

Cyclic Linearization and the Typology of Movement

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1. Introduction

- There is good reason to think that *wh*-movement involves intermediate steps, for example, movement to the left edge of an embedded CP:

(1) Wh-movement through left edge of CP

I wonder [which book he thinks [_{CP} ___ Mary read ___]]



Evidence: scope reconstruction, *all*-stranding (McCloskey 2000), agreement phenomena (Chung *passim*), and islands.

- **Why does *wh*-movement proceed through the left edge of CP?**
- **Logic of a common answer:** Things would go wrong otherwise.

Question: What would go wrong otherwise?

Common answer: There are **syntax-internal structural conditions** that require such movement, e.g. (2):

(2) Phase Impenetrability Condition (Chomsky 1999/2000)

In phase α with head H, the domain of H is not accessible to operations outside α , but only H and its edge.

Our alternative:

An answer in terms of *linearization*, i.e. conditions on the syntax-phonology interface

(3) Properties of *wh*-movement in (1):

- a. Movement 1 "revises" word order with respect to elements in the lower CP;
- b. Movement 2 "revises" word order with respect to elements in the upper CP; *but*
- c. Movement 2 does not revise word order with respect to elements in the *lower* CP. i.e. the moved *wh*-phrase precedes all elements in the lower CP both before movement and after movement,

Our conjecture: Property (3c) is not a coincidence. If it did not hold, the sentence could not be linearized.

2. General proposal

- Derivations proceed "bottom-to-top".
- Certain syntactic domains created in a derivation are *Spell-out Domains* (roughly: CP, DP and ν P/VP; but see Sabbagh 2003). By this, we mean (for now) domains whose construction is immediately followed by linearization. These roughly correspond to Chomsky's notion of *phase*.
- Linearization adds new ordering statements to the set of statements established by the linearization of previous Spell-out Domains.

(4) **Consequence: Linearization Preservation**

The linear ordering of syntactic units is affected by Merge and Move *within* a Spell-out Domain, but is fixed once and for all at the end of each Spell-out Domain.

- For example: if leftward movement of *which book* out of CP in (1) were to take place from a position preceded by an overt element X within CP, the ordering "X precedes α " would have to be altered in the higher domain -- contrary to the proposal.

[Languages look at first glance as if they may differ in the exact size of the Spell-out Domains, i.e. which ordering statements established in a lower portion of the tree are inviolable in higher portions. We will suggest that this effect is a reflex of an overt/covert distinction for external merge parallel to the better established overt/covert distinction for internal merge (movement).]

Predictions of other proposals:

- a. Movement only possible from the edge of a relevant domain.
- b. Successive-cyclic movement through the edges of relevant domains is required independent of linearization.

Predictions of our proposal:

- a. Movement is possible from the *non*-edge of a relevant domain so long as the previously established linearization is not disrupted.
- b. When there is no need to linearize, successive-cyclic movement through the edges of relevant domains is not required.

Summary of relevant evidence:

a. Non-Edge Movement:

Object Shift in Scandinavian (Holmberg 1999) is possible only when elements that preceded the object in VP still precede the object after it has shifted, as a consequence of other movement operations. [Cf. similar proposals by Müller 2001, Sells 2000, Williams 2002, among others.]

Verb movement to C in Scandinavian is possible only when elements that preceded the verb in VP still precede the verb after V-to-C movement. Crucial evidence: the contrast between *Quantifier movement* (Røgnvaldsson 1989; Jónsson 1996, Svenonius 2000) and *wh-movement* in V2 environments.

Main verb movement in English is possible only when the element that precedes it (the subject) moves to a position where it continues to precede the verb, hence no V-movement to C when the subject is in Spec,IP — but auxiliary verbs, externally merged outside vP, are subject to no such restriction. We can argue, contrary to tradition, that English main verbs move overtly to I.

Subject scrambling from vP when object has scrambled to the edge of vP in Korean and Japanese (Ko 2003) is possible only if the object ultimately scrambles to a position higher than the subject, recreating the order of elements in vP.

b. Non-successive-cyclic movement:

When linearization is not necessary, non-edge movement is generally possible. Example: **Ellipsis** which shows the phenomenon of "Salvation by Deletion" (Ross 1967; Chomsky 1972; Lasnik 2001; Merchant 2002; Fox and Lasnik 2003).

Ellipsis in this proposal has a capacity for evil as well as good. By eliminating ordering contradictions, it allows extraction from certain islands, but elimination of ordering statements can also leave remnant elements unordered, making pronunciation impossible. A **locality condition on multiple sluicing** is explained as a consequence of this "dark side" of ellipsis.

3. How it works

- Suppose a bottom-to-top derivation has created the syntactic domain **D** in (5), where D is also a Spell-out domain. Assume that the Spell-out operation establishes the ordering statements given in (5).

(5) [D X Y Z]

Ordering: **X<Y**
 Y<Z

[Redundant ordering statements such as $X < Z$ are omitted for ease of presentation until the final section, where we will see empirical consequences of the presence/absence of such statements.]

- An Ordering statement of the form $\alpha < \beta$ is understood by PF as meaning that the **last element of α precedes the first element of β** .
- The "elements" linearized by these statements are **heads of chains, never traces**. Thus, informally speaking, if the first element in Z is a trace, it is the *second* element in Z that is ordered after the last element of Y in (5). [This will be follow from the definition of "Dominates" combined with a particular hypothesis about the nature of movement. We will assume that movement is "re-Merge", so that when an element moves, it does not make a copy, but simply exists in two positions. A phrase dominates a moved constituent only if it dominates its most recently merged position]

- Next we merge α , starting a new Spell-out Domain...

(6) α [_D X Y Z]

Scenario 1 (movement from edge position)

- Suppose X now overtly moves to the left of α in (6). When the next domain D' (containing α and D) is spelled out, the linearization of D' will add (to the ordering statements from D) the new (boldfaced) ordering statements listed in (7):

(7) $\overbrace{[D' : \dots X \alpha [D t_x Y Z]]}$
 Ordering: $X < \alpha$ $X < Y$
 $\alpha < D \rightarrow \alpha < Y$ $Y < Z$

[boldface=new in the current Spell-out Domain]

As we noted above, " $X < \alpha$ " means that the last element of X precedes the first element of α .

Likewise, " $\alpha < D$ " means that the last element of α precedes the first (non-trace) element of D — in this case, Y (i.e. the first element of Y , if Y itself is complex). The arrow after " $\alpha < D$ " shows this consequence of the ordering statement. [We will not mark these phonological consequences consistently — only when it helps make things clearer.]

Key point: Because X was at the left edge of D , *the ordering statements added in D' are consistent with the ordering statements previously added in D* . Leftward movement from the left edge of a Spell-out Domain thus obeys Linearization Preservation and poses no ordering problems.

4. Holmberg's Generalization: Holmberg (1999)

Most famous instance of HG

- Scandinavian languages show V/2. When V moves to C, the object may move out of VP (crossing negation and adverbs).

(11) Object shift blocked by (unmoved) verb intervener: facts

- | | | | |
|----|--|-----|-------------------------------|
| a. | Jag kysste henne inte [_{VP} t _v t _o] | a'. | (*Jag kysste inte henne. |
| | I kissed her not | | I kissed not her |
| b. | *Jag har henne inte [_{VP} <u>kysst</u> t _o]. | b'. | Jag har inte kysst henne. |
| | I have her not kissed | | I have not kissed her |
| c. | *...att jag henne inte [_{VP} <u>kysste</u> t _o]. | c'. | ...att jag inte kysste henne. |
| | ...that I her not kissed | | ...that I not kissed her |

Previous accounts of HG

(12) Chomsky's HG (1993):

Verb movement is needed so as to obviate a violation of Relativized Minimality (Shortest Move) when the direct object raises over the subject.

(13) Bobaljik's HG (1994, 1995, in press):

Object shift disrupts adjacency between the verb and a head that hosts an affix. Verb raising is needed to restore adjacency.

(14) Holmberg's (1999) HG (HHG)

"Less often mentioned, but no less true, is the fact that not just an unmoved verb, but any phonologically visible category inside VP preceding the object position will block Object Shift."

(15) OS blocked by non-verb interveners (dotted underline)

a. First-object intervener

- *Jag gav den inte [_{VP} t_v Elsa t_o].
I gave it not Elsa

b. Particle intervener

- *Dom kastade mej inte [_{VP} t_v ut t_o].
They threw me not out

c. Preposition intervener (see also Wagner 2002)

- *Jag talade henne inte [_{VP} t_v med t_o].
I spoke her not with

Key facts in support of Holmberg's HG

(16) **OS not blocked if the non-verb intervener is moved by A-bar movement to the left of the OS landing site.**

a. *First object intervener moves...*

\bar{V}_{em}_{IO} gav_V du den_O inte [_{VP} t_V t_{IO} t_O]. [compare (15a)]
who gave you it not

b. *Particle intervener moves...*

$\bar{U}T_p$ kastade dom mej_O inte [_{VP} t_V t_p t_O] (bara ned för trappan).
out threw they me not (only down the stairs) [compare (15b)]

(17) **OS also not blocked if a verb intervener is moved to the left of the OS landing site even by movement other than V-to-C: "verb topicalization"**

a. \bar{K} ysst har jag henne inte (bara hållit henne i handen).
kissed have I her not (only held her by the hand)

b. \bar{S} ett har han me kanske [_{VP} t_V t_O ...]
seen has he me perhaps
(men han vet inte vad jag heter).
(but he knows not what I am called)

(18) **Holmberg's Explanation**

At the point at which OS applies, the object may not cross phonologically overt material. This follows from the assumption that OS applies at PF and is sensitive to a PF version of Shortest Move.

Our alternative

(19) **Revised HHG**
OS cannot revise the relative order of the constituents in VP.

Explaining the Revised HHG

- VP is a Spell-out Domain. The application of OS does not involve movement to the edge of VP. OS may apply after the spell-out of VP, as long as the result can be ordered (i.e. ordered without contradiction).
- The output of OS can be ordered only if the elements that preceded the object in VP continue to precede the object in the higher Spell-out Domain [Scenario 1; example (7)].
- If X belongs to VP and the ordering statements established for VP include X<O, OS will be impossible if Linearize of the next Spell-out Domain would add contradictory statements (e.g. O<X or a set of statements whose transitive closure would include O<X).

The famous cases: verb interveners

(20) VP: [VP V O]
Ordering: V<O

a. CP (**no V-raising**): [CP S aux [TP t_S O adv t_{aux} [VP V t_O]]

Ordering: S<aux V<O
aux<O
O<adv
adv<VP --> adv<V

V precedes O in the VP Spell-out Domain. Since O precedes adv and adv precedes V, by transitive closure, O precedes V — a contradiction.

b. CP (**yes V-raising**): [CP S V [TP t_S O adv [VP t_V t_O]]

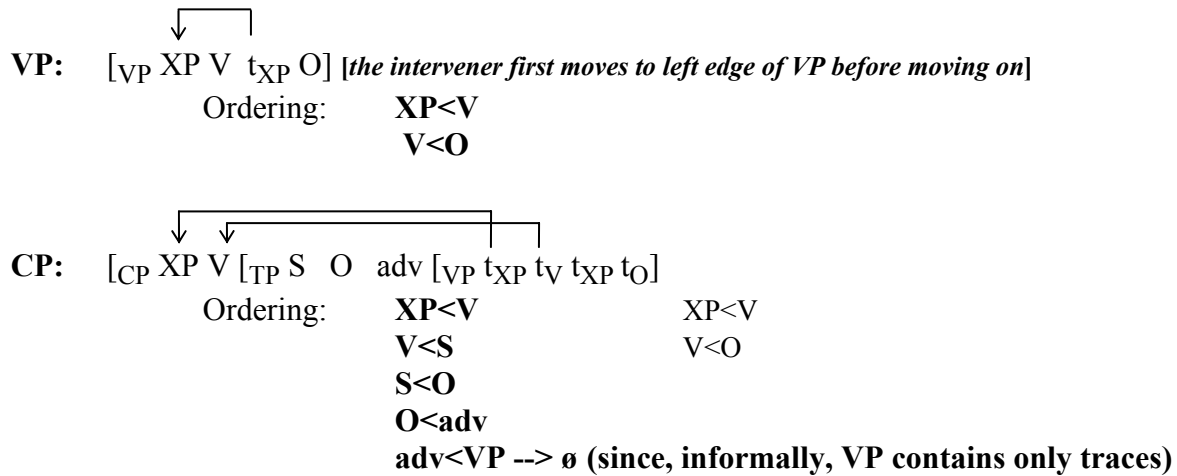
Ordering: S<V V<O
V<O
O<adv
adv<VP --> ∅ (since, informally, VP contains only traces)

V precedes O in the VP Spell-out Domain and continues to precede it in the CP spell-out domain. Since VP dominates only traces, the statement "adv<VP" has no consequences for pronunciation and creates no contradictions.

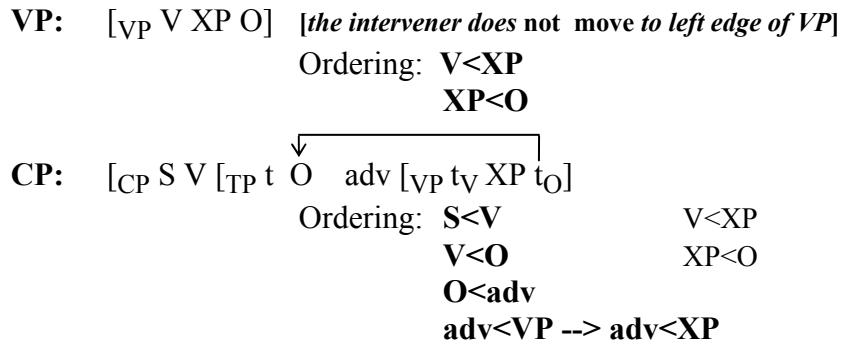
The new cases #1: non-verb interveners

- (16) a. Vem_{IO} gav_V du den_O inte [v_P t_V t_{IO} t_O].
who gave you it not
- b. UT_P kastade dom mej_O inte [v_P t_V t_P t_O]. (only down the stairs)
out threw they me not

(21) **Derivation of [ok] OS when a non-V intervener moves higher**



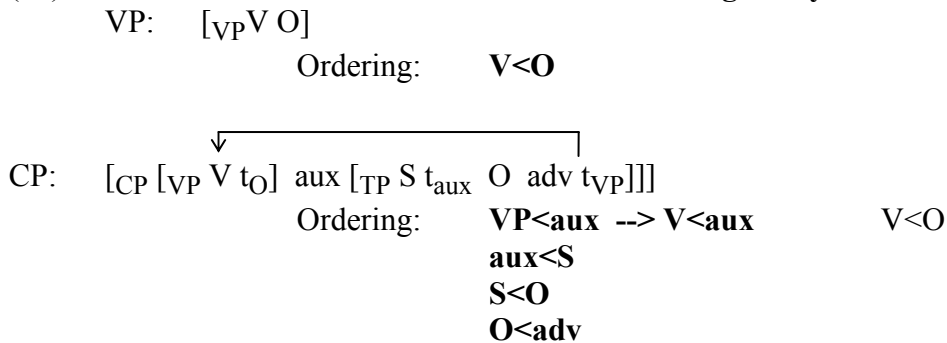
(22) **Derivation of *OS when non-V intervener remains unmoved**



XP precedes O at the VP Spell-out Domain. O precedes VP (by transitivity) in the higher Spell-out Domain, which means that O precedes XP — a contradiction.

The new cases #2: "V topicalization"

(23) **Derivation of OS when V-intervener raises higher by remnant VP-topicalization**



At the VP Spell-out domain V precedes O. In the higher Spell-out domain V still precedes O (through transitivity), so there is no contradiction.

Digression: Holmberg (1999) requires a different analysis of "V topicalization"

(24) **Holmberg's Explanation for HHG**

At the point at which OS applies, the object may not cross phonologically overt material. This follows from the assumption that OS applies at PF and is sensitive to a PF version of Shortest Move.

The logic of Holmberg's explanation, and some consequences:

- Holmberg's explanation involves a condition on the application of OS -- not a filter on its output.
- Since OS is successful when its intervener moves higher than the OS landing site, OS must apply countercyclically. Otherwise OS would have to apply crossing the verb -- in violation of HG.
- One instantiation of the countercyclic proposal is the view that OS applies "at PF". This makes sense of the fact that the intervention constraint distinguishes pronounced from unpronounced material.
- The apparent verb topicalization in (17) can be analyzed as remnant VP topicalization blocked by OS only if topicalization follows OS. If OS applies at PF, then topicalization would have to apply at PF. This would be an unlikely conclusion, since topicalization interacts with syntactic processes. Therefore, V must be able to undergo A-bar head movement on its own. On this analysis, then, the apparent V-fronting in (17) must really be V-fronting.

Reminder of our alternative: OS cannot revise the relative order of the constituents in VP.
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The logic of our alternative, and some *different* consequences:

- Revised HHG is not a condition on the application of OS, but (in effect) a filter on its output. OS may cross an "intervener" before the intervener moves out of the way. What is necessary is that spell-out retain the linear order that would have held without OS.
 - As a consequence, OS does not need to be viewed as "PF movement".
 - OS does not apply countercyclically.
 - OS may precede remnant VP topicalization. Thus, the apparent V-fronting in (17) might not be V-fronting.
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But is Verb Topicalization head movement or XP remnant movement?

Prediction (Alec Marantz, p.c.) : Remnant VP-topicalization should be possible only if the relevant trace is on the right edge of VP.

- Swedish rigid V-IO-DO order provides a test of this prediction, since only in (25a) (where the DO is the trace) is the trace on the right edge:

(25)a. ?[Gett henne t_{DO}] har jag den_{DO} inte...
 given her have I it not

b. *[Gett t_{IO} den] har jag henne_{IO} inte...
 given it have I her not
 (Anders Holmberg, p.c.)

- Holmberg (1999) takes the unacceptability of (26) as evidence for V-topicalization as opposed to VP-remnant movement. In fact, this evidence is compatible with our proposal, and has the same status as (25b). At the VP Spell-out Domain, the following order is determined: **heard < her < give < talk**. OS followed by VP topicalization in the higher Spell-out Domain violates this order.

(26) *[__{VP} Hört t_o hålla föredrag] har jag henne_o inte t_{vp}.
 heard t give talk have I her not

- Examples (27a-b), from Holmberg (1999) are a problem for proposals that countenance V-movement to Spec,CP. [Holmberg's suggestion: a restriction on the ability of V-traces to assign case.]
- If there is no actual V-movement to Spec,CP, but only (remnant) VP-movement, an example like (27a) could be generated in the following steps: (I) extract [*her give talk*] from VP; (II) object-shift *her* from [*her give talk*]; (III) move the remnant VP, which contains only the verb as a non-trace, to Spec,CP. The example can be excluded if step (I) is impossible: movement of small clauses and ECM-infinitives is generally not found. [An alternative derivation might first extract the VP *give talk*. We do not know whether such constituents move more generally.]¹

(27)a. *Hört_v har jag henne_o inte t_v [t_o hålla föredrag].
 heard have I her not give talk

b. *Hört_v har jag inte t_v [Per hålla föredrag].
 heard have I not Peter give talk

¹ In English, Heavy Shift may perhaps be followed by remnant VP topicalization, e.g. *Read we did the books that she recommended*. Heavy Shift of an ECM infinitive seems unacceptable, especially with remnant VP topicalization:

- (i) *Mary saw with her binoculars Bill give that talk we were expecting.
- (ii) *See she did Bill give that talk.

The VP of an ECM infinitive also may not be stranded:

- (iii) *See Bill she did give that talk.

5. An Anti-HG effect

Prediction

- Leftward movement from a Spell-out domain D either behaves like OS or proceeds via the left edge of D.
- Movement via the left edge of D should, in turn, create a new HG effect with respect to any other element of D that would otherwise have occupied the left edge of D.

What to look for

- An operation OP moving α whose landing site is similar to the landing site of OS —*but which appears to disobey HG*— must have proceeded via the left edge of the lower Spell-out domain (e.g. VP).
- OP will establish the ordering " $\alpha < \text{verb}$ " in the lower Spell-out domain.
- **Consequence:** An "anti-HG effect". OP blocks V-raising, e.g. V/2.

Quantifier Movement in Icelandic (Svenonius 2000; Rögnvaldsson 1989; Jónsson 1996)

- Quantifier movement (QM), like OS, is an operation that takes an element (a quantifier phrase) and moves it leftward over all the elements in the lower spell-out domain.
- However, unlike OS, QM can reverse the order of elements in the lower Spell-out domain (i.e. the elements it moves over may be overt, giving the appearance of violating HG.):

(28) **Quantifier Movement appears to violate HG**

- a. Hann hefur talað við ýmsa.
he has spoken with various
'He has spoken with various [people]'
- b. Hann hefur ýmsa talað við.
he has various spoken with
'He has spoken with various [people]'

- QM thus moves through the edge of the lower Spell-out Domain and should show an "anti-HG effect". It should block verb raising to C:

(29) **QM incompatible with V-movement to C**

- a. Jón hefur ekkert sagt Sveini.
Jon has nothing said Svein
'Jon has told Svein nothing'
- b. *Jón sagði ekkert Sveini.
Jon said nothing Svein
- c. Jón sagði Sveini ekkert.
Jon said Svein nothing
'Jon told Svein nothing'

(30) a. ?Hann mun marga stráka neyða jg til að kyssa.
he will many boys force you to to kiss
'He will force you to kiss many boys'

b. *Hann neyddi henni marga stráka til að kyssa.
he forced her many boys to to kiss

(31) a. ?Hann hefur engum skipað henni að giftast.
he has nobody ordered her to marry
'He hasn't ordered her to marry anybody'

b. *Hann skipaði henni engum að giftast.
he ordered her nobody to marry

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- **We have shown that when the main verb moves to C, QM cannot move QP to the left of overt material within VP. If there is no overt material within VP, can we still detect the anti-HG effect?**
 - **Yes. QM, even when not diagnosable by movement across overt material, can be diagnosed by parasitic gap licensing (Jónsson 1996, example from Svenonius 2000):**

(32) **QM licenses parasitic gaps**

fieir hafa mörgum₁ sagt upp t₁ án_ess a hrósa t₁ fyrir vel unnin störf.
they have many said up without to praise for well done work.
"They have fired many people without praising [them] for well done work".

- **As predicted, V-movement to C blocks PG licensing:**

(33) **V/2 incompatible with PG licensing**

a. * fieir sögðu engum upp án_ess að hrósa fyrir vel unnin störf
they said nobody up without to praise for well done work

b. * fieir sögðu mörgum upp án_ess að hrósa fyrir vel unnin störf
they said many up without to praise for well done work

c. fieir sögðu engum upp án_ess að hrósa fyrir vel unnin störf
they said nobody up without to praise them for well done work
'They fired nobody without praising them for a job well done'

(34) **Anti-HG effect weaker with P-stranding**

a. Ég hef engan talað við.
 I have nobody spoken with
 'I have spoken to no one'

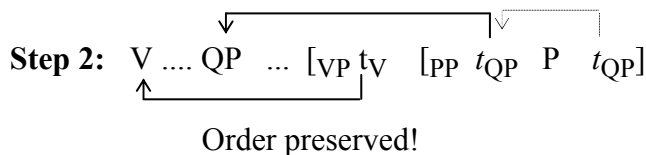
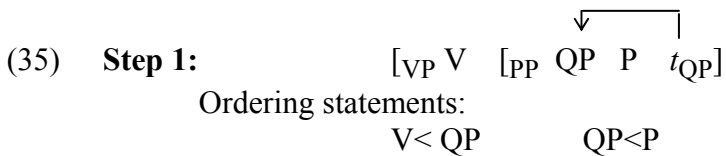
b. ? Ég talaði engan við.
 I spoke no one with

c. *?Ég talaði við engan.

"Thus, the pattern in ((34)a-b) is representative (Rögnvaldsson 1987:37 gives ((34)b) without marking it as degraded, but agrees (p.c.) that it is less than perfect; Jónsson 1996:93 marks it '?' and other informants have generally agreed). On the other hand, not moving the DP out of the PP, as in ((34)c), is substantially worse." (Svenonius 2000, p. 6)

Possible explanation if (34b) is taken to be good:

- Spec,PP is a possible intermediate landing site for QM (Van Riemsdijk 1978; Baltin 1978).
- Movement to Spec,PP places the quantifier to the left of everything in VP except the verb itself. If the verb is later to undergo movement to C, QM need not proceed via the left edge of VP but may move directly from Spec,PP to its final VP-external landing site.



Note: QM might also be free to skip the left-peripheral position within VP if V moves to C and QM is not crossing any (other) overt material within VP. QM of this sort would only license a Parasitic Gap if the final landing site of QM were a possible location from which Parasitic Gaps could be licensed.

6. How it works: details

Our proposal can be made consistent with a variety of approaches to phrase structure and movement. We will present an approach that allows us a reasonably simple formulation of our ideas in a manner consistent with other current work on syntax.

- We assume that *a moved element is pronounced only once*.
- This fact follows directly if Move (Chomsky 2002's "Internal Merge") is an operation that "re-merges" a previously merged element α . What movement does is to give α a new syntactic location.
- Since α is not "copied", but merely re-merged, only one token of α 's phonological features is present in the derivation (in the structure). The task of our proposal is to determine the relative ordering of these phonological features with respect to the phonological features of other elements.²

The phonological features of a moved element are ordered by rules of grammar that make reference to syntactic relations. Thus, we need to define the relevant syntactic relations in a way that sensibly applies to an element merged more than once. Our definitions will have as a consequence that it is the *highest*, i.e. *most recently merged*, position occupied by a moved element that is relevant for linearization.

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- Among the rules of grammar for a language are *Laws of Precedence*: statements of a familiar sort about the relative ordering of heads, complements, specifiers and modifiers.
 - These statements order the elements merged in the syntax (i.e. sisters).

(36) Format for the Laws of Precedence

Where X is the mother of α and β ; and α has properties φ (e.g. is a Head, was merged to a Head, satisfied EPP, etc.); and β has properties φ' , α precedes β .

[Note: We are agnostic about a number of important questions, including the invariance or parameterization of these laws (as debated in the literature on Kayne's 1995 Antisymmetry proposal). We suspect that all or most of our proposal could be reformulated if c-command, rather than sisterhood, were the central notion for Laws of Precedence (as in Kayne 1995).]

(37) Some Possible Laws of Precedence for English

- a. Where X is the mother of α and β and α is a specifier of β , α precedes β .
- b. Where X is the mother of α and β and β is a complement of α , α precedes β .

- As noted above, we propose that the position most recently occupied by α (in the course of a derivation) is the position to which linearization makes reference. This could be derived straightforwardly (given (36) and (37)) if the notion "position most recently occupied by α " is understood as part of a definition of the "mother" relation:

² Apparent examples in which an operation with movement-like properties leaves a pronounced copy might receive an analysis in which genuine copying takes place.

(38) **Mother**

The *mother* of α is the constituent formed by the most recent Merge of α .

(39) **Dominates**

A node X dominates α iff

- (i) X is the mother of α ; or
- (ii) X is the mother of β and β dominates α .

The definition of *Dominates* is the transitive closure of *Mother*, which in turn makes reference to the most recent Merge. From this it follows that when a complex constituent α is extracted from X by movement, the subparts of α are no longer dominated by X.

This is crucial to ensure that movement of a complex constituent may affect the linear order of its subconstituents.

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- An operation *Linearize* applied to a structure X will establish an ordering for certain subconstituents of X.
 - The elements ordered by *Linearize* are the maximal constituents in X whose own subconstituents have themselves already been ordered. There are two ways in which subconstituents of X might have had their ordering previously established. The ordering of subconstituents of a lexical item (segments, syllables, etc.) is given by the lexicon. The ordering of subconstituents of a phrase, on the other hand, is established if the phrase has already undergone *Linearize*. This view is natural within a model that incorporates cyclic linearization. If *Linearize* were able to reapply to subparts of previously ordered constituents, the idea of cyclic spell-out would be superfluous.
 - There will be evidence from Multiple Sluicing constructions in support of this view.

We will use the general term *Spell-out Domain* to refer both to phrases that undergo *Linearize* and to lexical items.

(40) **Spell-out domains**

lexical items, DP, CP, vP, ...

An *Ordering Table* receives the output of *Linearize* at various points as the derivation proceeds. The information that the Ordering Table receives from *Linearize* at any given stage is added to the information already present in the Ordering Table.

Linearize works as follows. When a Spell-out Domain X undergoes *Linearize*, the system first constructs the set of statements about ordering that are provided by the Laws of Precedence, which order sisters. We call this set LP(X). In constructing LP(X), the system does not look inside Spell-out Domains (other than X itself), for reasons just discussed:

(41) **Ordering statements provided by Laws of Precedence**

LP(X) :=

- { $\alpha < \beta$: α and β are dominated by X;
- α precedes β by a Law of Precedence;
- and neither α nor β is dominated by a Spell-out Domain other than X}

- LP(X) is used to create ordering statements that are usable by the phonology, i.e. ordering statements that relate terminal elements.
- To this end, Linearize interprets statements of the form " $\alpha < \beta$ " as "the end of α precedes the beginning of β " ($\text{End}(\alpha) < \text{Beg}(\beta)$).

What constitutes the end and the beginning of a constituent?

--> **If the constituent is a Spell-out domain**, the answer is obvious.

- The Ordering Table will already identify a unique element as its first member, and a unique element as its last member.

--> **If the constituent is *not* a Spell-out domain**, however, the Ordering Table will not identify a unique last or first member. In this case, one could imagine two possibilities.

- 1. The notions $\text{Beg}(\alpha)$ and $\text{End}(\alpha)$ might be undefined in this situation, but that would leave some elements unordered.
- 2. Alternatively, $\text{Beg}(\alpha)$ and $\text{End}(\alpha)$ might in general be defined as *sets* — sets that will contain more than one member when α is not a Spell-out domain.

The second choice is, of course, what is needed:

(42) **End and Beginning**

(i) $\text{End}(\alpha) :=$

$\{x: x \text{ is a terminal element reflexively dominated by } \alpha \text{ and } \neg \exists y \text{ s.t. } x < y \in \text{Ordering Table}\}.$ ³

(ii) $\text{Beg}(\alpha) :=$

$\{x: x \text{ is a terminal element reflexively dominated by } \alpha \text{ and } \neg \exists y \text{ s.t. } y < x \in \text{Ordering Table}\}.$

We now formulate the rule *Linearize*:

(43) **Linearize**

(i) Form the Linearization Set $L(X) :=$

$\{\alpha' < \beta': \alpha < \beta \in \text{LP}(X) \text{ and } \alpha' \in \text{End}(\alpha) \text{ and } \beta' \in \text{Beg}(\beta)\}.$

(ii) Update the Ordering Table by adding the members of $L(X)$.

³ "Reflexively dominates" is the union of "dominates" and identity. If lexical items always dominate subcomponents (e.g. *dog* dominates its phonological segments), then we can eliminate the word *reflexively* here, since it will be the /d/ or /g/ of *dog* that counts as the as the beginning or end of the lexical item.

(44) Example: Interaction of Linearization and covert *wh*-movement
Derivation of: (*I wonder*) to which boy John talked __ about this problem.

Build [DP₁ *which boy*].

Linearization of
DP1 Spell-out Domain

LP(DP1) *which* < NP

a. L(DP1) | *which*<*boy*

Build [DP₂ *this problem*].

Linearization of
DP2 Spell-out Domain

LP(DP2) *this* < NP

b. L(DP2) | *this*<*problem*

[Ordering table now contains: a, b]

Build *vP*, apply *vP*-internal *wh*-movement:

[vP [to which boy] [_{v} John [_{v'} talked [_{vP} __ [about this problem]]]]]*

Linearization of *vP* Spell-out domain⁴

LP(vP) *to*<[*which boy*] [*to which boy*]<*v'** *John*<*v'* *talked*<*VP* *about*<*this problem*

c. L(vP)	<i>to</i> < <i>which</i>	<i>to</i> < <i>John</i>	<i>John</i> < <i>talked</i>	<i>talked</i> < <i>about</i>	<i>about</i> < <i>this</i>
		<i>to</i> < <i>talk</i>	<i>John</i> < <i>about</i>	<i>talked</i> < <i>this</i>	
		<i>to</i> < <i>about</i>	<i>John</i> < <i>this</i>		
		<i>to</i> < <i>this</i>			
		<i>boy</i> < <i>John</i>			
		<i>boy</i> < <i>talk</i>			
		<i>boy</i> < <i>about</i>			
		<i>boy</i> < <i>this</i>			

[Ordering table now contains: a, b, c]

Build CP, raising subject to Spec,IP and the *wh*-phrase to Spec,CP:

[CP [to which boy] [_{C'} C [_{IP} John [_{vP} __ [_{v} __ [_{v'} talked [_{vP} __ [about this problem]]]]]]]*

Linearization of CP Spell-out domain

LP(CP) [*to which boy*]<*C'* *John*<*vP*

d.L(CP) | *boy*<*John* *John*<*talked*
boy<*talked*

[Ordering table now contains: a, b, c, d]

==>No conflicts among the elements on the ordering table. Terminals are fully ordered.

⁴ Yes, we have indeed suddenly switched to *vP* rather than *VP* as the lower Spell-out Domain for English. We return to this issue in section 11.

7. Overt vs. Covert Movement

Consider: [D' ... [D ...] ...], where D and D' are Spell-out Domains

Overt movement: Overt movement to a position in D' is movement that takes place *before* Linearize applies to D' . If overt movement to a position within D' crosses the boundary of D , we distinguish two situations:

[1] **Edge-based movement:**

Movement applies from the phonological edge of D . No ordering contradictions will arise when D' gets linearized.

[2] **Holmberg-style movement:**

Movement applies from a non-edge position within D . Ordering contradictions will arise when D' gets linearized, unless compensating movements from the edge of D occur.

Covert movement: movement within a Spell-out domain D that applies *after* linearization of D (cf. Nissenbaum 2000)

- If covert movement has applied within D , Linearize — when it applied to D — ordered the moved element **in its pre-movement position**.
- When Linearize applies to D' , D as a whole will be ordered with respect to elements in D' , but **nothing new is added concerning the ordering of elements within D** — because the construction of the set $LP(D')$ does not look across Spell-out Domain boundaries. (In other words, $LP(D')$ may have an ordering statement $\alpha < \beta$ only if neither α nor β is dominated by D .)
- Thus covert movement within D remains covert thereafter.

[If an element that has moved covertly from a non-edge position within D undergoes subsequent overt movement in D' , there will be an ordering contradiction — unless HG-type compensating movement repairs the violation.]

(45) Derivation of a multiple question: (*I wonder*) *to which boy John talked __ about what problem.*

Build [DP1 *which boy*].

Linearization of
DP1 Spell-out Domain

LP(DP1) *which* < NP

a. L(DP1) *which*<*boy*

Build [DP2 *what problem*].

Linearization of
DP2 Spell-out Domain

LP(DP2) *what* < NP

b. L(DP2) *what*<*problem*

[*Ordering table now contains: a, b*]

Build vP, apply vP-internal overt *wh*-movement:
[_vP [to which boy] [_v John [_v' talked [_vP __ [about what problem]]]]]*

Linearization of vP Spell-out domain

LP(vP) *to*<[*which boy*] [*to which boy*]<*v'** *John*<*v'* *talked*<VP *about*<*what problem*

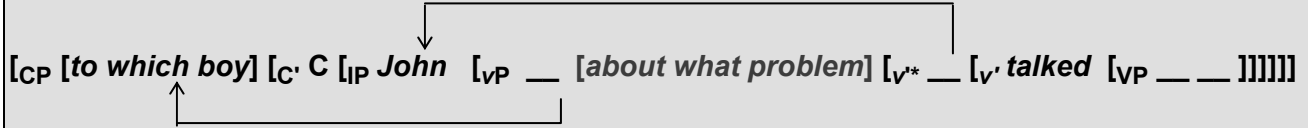
c. L(vP)	<i>to</i> < <i>which</i>	<i>to</i> < <i>John</i>	<i>John</i> < <i>talked</i>	<i>talked</i> < <i>about</i>	<i>about</i> < <i>what</i>
		<i>to</i> < <i>talk</i>	<i>John</i> < <i>about</i>	<i>talked</i> < <i>what</i>	
		<i>to</i> < <i>about</i>	<i>John</i> < <i>what</i>		
		<i>to</i> < <i>what</i>			
		<i>boy</i> < <i>John</i>			
		<i>boy</i> < <i>talk</i>			
		<i>boy</i> < <i>about</i>			
		<i>boy</i> < <i>what</i>			

[*Ordering table now contains: a, b, c*]

Apply vP-internal covert *wh*-movement:
[_vP [to which boy] [about what problem] [_v John [_v' talked [_vP __ __]]]]*⁵

⁵ We assume that the *wh*-phrase that moves second tucks in below the *wh*-phrase that moves first, whether the second instance of movement is overt or covert, as here (Richards 1997, 2001). See Nissenbaum (2000; 2001) for additional evidence. The assumption is not crucial to our story, however.

Build CP, overtly raising subject to Spec,IP and *wh*-phrase to Spec,CP:



Linearization of CP Spell-out domain

<i>LP</i> (CP)	[to which boy]<C'	John< <i>vP</i>
d.L (CP)	boy<John boy<talked	John<talked

Note: Although the phrase *about what problem* structurally occupies Spec,*vP* at this point in the derivation, it is linearized after *talked*.

[Ordering table now contains: a, b, c, d]

Covertly raise *about what problem* to Spec,CP:



Note: The linearization of *about what problem* still does not change! It remains pronounced after *talked*.

==>No conflicts among the elements on the ordering table. Terminals are fully ordered.

8. Salvation by Deletion

- (46) John left after he talked to a certain boy.
But I don't remember which boy ~~John left [after he talked to]~~.

Assume: The AdvP (*afterP*) is a Spell-out Domain that lacks a left-edge landing site for movement.

Consequently, in (46), *after, he, talked* and *to* will be linearized both before and after *which boy*. This will yield an unpronounceable structure — unless the relevant items are deleted!

- (47) **Properties of ellipsis of α**
 - a. Do not pronounce any terminal element dominated by α .
 - b. Delete from the Ordering Table all statements that mention elements unpronounced by (a).

(48) Example (46) without ellipsis

Build vP of the *after*-clause, applying overt *wh*- movement, linearize vP; then build the *after* CP, ultimately yielding:

[CP *after* [IP *he* [vP [DP *which boy*] *talked to* ___]].

Ordering Table after CP is linearized contains

<i>after</i> < <i>he</i>	<i>boy</i> < <i>talked</i>	<i>which</i> < <i>boy</i>
<i>after</i> < <i>which</i>	<i>boy</i> < <i>to</i>	
<i>he</i> < <i>which</i>	<i>talked</i> < <i>to</i>	

Note: If *he* is first linearized to the right of *boy* in vP, a contradiction arises already, since *which boy* does not move to Spec, CP to restore the original order. In any case...

Build vP of the main clause, applying overt *wh*- movement from the adjunct, linearize that vP; then build the *after* CP, applying overt *wh*-movement once more - ultimately yielding:

which boy John left [CP *after* [IP *he* [vP ___ *talked to* ___]].

New additions to Ordering Table:

<i>left</i> < <i>after</i>	<i>boy</i> < <i>John</i>
<i>John</i> < <i>left</i>	<i>boy</i> < <i>left</i>
<i>John</i> < <i>after</i>	<i>boy</i> < <i>after</i>

Contradictions! e.g. *after* < *which*, *which* < *boy*, *boy* < *after*

(49) With ellipsis: ...*But I don't remember which boy John left* [~~*after he talked to*~~].

<i>after</i> < <i>he</i>	<i>boy</i> < <i>talked</i>	<i>which</i> < <i>boy</i>
<i>after</i> < <i>which</i>	<i>boy</i> < <i>to</i>	
<i>he</i> < <i>which</i>	<i>talked</i> < <i>to</i>	

<i>left</i> < <i>after</i>	<i>boy</i> < <i>John</i>
<i>John</i> < <i>left</i>	<i>boy</i> < <i>left</i>
<i>John</i> < <i>after</i>	<i>boy</i> < <i>after</i>

No more contradictions!

9. Pseudogapping

Prediction

- It should be possible to repair a violation of Holmberg's Generalization by ellipsis.
- Lasnik has argued (in various papers) that this is precisely what happens in English Pseudo-Gapping.

(50) Pseudo -gapping

[?]Mary must speak French and Sue must -- German.

- The object raises by OS without the verb raising above it -- the normal situation in English, according to Lasnik's proposal. VP-ellipsis eliminates the violation of HG (here: old V<O vs. new O<V).

(51) Pseudogapping is not V-ellipsis, but (plausibly) VP-ellipsis (Jayaseellan 1990)

a. ?John gave Bill a lot of money, and Mary will ~~give Susan a lot of money~~.

(Lasnik 1999a,142; via Takahashi 2003)

b. I didn't expect your mother to like the picture; but I did ~~expect you to like the picture~~.

(Jayaseelan 1990, 67; via Takahashi 2003)

Hedge: It is not clear that the remnant in Pseudogapping is to the *left* of the elided VP.

Standard Alternatives: *leftward OS* (Lasnik) / *rightward HNPS* (Jayaseellan)

[Following discussion adapted from Takahashi 2003.]

- **In favor of the "right" theory (i.e. involving HNPS, not OS):**

(52) Pseudogapping remnant may be a DO, which may not A-move over an IO (in many dialects):

a. *The paper was given this student __.

b. Although he wouldn't give the this student the book, he would the paper.

(Bowers 1998; Baltin 2000, 2003 *contra* Lasnik 1995; 1999a,b)

- **In favor of the "left" theory (i.e. involving OS, not HNPS):**

(53) Pseudogapping remnant may be an IO, which may not undergo HNPS in English, but may A-move.

a. *He gave __ the book yesterday the woman who had called for it.

b. Although he wouldn't give *Bill* the book, he would Susan.

Takahashi (2003):

- **Why argue?** The data are essentially the union of the predicted good examples under both hypotheses.

An argument against ecumenism and in favor of the "right" analysis:

- The deletion site blocks contraction of an auxiliary. This might suggest that the remnant is to the *right* of the deletion site, rather than to the left (i.e. that the auxiliary immediately precedes the deletion site; King, *LI* 1.1). Note also the pause before the pseudogapping remnant:

(54) **No contraction before an ellipsis site**

Is Mary French?

- a. No, Sue is ___.
- b. *No, Sue's ___.

(55) **No contraction before a pseudogapping remnant**

- a. ?Mary's speaking French and Sue is -- German.
- b. *Mary's speaking French and Sue's -- German.

- c. Although I didn't give Mary a book, I will Sue.
- d. *Although I didn't give Mary a book, I'll Sue.

- Takahashi suggests that the argument might be defused if we reexamine the logical structure of the condition at work in (54).

Implicit in the view that takes (55) as an argument in favor of a non-ecumenical rightist view of Pseudo-gapping is the idea that King's constraint is a constraint on the occurrence of contracted auxiliaries.

Takahashi's alternative: it is a constraint on the licensing of VP-ellipsis. VP-ellipsis requires the local occurrence of an appropriate, pronounced, non-contracted head (Lobeck 1990). The presence/absence of an object-shifted DP between the relevant head and the elided VP is irrelevant to this licensing condition.

The worry: King's constraint extends to traces as well as ellipsis:

(56) **Traces are like ellipsis**

- a. Mary is smart, which John is *t* too.
- b. *Mary's smart, which John's *t* too.

We leave the matter open. Note that if pseudo-gapping turns out to never involve leftward movement, there is no counterexample to our proposals here — merely lack of a particular argument in its favor.

A relevant observation by Takahashi (2003):

- Both DO and IO may be remnants together — marginally — so long as the original order is preserved:

- (57) a. ??Although he wouldn't give Bill the book, he would Susan the paper.
b. *Although he wouldn't give Bill the book, he would the paper Susan.

Hmmm!

- What about Swedish? Swedish has VP-ellipsis — at least in comparatives and ACD contexts (apparently), but other factors may conspire to make the test impossible. An open question.

10. Multiple Sluicing

(58) **Multiple *wh*-construction: second *wh*-phrase moves covertly** [see (45) for derivation]
 I wish I knew [_{CP} [to which student]₁ John talked t₁ [about what problem]]

(59) **Properties of Ellipsis of α**

- Do not pronounce any terminal element dominated by α .
- Delete all ordering statements that mention elements unpronounced under (59a).
- Ellipsis can apply after covert movement (Spell-out domain-finally).***

Important consequence: An element *covertly* moved out of α will still be pronounced when α is elided, even though it would normally be pronounced within α , since it is not dominated by α . The definition of *dominate* was given as (39)

(60) **Multiple Sluicing** [Bolinger 1978; Takahashi 1994; Nishigauchi 1998; Merchant 1996; Richards 1997, 2001]

John talked to a certain boy about a certain problem.
 I wish I knew [to which boy]₁ [about what problem]₂ ~~John talked t₁ t₂.~~

[A property of English Multiple Sluicing that we will not explain: the second remnant may not be a DP.]

(61) A certain girl solved a certain problem.
 *I wish I knew which girl which problem.

See Richards (1997; 2001) for a proposal.]

Account:

- Ellipsis may apply after covert movement [(59c)].
- The ordering statements that normally make us call the movement *covert* are irrelevant, since these ordering statements are deleted [(59b)].⁶

How it works:

⁶ There is a distant but interesting similarity between this idea and Richards' (1997; 2001) proposal that weak features (e.g. the features relevant to non-initial *wh*-movement in English multiple questions) drive "overt" movement when the tail of the relevant chain undergoes ellipsis (because the non-tail is the only position available to PF after ellipsis).

- The Ordering Table for (58) [as seen in (45)] is the union of the sets given below. [We retain the format of (45) for convenience, but the Ordering Table is just a set.]
- The effects of Sluicing, i.e. ellipsis of IP (C?), are indicated by the overstrikes:

(62) **Linearization of (58)**

a. L(DP1)	which<boy																																								
b. L(DP2)	what<problem																																								
c. L(vP)	<table style="border-collapse: collapse; width: 100%;"> <tr> <td style="padding-right: 20px;">to<which</td> <td style="padding-right: 20px;">to<John</td> <td style="padding-right: 20px;">John<talked</td> <td style="padding-right: 20px;">talked<about</td> <td>about<what</td> </tr> <tr> <td></td> <td style="padding-right: 20px;">to<talk</td> <td style="padding-right: 20px;">John<about</td> <td style="padding-right: 20px;">talked<what</td> <td></td> </tr> <tr> <td></td> <td style="padding-right: 20px;">to<about</td> <td style="padding-right: 20px;">John<what</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="padding-right: 20px;">to<what</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="padding-right: 20px;">boy<John</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="padding-right: 20px;">boy<talk</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="padding-right: 20px;">boy<about</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="padding-right: 20px;">boy<what</td> <td></td> <td></td> <td></td> </tr> </table>	to<which	to <John	John<talked	talked <about	about<what		to <talk	John <about	talked <what			to<about	John<what				to<what					boy <John					boy <talk					boy<about					boy<what			
to<which	to <John	John<talked	talked <about	about<what																																					
	to <talk	John <about	talked <what																																						
	to<about	John<what																																							
	to<what																																								
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	boy<about																																								
	boy<what																																								
d.L(CP)	<table style="border-collapse: collapse; width: 100%;"> <tr> <td style="padding-right: 40px;">boy<John</td> <td>John<talked</td> </tr> <tr> <td style="padding-right: 40px;">boy<talked</td> <td></td> </tr> </table>	boy <John	John<talked	boy <talked																																					
boy <John	John<talked																																								
boy <talked																																									

- The statements that remain after ellipsis provide sufficient information to order the terminal elements of the remnants (i.e. the transitive closure of the ordering statements is a total ordering): *to<which<boy<about<what<problem.*

Question: What if the statements that remain after ellipsis do not provide sufficient information to order the terminal elements of the remnants?

Review of Linearize:

(63) **Ordering statements provided by Laws of Precedence**

LP(X) :=
 { $\alpha < \beta$: α and β are dominated by X;
 α precedes β by a Law of Precedence;
 and neither α nor β is dominated by a Spell-out Domain other than X}

(64) **End and Beginning**

(i) End(α) :=
 { x : x is a terminal element reflexively dominated by α and $\neg \exists y$ s.t. $x < y \in$ Ordering Table}.

(ii) Beg(α) :=
 { x : x is a terminal element reflexively dominated by α and $\neg \exists y$ s.t. $y < x \in$ Ordering Table}.

(65) **Linearize**

- (i) Form the Linearization Set $L(X) := \{\alpha' < \beta': \alpha < \beta \in LP(X) \text{ and } \alpha' \in \text{End}(\alpha) \text{ and } \beta' \in \text{Beg}(\beta)\}$.
- (ii) Update the Ordering Table by adding the members of $L(X)$.

-
- Take any two maximal Spell-out domains in D , D_α and D_β (i.e. domains whose internal linearization is already established). After Linearize applies to D , some ordering statement relating an edge of D_α and an edge of D_β will always appear in the ordering table.
 - By contrast, no element α inside a maximal previous Spell-out domain X will be mentioned in the new ordering statements added by $\text{Linearize}(D)$ unless α is either the beginning or the end of X .
 - The "density" of ordering statements that relate elements merged in the same Spell-out domain will thus be greater than the density of statements that relate elements merged in distinct Spell-out domains.
 - We are thus clearly not assuming that Linearize yields a total ordering of terminal elements. We make only the minimal assumption that the transitive closure of all ordering statements is a total linear order.

Consequence: Ellipsis, and the subsequent deletion of ordering statements, might yield a situation in which the transitive closure of all the *remaining* ordering statements is *no longer a total linear order*. Such cases might be excluded as unpronounceable.

Where to look: Cases in which multiple remnants α and β left by ellipsis were not directly ordered by an ordering statement $\alpha < \beta$ in the Ordering Table, but were "indirectly" ordered via intermediate statements later deleted under ellipsis because of the transitivity of precedence.

Such cases will arise when α and β were not merged as Spell-out Domain-mates (or ever overtly remerged as Spell-out Domain-mates).

Prediction: a Spell-out Domain-mate condition on multiple sluicing!

- When two *wh*-phrases are not phase mates, they are not ordered directly. Their relative order is determined via elements which are at the edge of the intervening phases.
- If these connecting links are deleted, phonology doesn't know what to do with the remaining elements.

(66) **Clausemate/phasemate condition on multiple sluicing** [Takahashi 1994, 285; Merchant 2001]

a. Fred thinks a certain boy talked to a certain girl.

I wish I could remember [which boy]₁ [to what girl]₂.

b. A certain boy said that Fred talked to a certain girl.

***I wish I could remember [which boy]₁ [to what girl]₂.**

(67) Example (66a): ...*which boy* ~~talked~~ *to what girl*

Build [DP1 *which boy*].

Linearization of
DP1 Spell-out Domain

<i>LP</i> (DP1)	<i>which</i> < NP
a. L(DP1)	<i>which</i> < <i>boy</i>

Build [DP2 *what girl*].

Linearization of
DP2 Spell-out Domain

<i>LP</i> (DP2)	<i>what</i> < NP
b. L(DP2)	<i>what</i> < <i>girl</i>

[Ordering table now contains: a, b]

Build vP, perhaps apply vP-internal overt *wh*-movement:

[_{vP} [*which boy*] [_{v*} ___] [_{v'} *talked* [*to what girl*]]]]

Linearization of vP Spell-out domain

<i>LP</i> (vP)	[<i>which boy</i>] < v'*	<i>talked</i> < VP	<i>to</i> < [<i>what girl</i>]
c. L(vP)	<i>boy</i> < <i>talk</i> <i>boy</i> < <i>to</i> <i>boy</i> < <i>what</i>	<i>talked</i> < <i>to</i> <i>talked</i> < <i>what</i>	<i>to</i> < <i>what</i>

[Ordering table now contains: a, b, c]

Apply vP-internal covert *wh*-movement:

[_{vP} [*which boy*] [*to what girl*] [_{v*} ___] [_{v'} *talked* ___]]]

Build CP, overtly raising *wh*-phrase subject to Spec,IP and then to Spec,CP:

[_{CP} [*which boy*] [_{C'} C [_{IP} ___] [_{vP} ___ [*to what girl*] [_{v*} ___] [_{v'} *talked* ___]]]]]

Linearization of CP Spell-out domain

<i>LP</i> (CP)	[<i>which boy</i>] < C'
d. L(CP)	<i>boy</i> < <i>talked</i>

[Ordering table now contains: a, b, c, d]

Covertly raise *about what problem* to Spec,CP:

[_{CP} [*which boy*] [*to what girl*] [_{C'} C [_{IP} ___] [_{vP} ___] [_{v*} ___] [_{v'} *talked* ___]]]]]

Ellipsis: Delete the ordering statements that mention terminal elements dominated by IP (C').

a. L(DP1) *which*<*boy*

b. L(DP2) *what*<*girl*

c. L(vP) | ~~*boy*~~<*talk* ~~*talked*~~<*to* *to*<*what*
 | ~~*boy*~~<*to* ~~*talked*~~<*what*
 | ~~*boy*~~<*what*

d. L(CP) | ~~*boy*~~<*talked* ~~*boy*~~<*talked*

What remains is a total ordering of the remnants: *which*<*boy*<*to*<*what*<*girl*.

(68) Example (66b): *...*which boy said that Fred talked to what girl*

Build [DP1 *which boy*].

Linearization of
DP1 Spell-out Domain

<i>LP(DP1)</i>	<i>which < NP</i>
a. L(DP1)	<i>which < boy</i>

Build [DP2 *what girl*].

Linearization of
DP2 Spell-out Domain

<i>LP(DP2)</i>	<i>what < NP</i>
b. L(DP2)	<i>what < girl</i>

[Ordering table now contains: a, b]

Build the lower vP:

[_{vP} Fred [_{v'} talked [to *what girl*]]]

Linearization of vP Spell-out domain

<i>LP(vP)</i>	Fred <v'*	<i>talked < VP</i>	<i>to < what girl</i>
c. L(vP)	<i>Fred < talk</i> <i>Fred < to</i> <i>Fred < what</i>	<i>talked < to</i> <i>talked < what</i>	<i>to < what</i>

[Ordering table now contains: a, b, c]

Apply vP-internal covert wh-movement:

[_{vP} [to *what girl*] [_{v'}* Fred [_{v'} talked ___]]]

Build the lower CP, overtly raising the subject to Spec,IP:

[_{CP} *that* [_{IP} Fred [_{vP} [to *what girl*] [_{v'}* ___ [_{v'} talked ___]]]]]

Linearization of CP Spell-out domain:

<i>LP(CP)</i>	C < IP	<i>Spec,IP < I'</i>
d. L(CP)	<i>that < Fred</i> <i>that < talked</i>	<i>Fred < talked</i>

[Ordering table now contains: a, b, c, d]

Covertly raise *to what girl* to Spec,CP:

[_{CP} [to *what girl*] [_{C'} *that* [_{IP} Fred [_{vP} ___ [_{v'}* ___ [_{v'} talked ___]]]]]

Build the higher vP, possibly applying *wh*-movement to its Spec:

[_{VP} *which boy* [*said* [_{CP} [*to what girl*] [_{C'} *that* [_{IP} *Fred* [_{VP} [_{V'} [_{V'} *talked*]]]]]]]]]]

<i>LP(vP)</i>	<i>which boy</i> <v'*	v <CP
e. L(vP)	<i>boy</i> < <i>said</i> <i>boy</i> < <i>that</i>	<i>said</i> < <i>that</i>

[Ordering table now contains: a, b, c, d, e]

Covertly raise *to what girl* to Spec,vP:

[_{VP} *which boy* [*to what girl*] *said* [_{CP} [_{C'} *that* [_{IP} *Fred* [_{VP} [_{V'} [_{V'} *talked*]]]]]]]]]]

Build the higher CP, raising subject *wh*-phrase to Spec,IP and then to Spec,CP:

[_{CP} *which boy* [_{C'} *C* [_{IP} [_{VP} [*to what girl*] [*said* [_{CP} [_{C'} *that* [_{IP} *Fred* [_{VP} [_{V'} [_{V'} *talked*]]]]]]]]]]]]

<i>LP(CP)</i>	[<i>which boy</i>] <C'
f.L(CP)	<i>boy</i> < <i>said</i>

[Ordering table now contains: a, b, c, d, e, f]

Covertly raise *to what girl* to Spec,CP:

[_{CP} *which boy* [*to what girl*] [_{C'} *C* [_{IP} [_{VP} [*said* [_{CP} [_{C'} *that* [_{IP} *Fred* [_{VP} [_{V'} [_{V'} *talked*]]]]]]]]]]]]

Ellipsis: Delete the ordering statements that mention terminal elements dominated by IP (C').

- | | | |
|---|--|-------------------------|
| a. L(DP1) <i>which</i> < <i>boy</i> | b. L(DP2) <i>what</i> < <i>girl</i> | |
| c. L(vP) <i>Fred</i> < <i>talk</i> | <i>talked</i> < <i>to</i> | <i>to</i> < <i>what</i> |
| <i>Fred</i> < <i>to</i> | <i>talked</i> < <i>what</i> | |
| <i>Fred</i> < <i>what</i> | | |
| d.L(CP) <i>that</i> < <i>Fred</i> | <i>Fred</i> < <i>talked</i> | |
| <i>that</i> < <i>talked</i> | | |
| e. L(vP) <i>boy</i> < <i>said</i> | <i>said</i> < <i>that</i> | |
| <i>boy</i> < <i>that</i> | | |
| f.L(CP) <i>boy</i> < <i>said</i> | | |

What remains: *which*<*boy* and *to*<*what*<*girl*. The transitive closure is insufficient for ordering the terminals.

Some possible predictions:

- In a language in which the second *wh*-phrase moves overtly (e.g. the languages of Donald Rumsfeld's "New Europe"), the Spell-out Domain-mate condition should not hold [Benjamin Spector, p.c.].
- In English, the Spell-out Domain-mate restriction should disappear if the second remnant is leftmost in the lower Spell-out Domain. The non-DP restriction on the second remnant makes this hard to test. The prediction might, however, run into problems with examples like:

(69) ?A certain book claims on a certain holiday all the townsfolk get drunk.
[*]I wish I could remember which book on which holiday.

The omission of *that* which makes the example possible is not perfect in the first place. This might affect the result, e.g. if there is a null *that* which is ordered.

11. V-to-T Movement in English, French and Swedish

- In Swedish, linearization of the lower Spell-out Domain does not take account of adverbs, [negation,] or the external argument. For this reason we called the lower Spell-out Domain VP.
- What if in a different language, the lower Spell-out Domain did take account of these elements, i.e. was clearly *v*P?

To take things one at a time, we will first investigate the question as a matter of choice of Spell-out Domain (VP vs. *v*P). We will then suggest an interesting alternative way of looking at the matter.

- English shows a relation between T and *v* that is generally taken to involve T-lowering (or pure Agree, or selection) rather than *v*-to-T movement (Chomsky 1957; Pollock 1989; etc.)
- But English T actually looks like it *does* attract verbal elements to it. The sole anomaly, which (at first glance) seems not to move to T, is the main verb *v*.

(70) Verb movement to T in English

a. Mary has+T not ___ read the book.

b. *Mary read+T not ___ the book

- English T behaves quite differently in this respect from T in Swedish.

(71) Swedish

a. ...at han inte har kommit.

...that he not has come.

b. ...at han inte kommer.

...that he not come.

We suggest that English shows *v*-to-T movement (not T-to-*v* Lowering or pure T-*v* agreement) — but that this movement never revises the relative ordering of V w.r.t. negation, adverbs, or the external argument.

- The seemingly special property of the English verbal auxiliary system comes from the fact that its lower Spell-out Domain includes adverbs, negation and the external argument -- unlike the comparable domain in Swedish.

If we are correct, French vs. *Swedish* is the real contrast that shows V-to-T vs. no V-to-T. What distinguishes English from French is not verb movement but Linearization issues.

What were the arguments that main-verb *v* does not move to T in English...?

Adverbs

(72) **English : *[V Adv Obj]**

- a. Bill hardly speaks Japanese.
- b. *Bill speaks hardly Japanese.

(73) **French: ok [V Adv Obj]**

- a. *Pierre à peine parle japonais.
Pierre barely speaks Japanese.
- b. Pierre parle à peine japonais.
Pierre speaks barely Japanese.

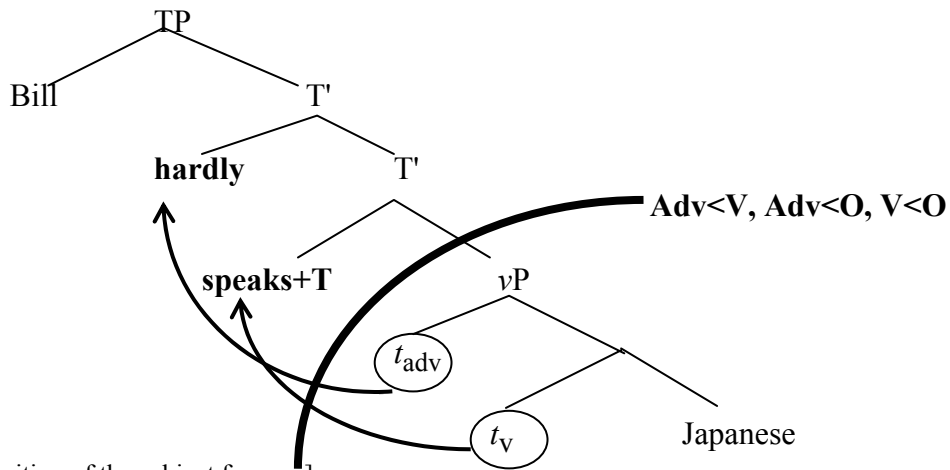
An alternative proposal: V-to-T movement & high merge of low adverbs

- In a TP without auxiliary verbs, the main verb *v* does move to T in English -- just as it does in French.
- This movement cannot apply across a *v*P-adverb because *v* and the *v*P-adverb belong to the same Spell-out Domain σ , and the order *Adv*<*v* was fixed in σ .
- Nonetheless, *v* does move to T.
- Adverbs that appear to the left of *v* in T are merged into the TP system. How?

• **The Adverb Shift variant:**

Adverbs like *hardly* can move from *v*P to TP by a process of "Adverb Shift" which masks *v*-to-T movement. This is the preferred variant if adverbs turn out to have a rigidly fixed external merge position within the clause (as in theories like Cinque's 1999).

(74)

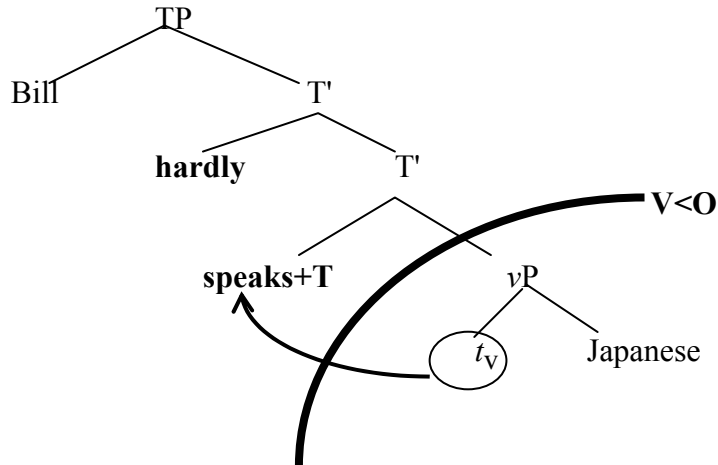


[ignoring base position of the subject for now]

- **The Flexible External Merge variant:**

Adverbs like *hardly* may be merged directly into the TP system, so long as their relative scope with respect to other elements violates no rules of adverb hierarchization (Ernst 1997; Bobaljik 1999; Nilssen 2002):

(75)



Independent evidence from vP ellipsis for high merge of low adverbs

Low adverbs that may not scope over auxiliary verbs. The main evidence for exclusively low merge:

- (76) a. Bill will hardly understand the talk.
b. *Bill hardly will understand the talk.
- (77) a. Mary is almost getting hit by a car right now.
b. *Mary almost is getting hit by a car right now.
- (78) a. Sue has totally missed the point.
b. *Sue totally has missed the point.

But under vP-ellipsis, these adverbs may occur to the left of T:

- (79) a. Did *you* understand the talk? *Bill* barely did.
b. Don't get hit by a car, as Mary almost did.
c. Sue completely missed the point, and I totally did too.

Claim: (79) shows high merger of low adverbs independent of V-to-T movement. The adverb moves from or is externally merged outside the elided *v*P.

But why no AdvS over an intervening auxiliary? [If AdvS were always possible, we would never have learned that *completely* etc. are low adverbs!]

- (80) **Ellipsis does not independently license higher-than-normal adverbs**
- Will *you* understand the talk? **Bill* barely will.
 - **Bill* is getting criticized by the boss, and *Mary* almost is.
 - Have you missed the point? ?**I* know I totally have.

Towards an answer: Adverb positioning, whether Adverb Shift exists or not, may not violate laws of relative scope before or after movement.

Negation

A standard argument that main-verb *v* does not move to T in English -- but nonetheless has a relation with T

- (81) **English :** *[V *not* Obj] / *[*not* V Obj]
- **Bill* not speaks Japanese. a'. *Bill* does not speak Japanese.
 - **Bill* speaks not Japanese

- (82) **French: ok [V *not* Obj]**
- **Pierre* ne pas parle japonais.
 Pierre not speaks Japanese
 - Pierre* (ne) parle pas japonais.
 Pierre speaks not Japanese

Some familiar accounts:

- Not* blocks an adjacency requirement between T and V (but adverbs are transparent, and auxiliaries can move to T, unlike main verbs); or
- Not* heads NegP, and *blocks a movement relation* (lowering) between T and V (but adverbs do not; auxiliaries can move over Neg); or
- Not* heads NegP, and *blocks an Agree relation* (perhaps as a "defective intervention effect") between T and V (but adverbs do not; auxiliaries can move over Neg)

The alternative proposal, continued: *not* is never merged in the TP domain

- (83) **Laws governing placement of negation in English**
- Sentential negation in English attaches to the highest verbal projection in TP (i.e. the highest auxiliary present, otherwise *v*).
 - Constituent negation attaches to the negated constituent.

What are the relevant linearized Domains?

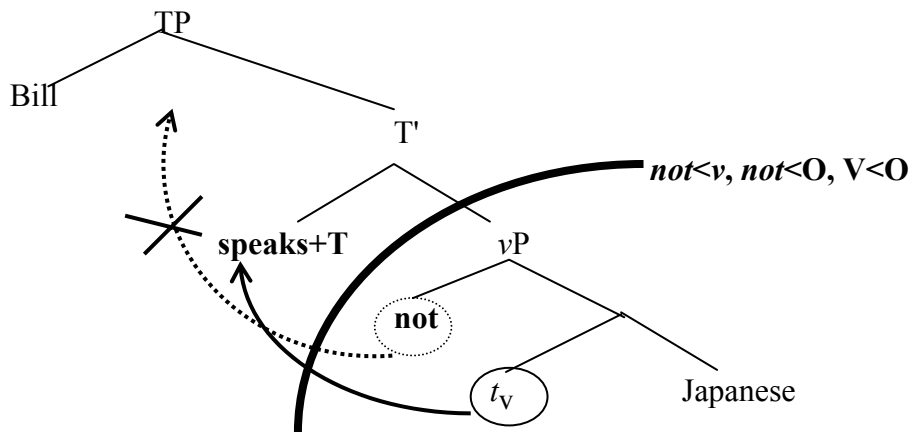
- In English, the relevant domain below CP is the domain containing *v* and its dependents (adverbs, sentence or constituent negation, external argument) — i.e. *vP*.
- Crucially, *auxiliary verbs lie outside this Spell-out Domain*. This fact is responsible for the difference between main and auxiliary verbs with respect to movement over *not*.

How it works, questions and answers:

- **When TP contains no auxiliary verb, can *v*-to-T movement apply across *not*?**
No. *v* and *not* belong to the same Spell-out Domain *vP* -- which is lower than T -- and the order *not* < *v* was fixed in *vP*. Raising *v* to T would yield *v* < *not* in the higher domain, a contradiction.
- **Could *not* move too, so that it precedes the main verb *v* in T, thus preserving *not* < *v* order?**
No. There is no process of "*not*-Shift" that could move *not* to the left of T. [Why? Unknown.] Note also that (83a) entails that *not* must be merged into *vP* in the absence of auxiliary verbs.

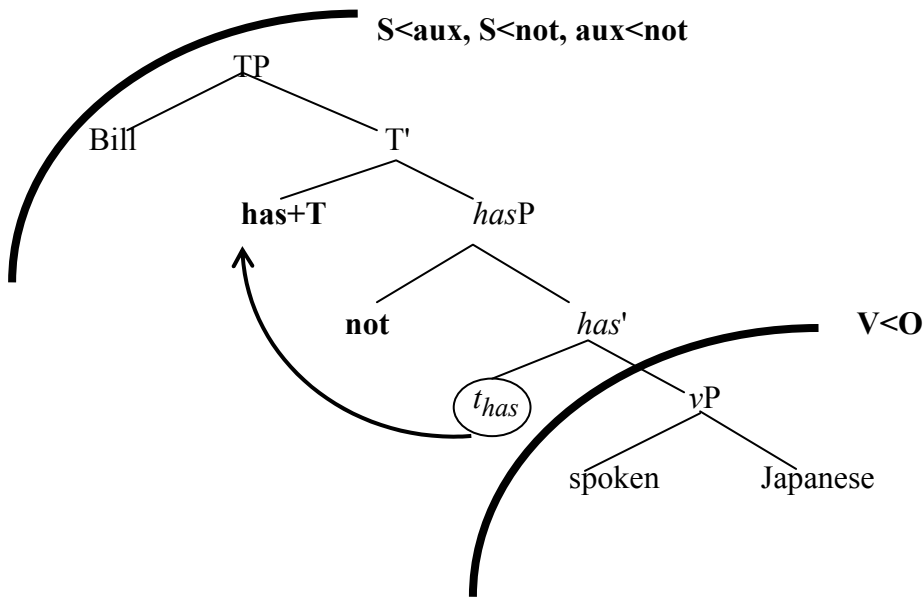
(84) **Prediction: *not* may not precede *did* (or other auxiliaries) under *vP*-ellipsis**
*Bill walked to school, but Mary not did.

(85) **v*-to-T over *not*: *John speaks not and *John not speaks.



- **When there is an auxiliary verb, can Aux-to-T movement apply across *not*?**
Yes: because Aux, *not* and T are in the same Spell-out Domain, and their order is not fixed until that Spell-out Domain (CP) undergoes Linearize.

(86) ok AUX-to-T over *not*: *Bill has not spoken Japanese*



The result: Impossibility of sentence negation in English without an auxiliary verb. *Do* is inserted in T to satisfy the verbal EPP property of T in such sentences. [The "last resort" property of *do*-support receives no particularly new explanation in our proposal.]

The position of the subject

- In English, the subject in Spec,vP belongs to the same Spell-out Domain as the pronounced verb, and is linearized with it. Movement of the subject to Spec,TP preserves **Subject < v** order established earlier when vP was linearized
- Main-v to C order would yield an ordering contradiction: **v < Subject**.
- Thus, v-to-C movement is impossible, and *do* is inserted.
- Since auxiliary verbs are merged after vP is spelled out, either **aux < Subject** or **Subject < aux** order can be established in the higher domain. Thus: no problem with Aux-to-C movement.

(87) **v-to-C vs. Aux-to-C**
 a. Has Bill ___ read the book?
 b. *Reads Bill ___ the book?

Note: The phenomenon in (87b) is uniform across verb types. This indicates that if our explanation for the phenomenon is correct, subject-formation in passive and unaccusative clauses must proceed via Spec,vP.

A caution about subject A-bar movement:

- If the subject is removed, as by *wh*-movement, to a position higher than C, v-to-C movement should be possible, and no *do*-support should be necessary.
- At first sight, this conclusion seems spectacularly correct:

(88) a. What did Mary buy ___?
 b. Who ___ bought the painting? (cf. **Who did buy the painting?* unless *did* is focused)

- It is likely, however, that the *v* in (88b) -- though it has moved to T -- does not move to C. If it did, we might expect to find *v* crossing high adverbs (adverbs merged in the higher Spell-out Domain). This is not the case:

(89) **Evidence that *v* does not move to C in subject questions**

- *Who bought fortunately the painting?
- *Who read supposedly *War and Peace*?

- Pesetsky and Torrego (2001) provide reasons why T (with or without *v* in it) should not move to C in subject questions -- independent of the spell-out theory presented here.

Variation across languages: Spell-out Domain version

1. The external argument in Swedish

- The external argument must be within the lower Spell-out Domain in English, to explain (87). But it must be *outside* the lower Spell-out Domain in *Swedish*, because the facts are different. In the verb-second construction, *v* freely moves over the external argument (and over adverbs).

Variation in Spell-out domain?

- Perhaps VP, rather than *v*P is the Spell-out Domain in Swedish (or: a projection of *v* not including dependents).

2. Adverbs and negation in French

- In French finite clauses, *v* appears to move over adverbs [example (73)] and over negation [example (82)]. It may be that, as in Swedish, VP rather than *v*P is the lower Spell-out Domain. French, unlike Swedish, shows *v*-to-T movement.
- On the other hand, the verb never moves over a non-pronominal external argument. The complexities of French inversion constructions are a topic we have not yet investigated So this is an open problem?

A Possible Typology:

	French	English	Swedish
verb moves to T	yes	yes	no
Spell-out Domain size	VP?	<i>v</i>P	VP

12.Covert External Merge

An alternative:

1. External merge, like internal merge, may be *covert* — i.e. apply within a Spell-out Domain D after Linearize(D).
 2. The lower Spell-out Domain is universally vP and is not subject to variation.
- In a language like Swedish, the subject, vP-adverbs and vP negation are not linearized within vP because they are *merged after* Linearize applies to vP.
 - Covert merge of the modifiers and specifiers of vP gives the impression of a smaller Spell-out Domain in Swedish (e.g. VP or V'), because covertly externally merged elements in D are not ordered as part of Linearize(D).
 - In order for a covertly externally merged element in D to be linearized, it must move overtly into a higher Spell-out Domain.

[Exception: If vP has only one Specifier/modifier α , and is otherwise completely vacated by movement, the system will know that α is the leftmost (and rightmost) element in vP and movement of α will not be crucial to ordering.]

(90) Swedish: covert Merge of Spec,vP and adverbial, vP

Hittade han faktiskt pengarna under sängen?⁷
found he actually money-the under bed-the
'Did he actually find the money under the bed?'

[Example (90) shows verb movement to C over both the subject and adverb *faktiskt*. For expository purposes, we make the assumption, controversial and perhaps incorrect, that *faktiskt* is merged as a vP modifier. We also ignore the internal structure of the DPs *pengarna* and *sängen*, where the suffixal article may reflect N-to-D movement.]

⁷ In the absence of a Swedish speaker close at hand, I have taken examples (sometimes modified) from Peter Svenonius' on-line "Minimal Syntax of Swedish":

http://www.hum.uit.no/a/svenonius/lingua/flow/li/minig/enmini_sv.html

Build vP, perhaps moving V through an intermediate VP shell to v:
 [vP hittade [VP ___ pengarna [VP ___ [PP under sängen]]]]

Linearization of vP Spell-out domain

LP(vP)	v<VP	V<VP	P<DP
a. L(vP)	hittade<pengarna hittade<under hittade<sängen	pengarna<under pengarna<sängen	under<sängen

[Ordering table now contains: a]

Covertly merge external argument and adverb in vP:
 [vP faktiskt han hittade [VP ___ pengarna [VP ___ [PP under sängen]]]]

Build CP, moving V to T and C; subject to Spec,TP; and adverb to T (?):
 [CP hittade+C [TP han [T* faktiskt [T' ___+T [VP ___ ___] ___] [VP ___ pengarna [VP ___ [PP under sängen]]]]]]

Linearization of CP Spell-out domain

LP(CP)	C<TP	han<T'*	faktiskt<T'
a. L(CP)	hittade<han hittade<faktiskt hittade<pengarna	han<faktiskt han<pengarna	faktiskt<pengarna

[Note that if *han* and *faktiskt* had not moved, they would not have been ordered with respect to other terminal elements.]

Possibility: The fact that adverbs precede all auxiliary verbs in Swedish non-V/2 environments is a sign that adverbs move to T obligatorily. Why this does not violate scope restrictions is unknown. Reconstruction? A-bar movement?

Note: Overt successive-cyclic A-bar movement that moves a constituent to the left of the main verb [e.g. the topicalization of the PP in (91)] must precede covert merger of the subject and adverbials to vP. Either

- (1) VP is a landing site for such movement, or
- (2) vP is the landing site for the A-bar movement and precedes the covert merger of the subject, raising tucking-in and locality issues.

- (91) **A-bar movement in Swedish: via Spec,VP?**
 Under sängen hittade han faktiskt pengarna .
 under bed-the found he actually money-the
 'Did he actually find the money under the bed?'

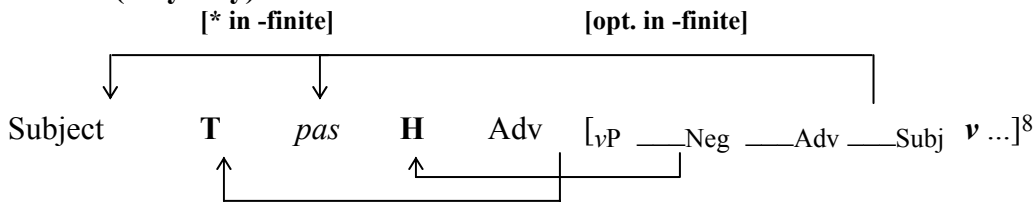
Note: The cyclic nature of linearization (and possibly Spell-out) removes the limitation on covert external merge noted by Chomsky (1995, chapter 4, 292-293), following work of Bošković.

French

The easy way out:

- Both negation (*pas*) and adverbs are covertly merged in *vP*, as in Swedish.
- They move out of *vP*, as in Swedish, but to different landing sites. Adverbs raise to a position below an intermediate head *H*.
- In non-finite clauses, there is optional movement of *v* to *H* and no movement of *v* to *T*.

- (92) **French (easy way)**



But, as noted by Pollock (1989), in elevated style Auxiliary verbs do raise above *pas* in non-finite clauses. This auxiliary/main verb distinction suggests that the syntax of non-finite clauses is in some ways more similar to English.

- This is difficult to analyze in our approach. A possibility:

Finite clauses: As above.

Non-finite clauses: Adverbs *but not negation* may be covertly merged.
 Adverbs and negation move as in (92)

I optionally attracts V (in elevated style). H optionally attracts V.

- Questions include: relative scope of negation and adverbs; why covertness is different in non-finite clauses.

Other instances of covert external merge

⁸ Perhaps the subject is higher than Neg and the Adv, which is presumably the case in comparable English examples. This may raise semantic issues.

- **Verb movement over Obj in an OV V/2 language like Dutch/German. [Covert merge of V and Object.]**
- **More generally:** Are there violations of Holmberg's (real) Generalization where we can be sure that movement does not proceed through the edge of the relevant Spell-out Domain?