyclicity (if it does not violate any condition of phrase structure).

since something along the lines of the Case Filter must be stipulated anyway.[10]

An advantage of this means of resolving the problem posed by the vP-internal subject is that it suggests a more natural way of dealing with languages in which the vP-internal subject does seem to be visible to linearization. F&P cite Ko's (2004) work on Korean scrambling in this connection. Ko shows that a ban on scrambling the object over the subject follows on the assumption that S and O begin in the same minimal phase. Given (33), this point of variation might rather be tied to variation in Case assignment, or to variation in the feature which serves to make a DP visible.

7. A-movement and reconstruction

In English, A-movement typically does not cross phase boundaries (assuming that passive and unaccusative vPs are "weak" phases). This implies that it should typically be impossible for A-movement to reconstruct for scope, since, as we have seen in the preceding section, scope reconstruction can only occur when a DP moves across a phase boundary. The lack of reconstruction in examples such as (34b) (Chomsky 1995) is therefore correctly predicted:

(34) a. Everyone is not intelligent. ($\forall > \neg, \neg > \forall$)
b. Everyone seems not to be intelligent. ($\forall > \neg$, $^{*}\neg > \forall$)

In contrast, cross-phasal A-movement is predicted to show optional scope reconstruction. One candidate for a cross-phasal A-movement

[10](33) does differ from the traditional Case filter in implying that movement to a Case position may not be necessary in ellipsis contexts. It is not immediately clear whether this has any testable consequences.

is "short" scrambling in Japanese. There is good evidence that short scrambling is A-movement. Nonetheless, as illustrated in (35b), short scrambling gives rise to scope ambiguities, suggesting that short scrambling may undergo scope reconstruction:

(35) $\exists > \forall$, *$\forall > \exists$

a. Dareka-ga daremo-o aisite iru
Someone-NOM everyone-ACC love.
'Someone loves everyone.'

$\exists > \forall$, $\forall > \exists$

b. Daremo-o$_1$ dareka-ga t_1 aisite iru.
Everyone-ACC someone-NOM loves.
'Everyone, someone loves.'

What about examples such as (36), which appear to show a scope ambiguity?

(36) A Londoner is likely to win the lottery.

Following Lasnik (2012), I assume that these can be accounted for on the assumption that indefinites are (sometimes) interpreted as variables rather than as full quantificational DPs. The variable introduced by an indefinite is bound by a separately introduced "existential closure" operator (Heim 1982), which may be introduced in either the matrix or the embedded clause:[11]

(37) [A Londoner] is likely ~~[a Londoner]~~ to win the lottery.

a. LF: $\exists x$ [is likely [$(x$: Londoner$)$ to win the lottery]]

b. LF: is likely [$\exists x$ [$(x$: Londoner$)$ to win the lottery]]

[11] Lasnik cites Heim (1982), a locus classicus of the non-quantificational treatment of indefinites, but it seems likely that his idea could be implemented using a wide variety of non-quantificational semantic analyses of indefinites.

What about reconstruction under negation in simple clauses? This is possible for some – (38a) – but not all – (38b) – strong quantifiers, and (as expected) for indefinites – (38c):

(38) a. Everyone isn't here yet. ($\forall > \neg, \neg > \forall$)

b. Most people aren't here yet. ($\forall > \neg, {}^*\neg > \forall$)

c. A large elephant isn't in this room. ($\exists > \neg, \neg > \exists$)

It is puzzling why there should be a contrast between (38a) and (38b), and I have no insight to offer here. I will simply note that the possibility of lowering *everyone* in (38a) is accounted for under the present analysis. Raising from [Spec,vP] to [Spec,TP] in a transitive sentence crosses a strong phase boundary and is therefore able to reconstruct. By contrast, A-movement to [Spec,TP] in a passive does not cross a strong phase boundary, so *everyone* cannot lower in the passive. Judgments in such cases are difficult, but there does appear to be a contrast between pairs such as (39a)-(39b):

(39) a. ??Everyone hasn't been driven to work yet at this time of the morning.

b. Everyone didn't drive to work yet at this time of the morning.

With regard to reconstruction for binding, illustrated in (40) for A-movement, Lasnik notes that such examples are unproblematic given the assumption that binding relations may be established in the course of the derivation. Thus, although these are in a broad descriptive sense "reconstruction effects," they do not require any mechanism of reconstruction or lowering.

(40) a. Each other$_1$'s friends seem to the boys$_1$ t to be intelligent.

b. His$_1$ mother seems to every boy$_1$ t to be intelligent.

8. Holmberg's generalization for QR

One of the central empirical results of Fox and Pesetsky's (2005) is an account of Holmberg's generalization. This generalization, which holds of Object Shift in Scandinavian, is stated in (41):

(41) *Holmberg's Generalization*

Object Shift cannot cross phonetically realized material within the verb phrase.

This generalization is illustrated by the following pair of examples from Holmberg (1999). In (42a), the verb moves together with the object so that it remains to its left. In (42b), the auxiliary blocks movement of the main verb so that the object ends up to the left of the verb:

(42) a. Jag kysste henne inte [$_{VP}$ t$_V$ t$_O$].
I kissed her not

b. *Jag har henne inte [$_{vP}$ kysst t$_O$].
I have her not kissed

F&P's account of Holmberg's generalization can be summarized as follows:[12]

- VP, which is a verbal projection excluding the external argument, is a phase.
- Object Shift is a leftward movement to a position above VP.

[12] This is an adapted version of a summary given in a 2003 handout by Fox and Pesetsky. I have replaced "Spell-Out domain" with phase for consistency with the preceding material.

- Object Shift must occur in a single step: it cannot proceed via the left edge of VP.
- Object Shift may apply after the Spell-Out of VP, as long as the result can be ordered without contradiction.
- The output of Object Shift can be ordered only if the elements that preceded the object in VP continue to precede the object in the higher phase.
- If X belongs to VP and the ordering statements established for VP include $[X \prec O]$, Object Shift will be impossible if linearization of the next phase would add contradictory statements (e.g. $[O \prec X]$).

This explanation carries over to the present framework. We can either adopt F&P's assumption that it is VP rather than vP which is a phase, or, following section 6 above, assume that Caseless vP-internal subject is ignored for the purposes of linearization.[13] The remainder of this section considers certain scope phenomena which are abstractly similar to Holmberg's generalization.

8.1. Bruening (2001) and scope freezing

Bruening (2001) discusses a number of intriguing facts relating to scope freezing with English double object verbs and spray/load verbs. The first and second objects of a double object verb must have surface scope with respect to each other, as must the two internal arguments

[13] F&P note (p. 15) that the reason they take VP rather than vP to be a linearization domain is that Object Shift would immediately give rise to an ordering contradiction in the structure $[_{XP}$ Obj ... $[_{VP}$ Subj V $t_{Obj}]]$.

of the *with* variants of spray/load verbs:[14]

(43) a. John showed a boy every book.
($\exists > \forall$, $*\forall > \exists$)

b. John loaded a truck with every bale of hay.
($\exists > \forall$, $*\forall > \exists$).

Surprisingly, ACD out of the second object is nonetheless possible, as shown in (44a). Moreover, even in the ACD case, the first object must scope over the second – (44b):

(44) a. John awarded me every medal that Bill did.

b. John awarded a #different boy every medal that Bill did.

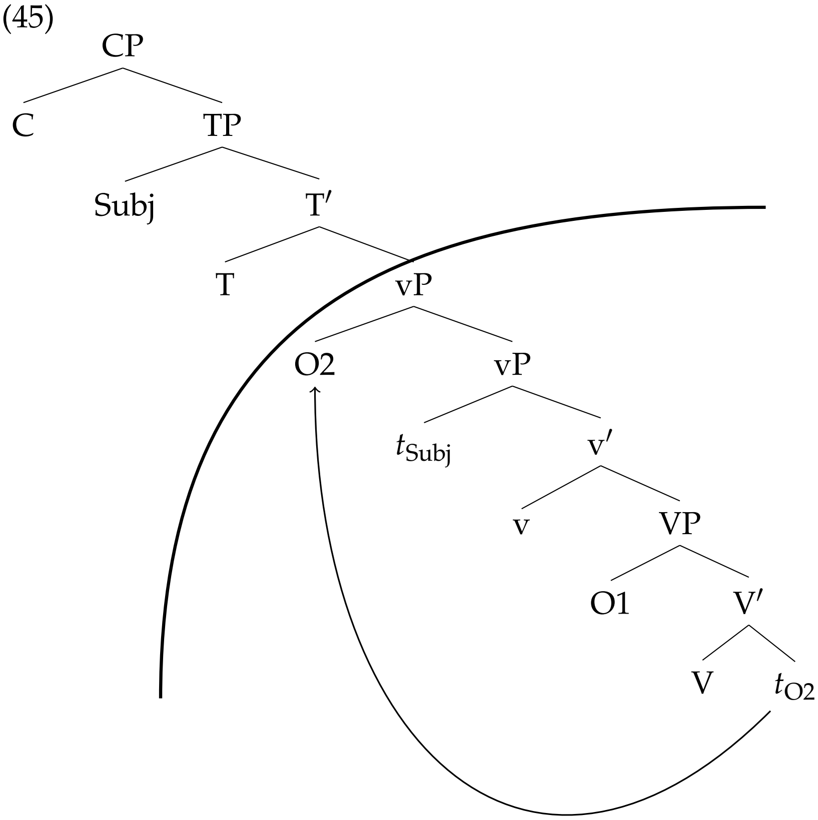
This appears paradoxical: the availability of ACD in (44a) suggests that the second object can QR, but the scope freezing facts in (43) suggest that it can't.

Bruening's solution to this paradox is built on the hypothesis that the second object can undergo QR only if the first does also. This ensures that the first and second object always retain their relative scope. Bruening argues that superiority is the condition responsible for this constraint. From the present point of view, the preceding phenomena are interesting because viewed abstractly they are another instance of Holmberg's generalization. Suppose that like Object Shift, QR is a movement which cannot proceed successive-cyclically via phase edges, and that no phase boundary intervenes between the first and second objects in the double object construc-

[14]The observation that scope is frozen in the *with* variant of the spray/load alternation is noted in Larson and May (1990), who attributes it to David Lebeaux.

tion.[15] Then just as the object can only shift if the verb raises with it, the second object will only be able to QR if the first follows suit. There are two potential derivations for illicit inverse scope. The first has the second object QR to the edge of vP:

(45)



Output for vP phase: O2 $\prec$ Subj $\prec$ v $\prec$ O1 $\prec$ V
Output for CP phase: C $\prec$ Subj $\prec$ T $\prec$ vP

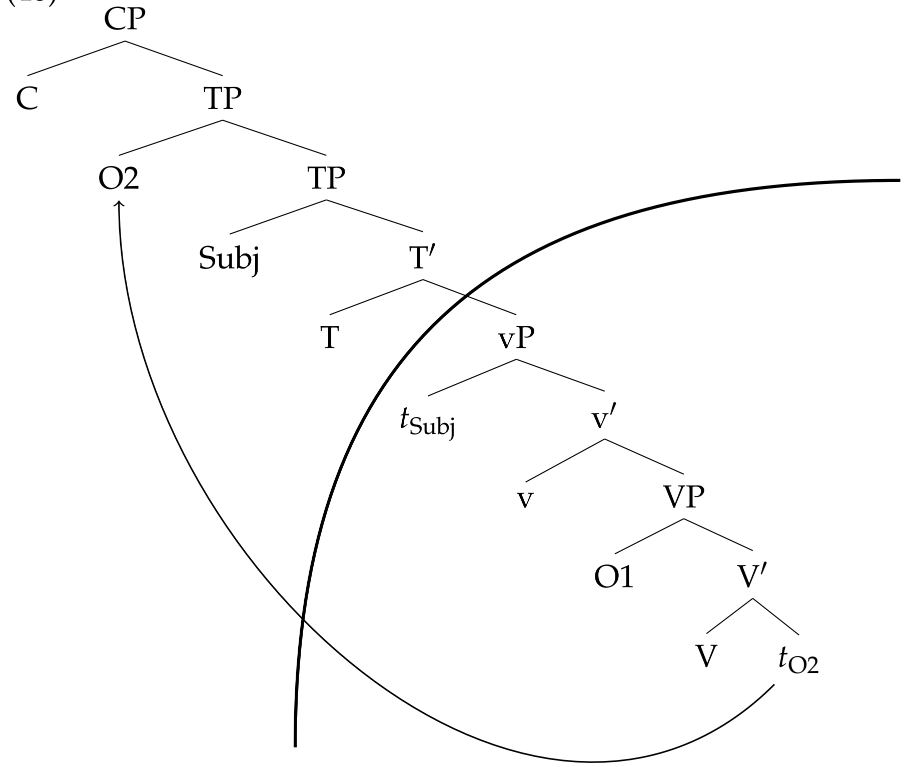
Since phase-internal movement cannot be covert (see section X above), $[\text{O2} \prec \text{O1}]^{\text{SM}}$ will inevitably be in the final set at SM.[16] English does not permit overt QR, so this derivation is impossible.

The second potential derivation of inverse scope has the second object QR to the edge of TP:

[15] Given the Visibility Criterion in (33), we also require the (innocuous) assumption that the first and second objects each receive case within their phase of origin.

[16] This would only strictly be true if the first and second objects were heads rather than phrases. If they are phrases, then we will have $[o_2 \prec o_1]$ for every pair of terminals o_1, o_2 in the first and second objects respectively.

(46)



Output for vP phase: Subj $\prec$ v $\prec$ O1 $\prec$ V $\prec$ O2
Output for CP phase: C $\prec$ O2 $\prec$ Subj $\prec$ T $\prec$ *vP*

This derivation permits QR to be covert, since the second object proceeds directly to the edge of TP without stopping off at the edge of vP. However, the derivation also leads to an ordering contradiction. From linearization of the vP phase we have $[\text{O1} \prec \text{O2}]^{\text{vP}}$ which entails $[\text{O1} \prec \text{O2}]^{\text{SM}}$, but from linearization of the CP phase we have $[\text{O2} \prec \text{vP}]^{\text{CP}}$ which entails $[\text{O2} \prec \text{O1}]^{\text{SM}}$. The derivations in (45)-(46) exhaust the possible means of obtaining inverse scope, so the present theory predicts that the first and second object DPs in the double object construction must have surface scope with respect to each other.

The present analysis also predicts the contrast noted by Hornstein (1995, 76) between (47a) and (47b):[17]

(47) a. Someone considers every congressman a fool.
($\exists > \forall$, $^*\forall > \exists$)

b. Someone considers every congressman to be a fool.
($\exists > \forall$, $\forall > \exists$)

In (47b), the vP inside the infinitive introduces a strong phase boundary separating *every congressman* from *a fool*. To account for the possibility of non-surface scope in (48), I assume that there is a phase boundary between the two internal arguments in ordinary ditransitives:

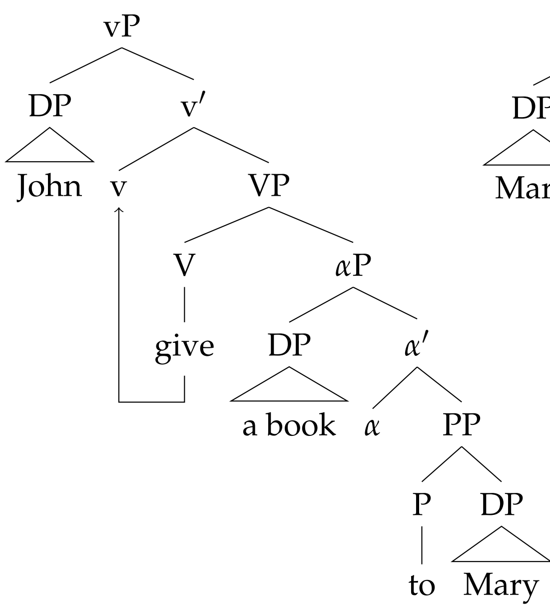
(48) I gave a book to every boy. ($\exists > \forall$, $\forall > \exists$)

The most obvious candidate phase head is the preposition. However, if argument PPs were always phases there a would also be a phase boundary between the two internal arguments in the *with* variant of the spray/load alternation. Since this structure also shows scope freezing (see (43b) above), we must look elsewhere for a candidate phase head. Section 6 of Bruening's (2001) paper develops an account of the structural contrast between double object and spray/load constructions on the one hand and and ditransitive structures on the other. I will adopt this analysis in its essentials. Following Marantz (1993), Bruening proposes that double object and spray/load verbs trigger formation of a complex predicate via head movement of V.

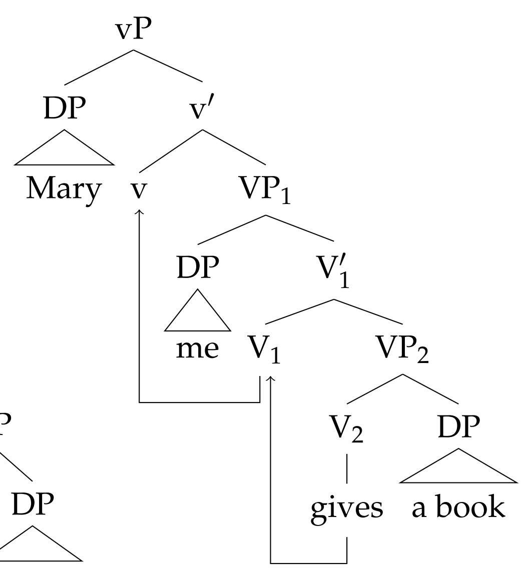
[17] An alternative explanation for this contrast is simply that the indefinite cannot be interpreted as a true quantifier in the small clause predication in (47a). However, it is somewhat unclear what the order of explanation should be in this instance. It may be that the indefinite cannot receive a quantificational interpretation precisely because it cannot undergo QR (den Dikken 2006, 137).

Within Bruening's framework, this renders the two objects equidistant for the purposes of superiority. Within the present framework, there is a connection with the recent literature on "phase extension."[18] Raising of the verbal head removes any phase boundaries which might otherwise have intervened between the two objects. The trees in (49)-(51) show the structures that Bruening proposes for ditransitive, double object and spray/load (*with* variant) verbs:[19]

(49) Ditransitive



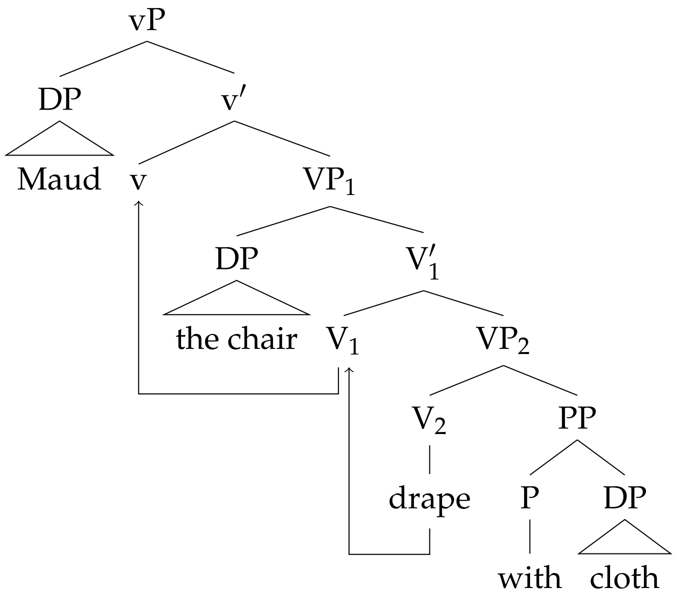
(50) Double object



[18]den Dikken (2007).

[19]The α head in (49) is introduced in place of the ternary-branching VP structure which Bruening tentatively proposes. See tree (72) in Bruening's paper. Bruening notes that an alternative structure for (49) in which *a book* is the specifier of the PP is somewhat implausible, given that the P together with its complement can undergo movement. The tree in (49) is adapted from Bruening's (61), the tree in (50) from his (59) and the tree in (51) from his (63).

(51) Spray/load (*with* variant)



If α in (49) is a phase head, the direct and indirect objects are not in the same minimal phase, so scope freezing is not predicted. In (50)-(51), all of the verbal heads eventually end up in the position of v, so that whether or not V_1 and V_2 are phase heads, the original VP_1 and VP_2 will not be phases (given a suitable theory of phase extension).

8.2. Scope freezing subsumed under Holmberg's generalization

Bruening shows that although the first and second objects in the English double object construction must have surface scope with respect to each other – (52a) – it is nonetheless possible for the second object to scope over the subject – (52b). ACD out of the second object is also possible – (52c). Surprisingly, however, ACD out of the second object does *not* permit the second object to scope over the first – (52d).

(52) a. John showed a boy every book. ($\exists > \forall$, $*\forall > \exists$)

b. At least two judges awarded me every medal. (a.l.t $>$

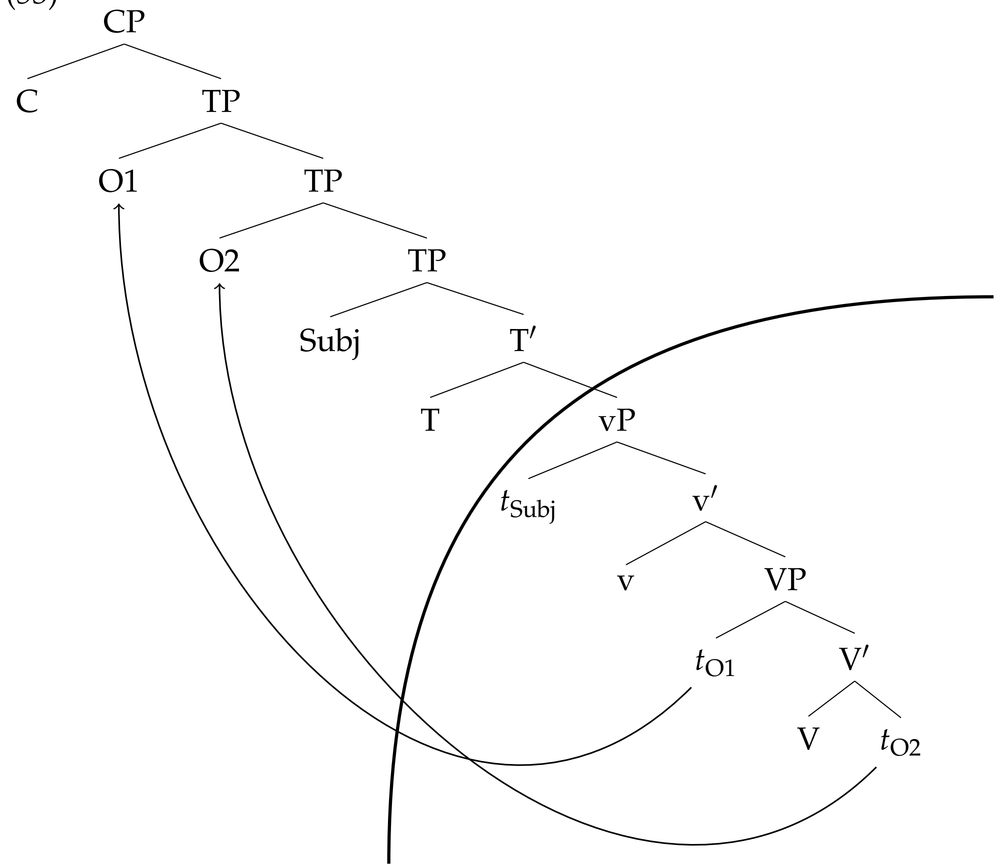
$\forall, \forall >$ a.l.t.)

c. John awarded me every medal that Bill did.

d. John awarded a #different boy every medal that Bill did.

Bruening argues that these facts are explained on the assumption that QR of the second object is possible only when the first object undergoes QR to a still higher position. We can now see how the necessity of this additional instance of QR follows from the present theory. As explained above, QR of the second object alone leads either to illicit overt QR, or an ordering contradiction. However, if the second object also undergoes QR, the ordering contradiction is avoided:

(53)



vP phase linearization: Subj $\prec$ v $\prec$ O1 $\prec$ V $\prec$ O2
CP phase linearization: C $\prec$ O1 $\prec$ O2 $\prec$ Subj $\prec$ T $\prec$ vP

A crucial assumption here is that most of the heads within vP are not scope-bearing, and hence are ignored for the purposes of scope linearization (see the discussion of "pruning" in section 2 above). For example, there is a contradiction in (53) between $[\text{V} \prec \text{O2}]^{\text{CI}}$ and $[\text{O2} \prec \text{V}]^{\text{CI}}$ (the second of which follows from $[\text{O2} \prec \text{vP}]^{\text{CP}}$). Since V by hypothesis is not scope-bearing, this contradiction is harmless.

If an additional scope bearing head within vP is added to the left of the object, it is predicted that the second object should no longer be able to QR out of the vP to scope over the subject. This in fact seems to be the case:

(54) At least two judges twice awarded me every medal.
(a.l.t $>$ twice $>$ $\forall$ is only possible scope reading.)

As (55) illustrates, this effect obtains even with quantificational heads such as *twice* which cannot undergo QR:

(55) Most of the boys have twice arrived late.
(most $>$ twice, *twice $>$ most)

The effect would be more difficult to explain under Bruening's account, since superiority, as it applies to QR, is only sensitive to the presence of other elements which may undergo QR.

Norbert Hornstein and Marcel den Dikken (p.c.) point out that there is a potential problem with Bruening's analysis of scope freezing which might carry over to the present analysis. If QR in ACD targets TP, it is predicted that the first object must scope over the subject in instances of ACD from the second object. This is not in fact the case. For example, (56) clearly has a reading under which there may be two different students for every professor:

(56) Every professor gave two students most of the books that you did.

This problem could be obviated if the first and second objects could both QR to a position which is outside of the ellipsis site but nonetheless below the subject. Fox (2002) has independently argued that ACD can be resolved via QR targeting the verb phrase. One indication that this sort of analysis is available is the possibility of both the first and second objects scoping under the subject in instances of ACD within the second object:

(57) [Every professor]$_1$ gave two of his$_1$ students most of the books his$_1$ TA did.

If vP is a phase, short QR to vP is not available in the present theory. However, as noted in footnote 9, there is nothing blocking QR to a projection sitting between the vP phase and the subject.

9. Conclusion

As a descriptive generalization, it is roughly accurate that scope in English follows linear order. We have seen that certain constraints on scope relations mirror constraints which have been argued to derive from linearization effects on the PF side. This hints at a more direct connection between scope and linear order than is typically assumed. There are two respects in which scope does not follow linear order. First, verb-phrase-internal quantifiers can often scope over subjects. The present theory accounts for this in a rather conventional way by stipulating the availability of covert QR. Second, constituents deeply embedded in left branches cannot scope over constituents on the corresponding right branch. This effect can be captured in a phase-based framework without directly introducing any hierarchical constraints on scope.

The mechanism of linearization imposes a certain anti-locality constraint. If two heads or phrases α and β are in the same minimal domain, α cannot move over β unless either (i) α moves via the edge of the phase, or (ii) β moves together with α in an order-preserving manner. Object Shift and QR are two examples of movements which cannot proceed via phase edges. They are consequently restricted by (ii), as noted by Holmberg in the case of the former and Bruening in the case of the latter.

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