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BACHRACH & KATZIR (2007)

Bachrach, Asaf and Roni Katzir. 2007. Right-Node Raising and Delayed Spellout. Ms., MIT. Available for download at LingBuzz: http://ling.auf.net/lingBuzz/000314

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1. BACKGROUND & GOALS

RIGHT NODE RAISING (RNR): silencing of material in non-final conjuncts. The shared material is referred to as *pivot* or RN:

(1) a. John bought a book about Tarski and Mary read a book about Tarski
b. John bought __and Mary read **a book about Tarski** (RNR, backward deletion)
(a book about Tarski = Pivot)
c. *John bought **a book about Tarski** and Mary read __ (forward deletion)

● RNR is subject to the *Right Edge Restriction:* shared material must be located at the right edge (see Oehrle 1991, Wilder 1999; for exceptions see below):

(2) a. I gave a present to__ and congratulated **all the winners**
b. *I gave__a present and congratulated **all the winners**

(3) *Right Edge Restriction (RER)*
If α surfaces in the *final* conjunct (RNR), gap(s) corresponding to α must be at the *right edge* of their non-final conjuncts. (Wilder 1999: (5a))

● Islands are suspended with RNR (for exceptions see below):

(4) a. [John met the man who wrote __] and [Mary met the woman who published __] **the recent bestseller about bats**
b. *Which book$_1$ did John meet the man who wrote t_1 (Complex NP Constraint)

ACROSS THE BOARD (ATB)-MOVEMENT: movement out of all conjuncts in coordinate structures:

(5) She told him **which book$_1$** [$_{IP}$ John bought t_1] and [$_{IP}$ Mary read t_1] (ATB-movement)

● ATB-movement obviates the effects of the Coordinate Structure Constraint. If only one conjunct contains a gap, this gap must not be bound from outside the conjunction ((6)a vs. (6)b)

different in (6)a excludes the conjunction reduction derivation in (6)c. This in turn ensures that (6)a involves coordination below the matrix predicate.

(6) a. She told him (on different occasions) [$_{CP1}$ **which book$_1$** I bought t_1] and [$_{CP2}$ that you read **a biography of Tarski**]
b. *She told him **which book$_1$** [$_{IP1}$ I bought t_1] and [$_{IP2}$ you read **a biography of Tarski**]
c. *[$_{CP}$ She told him on different occasions [$_{CP}$ which book$_1$ I bought t_1]] and [$_{CP}$ she told him on different occasions [$_{CP}$ that you read a biography of Tarski]]
(on internal, bound variable reading for *different*)

- ATB-movement is subject to island constraints:

(7) *__Who$_1$__ did [a man who loves t_1 dance], and [a woman who hates t_1 go home]?
(cf. [A man who loves Sally danced], and [a woman who hates Sally went home])

- However, islands are suspended if the gap is at the *right edge* of both conjuncts.

(8) **Which book$_1$** did [John meet the man who wrote t_1], and
[Mary meet the woman who published t_1]?

THREE ANALYSES OF RNR

I. MOVEMENT (Ross 1967; Hankamer 1971; Postal 1974, 1998, Bresnan 1974; Sabbagh 2007):

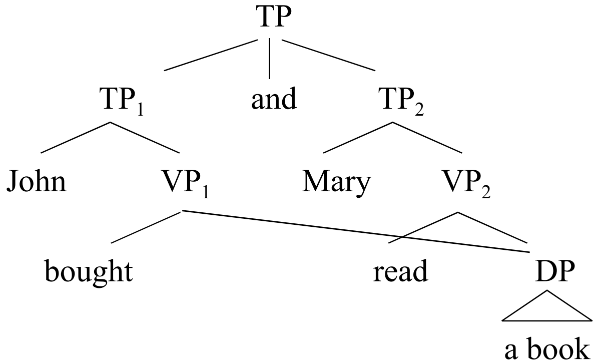
(9) [[John bought t_1] and [Mary read t_1]] [a book]$_1$ (rightward ATB-movement)

II. ELLIPSIS by Backward Deletion (Wexler & Cullicover 1980; Hartmann 2000; Wilder 1997):

(10) John bought ~~a book~~ and Mary read a book

III. MULTIPLE DOMINANCE (MD) (McCawley 1982; Levine 1985; Blevins 1990; Wilder 1999):

(11) John bought and Mary read a book



- General question for MD approaches: where is shared material (*a book*) pronounced?

(12) John bought ~~a book~~ and Mary read a book

B&K'S PLOT

The basic idea: Presence/absence of islands conditions follows from MD analysis of movement.

- There is a *Factor X* which, at a certain stage in the derivation, forces pronounciation of all categories that have alread been merged. These categories are frozen in place and cannot escape into higher domains. Thus, presence of Factor X triggers classic islands.
- Factor X is absent in two specific configurations:
  - intermediate specifiers for successive cyclic movement (movement to the edge)
  - inside coordinate structures, above shared material

  These configurations do not force pronounciation, and therfore do *not* establish islands.

➜ Consequence: conditions on how to spell out (= linearize) terminals (i) determine where shared material is pronounced and (ii) derive RER

- Factor X, the criterion responsible for forced spellout, is *complete dominance.*

2. ARGUMENTS PRO/CONTRA MOVEMENT

B&K discuss evidence for MD, and against ellipsis/movement analyses of RNR.

2.1. SUSPENSION OF ISLANDS

(13) [John met the man who wrote] and [Mary met the woman who published __] the recent bestseller about bats

➜ Evidence against movement I

2.2. SUSPENSION OF UPWARD BOUNDEDNESS

● Rightward movement (by Heavy NP Shift or extraposition) is subject to *Right Roof Constraint* (examples from Sabbagh 2007):

(14) *Right Roof Constraint (RRC;* Sabbagh 2007's version of Ross 1967)
Rightward movement may move and right-adjoin an element X to the cyclic node in which X is merged [= local vP or CP], but no further.

(15) a. Sam [$_{vP}$ [$_{vP}$ saw t_1] yesterday] [the new headmaster]$_1$ (HNPS)
b. *John [$_{vP}$ [$_{vP}$ claimed [$_{☛CP}$ that Sam [$_{☛vP}$ loves t_1]]] yesterday]] [the new headmaster]$_1$

● The effects of RRC are suspended with RNR (Ross 1967):

(16) [John claims that Sam loves t_1], and [Mary claims that Sam hates t_1] the new headmaster$_1$

➜ Evidence against movement II

2.3. WIDE SCOPE I OF PIVOT: RELATIONAL MODIFIERS

● Carlson (1987): relational modifiers like *different* and *same* display systematic ambiguity between internal (distributed) and external (deictic) reading (see Barker 2007 for recent analysis):

(17) John and Bill read a different book
a. *external*: John and Bill read a book which was different from *that* book
b. *internal*: John read a book that was different from the book that Bill read and Bill read a book that was different from the book that John read

Internal reading is contingent on presence of plural antecedent that can be distributed over.

(18) John read a different book — only external (deictic)

(19) a. John and Mary read a different book — internal/external
b. (Some of) the students read a different book — internal/external
c. Every student read a different book — internal/external

Distributivity can also be provided by plurality of events (conjunction of predicates of events):

(20) a. John [$_{V°}$ bought and read] a different book
b. John read a different book [$_{AdvP}$ quickly and slowly]
c. He witnessed the [$_{NP}$ arrival and departure] of a different man

● Pivot of RNR may take scope above the conjunction (Abbot 1976; Jackendoff 1977):

(21) a. John hummed _ , and Mary sang _, a different tune.
b. *John hummed a different tune and Mary sang a different tune (on internal reading)

➜ Evidence for movement I

2.4. WIDE SCOPE OF PIVOT II: EXCEPTIONAL Q-SCOPE

● RNR feeds unexpected wide scope for universals out of scope islands (Sabbagh 2007).

(22) a. John knows [someone who speaks every Germanic language], and
Bill knows [someone who wants to learn every Germanic language].
$\exists \succ \forall$ / * $\forall \succ \exists$
b. John knows [someone who speaks _], and Bill knows [someone who wants to learn _], every Germanic language. $\exists \succ \forall$ / $\forall \succ \exists$

➜ Evidence for movement II

NB: Exceptional wide scope properties of RNR are not discussed in B&R (2007a); but see B&R (2007b) for an account in terms of delayed spellout.

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3. NEW OBSERVATIONS BY BACHRACH & KATZIR

3.1. RNR FEEDS WH-MOVEMENT

● If an extracted category is the pivot of RNR, movement does not observe islands. This indicates that RNR may feed wh-movement:

(23) Which book$_1$ did [John meet the man who wrote __], and
[Mary meet the man who published __] $t_{1,\ Pivot}$?

(24) *Which book$_1$ did John meet the man who wrote t_1?

● Extraction can also target a proper subpart of the pivot:

(25) Which animal$_1$ did John say that Mary knew [a man who wrote __], and [a woman who published __] [an encyclopedia article about t_1]$_{Pivot}$

The fact that right-ward movement suspends islands for left-ward extraction directly contradicts the linearization based approach of Sabbagh (2007). Basic assumptions of Sabbagh (2007):

(i) a. Order Preservation: Don't change relative order across phases! (Fox & Pesetsky 2005)
b. Pivot may move to the right edge of vP
c. Pivot may move directly to matrix CP if movement proceeds string vacuously

For a linearization analysis, the switch from righ-ward to left-ward movement proves fatal, because the former operation creates a precedence statement that is inevitably inconsistent with an ordering statement created by the latter movement.

(ii) Derivation of (23):

Step 1: move pivot to right edge of vP $[_{vP}\ t_1\ \ \alpha\ \ Pivot_1]$ Ordering in vP: α < Pivot
Step 2: (successive cycl.) move pivot to left $[_{CP}\ Pivot_1 [_{vP}\ t_1\ \ \alpha\ t_1]]$ Ordering in CP: Pivot < α
➜ contradictory ordering statements

➜ Evidence against movement/linearization analysis I

3.2. C-COMMANDING ISLANDS

STRONG ISLANDS (CNPC in (24); subject/adjunct condition) result in strong violations and arise from the combination of certain nodes which are in a dominance relation (e.g. if CP is immediately dominated by IP, NP or VP).

(24) *Which book$_1$ did John meet the [$_{NP}$ man [$_{CP}$ who wrote t$_1$]]

combination of (upper segement of) NP and relative clause *dominates* the trace

WEAK ISLANDS (*wh*-/factive/extraposition/negative islands) lead to mild unacceptability. Their signature is a c-commanding intervener between the head and the tail of the chain. These cases fall under Relativized Minimality (RM; Rizzi 1990; Cinque 1990).

(26) ??Which book$_1$ did John wonder whether/who wrote t$_1$?

wh-operator in SpecCP *c-ommmands* the trace

● RM islands tolerate RNR, but not ATB-extraction.

(27) [Who cooked __] and [who ate __] the black beans? (= (19))

(28) *What$_1$ did [who cook t$_1$] and [who eat t$_1$]? (= (20))

➜ Evidence against movement/linearization II

3.3. CONJUNCTION EXTERNAL ISLANDS

If the island is added above the conjunction site, locality effects cannot be repaired.

(29) *Which animal$_1$ does John know a reporter [who made famous [a man who published_] and [a woman who illustrated _] [a book about t$_1$]?

➜ Evidence against movement/linearization III

3.4. SUMMARY

(30) *RNR vs. leftward ATB-movement*

		RNR	ATB-extraction
Island located inside conjuncts	dominating islands	✔	✔
	c-commanding islands (RM)	✔	✘
Island located above conjunction		✘	✘

- *Movement/linearization analyses:* cannot account for persistent islands (shaded in (30))
- *Ellipsis analyses:* fail to account for variable island sensitivity of RNR (islands inside conjunction vs. islands above conjunction).

4. Multiple Dominance

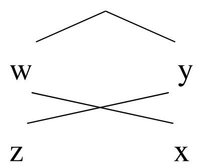
● A prominent axiom for graphs in linguistics dictates that syntactic trees must not contain crossing branches. The *Non-Tangling Condition* prohibits discontinuous constituents and Multiple Dominance (see Partee et. al 1990, chapter 16.3; Wall 1972; McCawley 1982; a.o.):

(31) *Non Tangling Condition*

$(\forall w,x,y,z \in N)$ (w dominates x $\wedge$ y dominates z $\wedge$ $w < y \rightarrow x < z$)

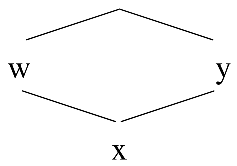
(where '< a' denotes irreflexive precedence relation)

(32) <u>Consequence I:</u> Discontinuous constituents are not allowed.



w dominates x and y dominates z and w < y,
but it does not hold that x < z

(33) <u>Consequence II:</u> No Multiple Dominance trees.

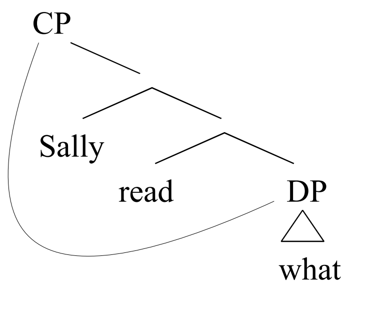


w dominates x and y dominates x, and w<y,
but it does not hold that x < x (because '<' is irreflexive)

● Abandoning (31) permits Multiple Dominance (MD) (NB: B&K exclude all but a specific configuration of discontinuous constituents; see §7) MD-trees can be used for representing two configurations: movement and sharing of common material in coordinate structures.

(34) a. (She asked) what Sally read what (Movement of *what*)

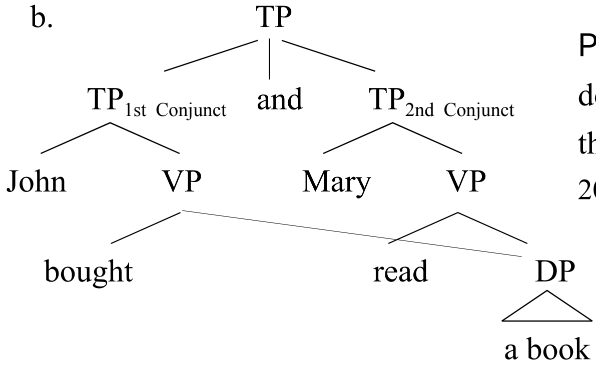
b.



Internal merge (= movement; McCawley 1982; Engdahl 1986): α is first merged in its base position (*external merge*; Chomsky 2004), and then remerged into the landing site.

(35) a. John bought and Mary read a book

b.



Parallel Merge (sharing by MD): α is dominated by two (or more) mother nodes that belong to different conjuncts (Citko 2005; Wilder 1999)

- B&K note two problems with embedding MD in standard Minimalist model:
  - *Linearization*: As there is only one occurrence of *what*, and *a book*, respectively, but two possible spellout positions, it needs to be determined where to linearize the terminals.
  - *Countercyclicity*: Derivation can forego pronounciation of *what* in lower position (immediately dominated by vP only) only if the derivation has reached higher position of *what* (immediately dominated by vP and CP).

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5. Complete Dominance and Cyclic spellout

5.1. Outline of the theory

***Part I: Locality** (partially transposed into copy theory)* *(☞5.2 Complete Dominance)*

In derivations involving multiple occurrences of X, the locality theory for any given node α differs according to whether α contains *all* copies of X or only *some* copies of α (this is what was called 'Factor X' in the introduction).

(36) a. If α contains *all* copies of X, then X needs to be pronounced somewhere inside α
⇨ α is an island for X

b. If α does *not* contain *all* copies of X, then X can be pronounced above α
⇨ α is not an island for X

There are two contexts in which α does *not* contain *all* copies of X:

○ intermediate specifiers for movement of X to the edge
○ the individual conjuncts of a coordinate structures in which X is shared

➜ derives island insensitivity of RNR

(37) *Inventory of theory*
a. Whether N contains all copies of α or not is expressed in terms of *complete dominance*.
b. At which point the content of α is pronounced is dependent on the definitions of (i) Spellout; (ii) the notion of Phase; and (iii) complete dominance

Part II: Well-formedness conditions on MD trees *(☞7. Linearization)*

Not all MD trees are well-formed. Apart from a definition of islands/locality, B&K provide a method for eliminating all but a few MD structures. The surviving MD configurations meet the following criteria:

(38) a. If X is in a *peripheral* position, X can be multiply dominated ➜ admits RNR

b. If X is *not* in a peripheral position, X *cannot* be MDed (or, as will be seen in §7, cannot be linearized at all) ➜ derives RER

(39) *Inventory of theory*
a. Whether the combination of two nodes yields a well-formed tree is expressed in terms of a *linearization algorithm* (which also derives exceptions for MD).
b. The linearization algorithm is more permissive for MD-structure. This difference between MD and non-MD is again expressed in terms of *complete dominance*.

5. 2. Complete Dominance

(40) *C(omplete) Dominance*
X c(ompletely) dominates Y iff
a. X is the only mother of Y or
b. completely dominates every mother of Y

(41) *Mother*
X is a mother of Y if there is a Z such that Y has been merged with Z.

Sample Computations:

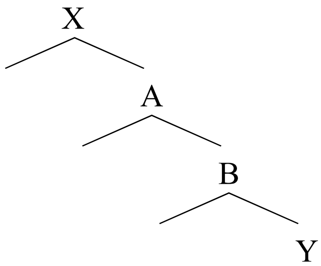
(42) Does X c-dominate Y in (45)a?
X c-dominates Y iff
a. X is the only mother of B. This is not the case, because X is not a mother of Y.
or
b. X c-dominates every mother of Y. B is the only mother of Y. Thus, X c-dominates Y iff X c-dominates B.

(43) Does X c-dominates B?
X c-dominates B iff
a. X is the only mother of B. This is not the case, because X is not a mother of B.
or
b. X c-dominates every mother of B. Since A is the only mother of B, X c-dominates B iff X c-dominates A.

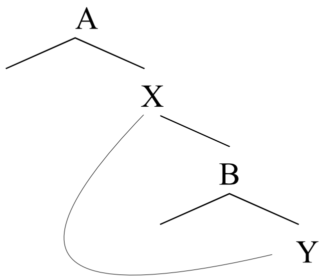
(44) Does X c-dominates A?
X c-dominates A iff X is the only mother of A. This is the case in (45)a.

➜ Thus, X c-dominates Y in (45)a.

(45) a.



b.



➜ *Specifiers are not c-dominated by their mothers*

(46) Does X c-dominate Y in (45)b?
X c-dominates Y iff
a. X is the only mother of Y. This is not the case, because B is also a mother of Y.
or
b. X c-dominates every mother of Y. X and B are the mothers of Y. Thus, X c-dominates Y iff X c-dominates X and X c-dominates B.

(47) Does X c-dominates X?
X c-dominates X iff
a. X is the only mother of X. This is not the case, because X is not a mother of X
or (motherhood is irreflexive!)
b. X c-dominates every mother of X. A is the only mother of X. Thus, X c-dominates X iff X c-dominates A. This is not the case.

➜ Thus, X does not c-dominates Y in (45)b.

(48) Does <u>A c-dominate Y</u> in (45)b?
A c-dominates Y iff
a. A is the only mother of B. This is not the case, because A is not a mother of Y.
or
b. A c-dominates every mother of Y. X and B are the mothers of Y. Thus, A c-dominates Y iff A c-dominates X and A c-dominates B.

(49) Does A c-dominate X? Yes, A c-dominates B, because A is the only mother of X.

(50) Does A c-dominate B?
A c-dominates B iff
a. A is the only mother of B. This is not the case, because A is not a mother of B.
or
b. A c-dominates every mother of B. X is the only mother of B. Thus, A c-dominates B iff A c-dominates X.

(51) Does A c-dominate X? Yes, because A is the only mother of X

➜ Thus, A c-dominates Y in (45)b.

NB: As is standard practice in linguictis, B&K adopt a *reflexive* definition of dominance. Still, c-dominance is irreflexive, due to the fact that motherhood is irreflexive!

5.3. CYCLIC SPELLOUT

The derivation proceeds in phases. In contrast to standard theories of cyclic spellout, it is not the *complement* domain of a phase node X which is transferred, but *the node X itself.* The fact that the left edge of X serves as an escape hatch, i.e. is not spelled-out together with the other nodes inside X, follows from the three assumptions that (i) only nodes that are completely dominated are spelled out and that (ii) specifiers are not completely dominated by their mothers (see (57)).

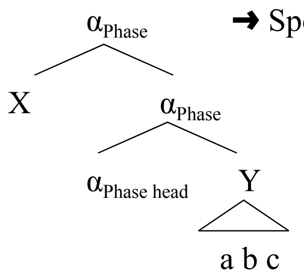
(52) *Complete Dominance Domain of X (CDD(X))*
The set of nodes completely dominated by X

(53) *Spellout*
A syntactic structure is mapped onto an object that cannot be further modified. In the case of the PF interface, the resulting immutable object is a string (≈ *Shape Conservation;* Williams 1998; Fox & Pesetsky 2005).

(54) *Spellout Domain of a phase node X (SOD(X))*
SOD(X) = CDD(X)

(55) *Phase nodes*: vP is a phase node and CP is a phase node, and nothing else is a phase.

(56) a. Spellout of α:= transfer α to the PF interface
b. Spellout domain of $\alpha_{\text{Chomsky/Nissenbaum}}$:= the set of nodes dominated by the sister of α
c. Spellout domain of $\alpha_{\text{B\&K}}$:= the set of nodes c-dominated by α

(57)


➜ Spellout $\text{domain}_{\text{B\&K}}$: α minus nodes not c-dominated inside α (⇒ <a, b, c>)

➜ Spellout $\text{domain}_{\text{Chomsky/Nissenbaum}}$ (⇒ <a, b, c>)

(58) Corollary: the string α cannot be changed by further syntactic operations

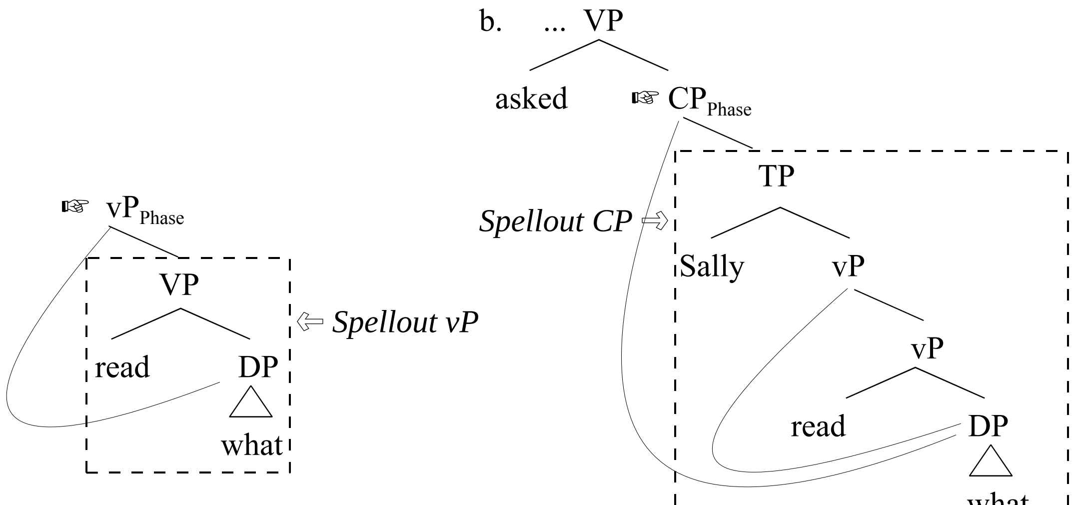
6. IMPLEMENTATION

6.1. SUCCESSIVE CYCLIC MOVEMENT

Together with cyclic spellout, the theory entails that categories that are remerged at the edge of a phase are not spelled out in that phase. This derives the assumption that intermediate copies generated by successive cyclic movement are silent:

(59) She asked what Sally ~~what~~ read ~~what~~ (Successive cyclic movement of *what*)

(60) a. b.



(subject trace suppressed)

○ In (60)a, *what* is remerged with vP. Spellout targets all nodes c-dominated by vP. Since *what* is not c-dominated by vP, *what* is not transferred to spellout at the vP-phase.

○ In (60)b, *what* is remerged with the next higher phase CP. Since *what* is not c-dominated by CP, *what* is not spelled out at CP.

● Observe that *what* is not c-dominated at the root either. Thus, something like (61) is needed.

(61) ASSUMPTION: The root is c-dominated by a silent node.

6.2. DERIVING ISLANDS

Together with the assumption that the results of spellout cannot be altered (see (58)), it is correctly predicted that the CNPC violation (62) cannot be generated by the derivation in (63).

(62) *[$_{CP2}$ What$_1$ did John [$_{vP2}$ t$_1$ know a man [$_{CP1}$ who [$_{vP1}$ t$_1$ ate t$_1$]]]]

Once the specifier of CP1 is filled in (63)c, spellout (see (63)d)transfers all nodes c-dominated by CP1 to PF. *what,* which is located in (an outer) SpecvP, is c-dominated by CP1, and therefore needs to be spelled out. Thus, the sequence (62) cannot be produced by the derivation detailed in (63):

(63) a. Merge *what*: [$_{vP1}$ what$_1$ [$_{VP}$ ate t$_1$]]
b. Spellout CCD(vP1): [$_{VP}$ ate t$_1$]
c. Merge *who*: [$_{CP1}$ who [$_{vP1}$ what$_1$ [$_{VP}$ ate t$_1$]]]
☞ d. Spellout CCD(CP1): [$_{vP1}$ what$_1$ [$_{VP}$ ate t$_1$]]
e. Merge *man* and CP1: [$_{NP}$ man][$_{CP1}$ who [$_{vP1}$ what$_1$ [$_{VP}$ ate t$_1$]]]]
.... f. Spellout CCD(vP2): [$_{vP2}$ know a [$_{NP}$ man][$_{CP1}$ who [$_{vP1}$ what$_1$ [$_{VP}$ ate t$_1$]]]]
.... g. *Did John know a man who what$_1$ ate

? What actually rules out the derivation (63), why is (63)g not well-formed?

(63)g is ill-formed for two reasons. First, (64)a violates a prohibition on combining y/n questions with wh-questions, also at work in (64)a/b. (LF movement does not obey Subjacency, see (64)c; Huang 1982; Chomsky 1973). Second, if this factor is controlled, the wh-phrase can still for some reason not be spelled out in SpecvP (see (64)d). Note that this fact cannot be linked to the contrast between English and Bulgarian/Croation-type languages, where all wh-phrases are topicalized, because this distinction does not apply to relative clauses. (A standard way to derive this fact would be to assume that in English, only attracting heads bear EPP-features, while in Bulgarian/Croation-type languages, the wh-phrases themselves are marked for movement, too.)

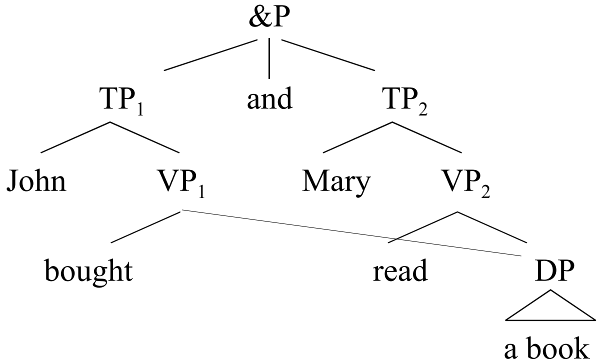
(64) a. *Did John know a man who ate what (combination of y/n and wh-question)
b. *Did John know what (combination of y/n and wh-question)
c. Who knows a man who ate what (island insensitive *wh-in-situ*)
d. *Who knows a man who what ate (illegitimate spellout of *wh* in SpecvP)

➜Puzzle (for everyone): Why can *wh*-phrases not be spelled-out in SpecvP?

6.3. COORDINATION AND RNR

● In (65), the object DP *a book* is neither c-dominated by VP$_1$ nor by VP$_2$: DP has more than one mother. VP$_1$ does not c-dominate all mothers of DP, because VP$_1$ does not c-dominate itself. The same holds of VP$_2$. Thus, the first node c-dominating the object is the conjunction phrase &P.

(65) John bought and Mary read a book



⇨ DP not c-dominated inside conjunction

● The pivot is not c-dominated until the derivation reaches the point at which coordination joins the two subtrees. Since c-dominance is crucial for spellout of a phrase, the pivot cannot be spelled out prior to &P. In other words, the pivot cannot be forced to be spelled out *inside* the conjunction. As a result, α may freely violate locality conditions inside the conjuncts:

(66) Which book$_1$ did [John meet the man who wrote __], and
[Mary meet the man who published __] t$_{1, Pivot}$?

● However, adding an island once the pivot is c-dominated triggers the familiar island effects:

(67) *Which animal$_1$ does John know a reporter [who made famous
[a man who published_] and [a woman who illustrated _] [a book about t_1]?

? Ourania Sinopoulou: How does the derivation know that the pivot is shared? The two conjuncts are assembled separately. At the point where the first conjunct is processed, the pivot is not MDed yet. *Possible answers* (Vina Tsakali, Elena Anagnostopoulou): pivot is interpreted in both conjuntcs. This is marked by feature on pivot, which induces sharing later on.

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7. LINEARIZATION

A linearization of a tree is a mapping from non-terminals to terminals which determines the order of the terminals in the output. Among others, this mapping is assumed to satisfy two properties:

(68) a. *Order preservation:* If e.g. NP precedes VP, then the nodes inside NP are pronounced before the nodes inside VP (⇨ excludes discontinuous constituents)

b. *Consistency w.r.t. pronouniciation:* the results of linearization must not contain statements such as *a precedes b* as well as *b precedes a*; or *a precedes itself.* Usually this is done by demanding that the result is asymmetric and irreflexive (and transitive and total, i.e. a *stong order* in the set theoretic sense; see also Kayne 1994).

<u>REFLEXIVE PRECEDENCE</u>: B&K note that MD trees cannot be linearized if precedence is defined irreflexively (‘<’). This follows from the fact that MD introduces reflexive relations, in contradiction to the assumption that precedence is defined irreflexively:

(69) *Strict Linearization in terms of irreflexive precedence*
If A is linearized before Y then $\forall a \in A. \forall b \in B. a < b$

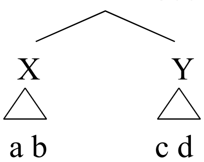
(70) [$_{CP}$ *What* did John [$_{VP}$ eat *what*]] (*what* merged twice)
CP < VP ⇒ what < what (violation of irreflexivity)

➜ B&K therefore adopt reflexive precedence (‘≤’). This immediately resolves the problem for (70), because *what* ≤ *what* is now a legitimate pair in the precedence relation.

7.1. A TWO-STEP LINEARIZATION PROCEDURE

B&K define an algorithm for linearizing trees compositionally bottom-up, which consists of two steps: collecting the terminals under a node (*D-lists)*, and combining these D-lists to larger units.

(71) Z *Second step*: compute the result of combining D-list(X) and D-list(Y) (see definition (75))



First step: collect D-list of X and D-list of Y (see definition (72))

STEP 1: D-LISTS The procedure for computing D-lists differs according to *where* in the tree these lists are collected: if X is not yet completely dominated, the D-list may contain *multiple occurrences* of X. Once X is c-dominated, all but one occurrences must disappear. This has important consequences, as will be seen in (79). (B&K actually don't say how this is achieved).

(72) *Linearization Well-Formedness Condition*
a. D-list for a node X:= all terminals dominated by X
b. If y∈CDD(X) then y appears on the D-list of X exactly once ☞ Movement in (88)!

Notational convention: lists are placed in angled brackets

(73) Application to (71):
D-list(X) = <a, b>
D-list(Y) = <c, d>

STEP 2: COMPOSITION RULE FOR LINEARIZATION The composition rule for combining two D-sets includes a weakened version of precedence among non-atomic lists. Usually, if X and Y are nodes with two or more terminals, X is said to precede Y iff *all* elements of X precede *all* elements of B. In terms of D-lists, this can be expressed as follows:

(74) a. D-list(X) = <a, b>
b. D-list(Y) = <c, d>
c. D-list(X) ≤ D-list(Y) = <a, b, c, d> ⇨ standard linearization

B&K's system yields different, more liberal results, allowing for some overlap between the individual lists. In particular, <a, b> and <c, d> may be also combined as follows, with c and b having changed place:

d. D-list(X) ≤ D-list(Y) = <a, c, b, d> ⇨ B&K's linearization

In addition to this relaxed composition principle for ordering nodes, the linearization algorithm includes a condition enforcing order preservation (see (68)a), defined in terms of *Conservativity*:

(75) *Linearization algorithm*

If X is ordered to the left of Y (X•Y) to form a new object C, the D-list of Z must observe the following conditions:

a. EDGE ALIGNMENT: The right edge of X must precede the right edge of Y, and the left edge of X must precede the left edge of Y.

b. CONSERVATIVITY: Orders established within X and Y must be preserved in Z.

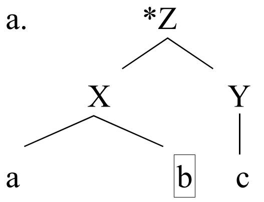
Notational convention: shared material is placed in parentheses

➜ Consequence of (72)b for (75): Material that is not c-dominated can occur more than once. If a category is shared, Edge Alignment and Conservativity can therefore be satisfied by different occurrences of that category, respectively (see movement example in (88)).

7.2. CONSEQUENCES OF LINEARIZATION

❖ Order of (c-dominated) terminals cannot be switched:

(76) a.



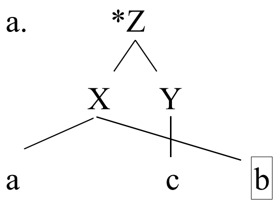
b. <a, b> • <c> ⇏ <<u>b</u>, a, c> (Linearize X and Y)

a ≤ b   b ≤ a, violating Conservativity

✔Edge Alignment: because the right edge of X (= b) does not precede the right edge of Y (= c)
✘Conservativity: because a precedes b in X, but not in Z.

❖ No discontinous constituents across the right edge of B:

(77) a.



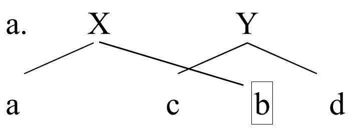
b. <a, b> • <c> ⇏ <a, c, <u>b</u>>

c ≤ b, instead of b ≤ c, in violation of Edge Alignment

✘Edge Alignment: because the right edge of X (= b) does not precede the right edge of Y (= c)
✔Conservativity: because a precedes b in X, as well as in Z

○ Discontinous constituents that reach *into* Y are legitimate:

(78) a.



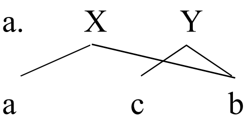
b. <a, b> • <c, d> ⇒ <a, c, <u>b</u>, d>

✔Edge Alignment: the right edge of X (= b) precedes the right edge of Y (= d)
✔Conservativity: a precedes b in X, and c precedes d in Y. The same relations obtain in Z.

MD and RNR

❖ Discontinuous constituents *across* Y are legitimate if b is shared (compare to (77)). Since b is shared, it can occur twice (even though this does not have any effect - cf. (88)):

(79) a.



➜ accounts for possibility of RNR
➜ excludes RNR by Forward Deletion

b. <a, (b)> • <c, (b)> ⇒ <a, c, b>

b is shared, hence two occurrences of b — b is c-dominated, hence only one occurrence of b

✔Edge Alignment: the right edge of X (= b) (reflexively) precedes the right edge of Y (= b), because b ≤ b.
✔Conservativity: a precedes b in X, and c precedes b in Y. In Z, these orderings are preserved

c. <a, (b)> • <c, (b)> ⇏ <a, b, c>

c ≤ b — b ≤ c, in violation of Conservativity

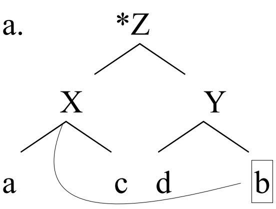
✔Edge Alignment: the right edge of X (= b) precedes the right edge of Y (= b)

✘Conservativity: c precedes b in B, but b precedes c in Z.

(80) *John bought **a book about Tarski** and Mary read __ (= (1)c)

❖ Discontinuous constituents across Y are illegitimate if b is shared and the gap inside the first conjunct is *non-peripheral*. Both logically possible options for ordering are blocked.

(81) a.



➜ derives RER in first conjunct

b. <a, (b), c> • <d, (b)> ⇏ <a, c, d, b>

b ≤ c — c ≤ b, violating Conservativity

✔Edge Alignment: the right edge of X (= c) precedes the right edge of Y (= b)

✘Conservativity: b precedes c in X, but c precedes b in Z.

c. <a, (b), c> • <d, (b)> ⇏ <a, b, c, d,>

d ≤ b — b ≤ d, violating Conservativity
b ≤ d, instead of d≤b, violating Edge Alignment

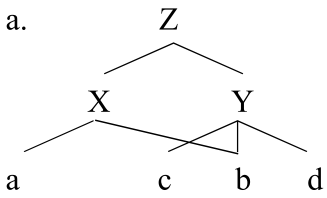
✘Edge Alignment: the right edge of Y (= b) does not follow the right edge of X (= c)

✘Conservativity: b precedes c in X, but c precedes b in Z.

(82) a. I gave a present to__ and congratulated **all the winners.**
b. *I gave__a present and congratulated **all the winners.**

❖ Discontinuous constituents that reach into Y are legitimate if b is shared, and the gap inside the second conjunct is not peripheral.

(83) a.



➜ RER violations in second conjunct (s. (84)) do *not* fall out from Edge Alignment

b. <a, (b)> • <c, (b), d> ⇒ <a, c, b, d>

✔Edge Alignment: the right edge of X (= b) precedes the right edge of Y (= b)

✔Conservativity: all orderings are preserved

(84) * [John congratulated __] and [Mary gave **the winner** the prize] (=(68))

(84) is excluded by the assumptions that (i) spellout of Y precedes spellout of X and that (ii) b is not c-dominated inside X or B. b is spelled out once Z is completed. But in order to generate <a,c,b,d>, b would have to be squeezed into the already completed, i.e. spelled out object <a,c,d>. This contradicts the cyclic spellout model:

(85) Step 1: Spellout(B) ⇒ <c,d>
Step 2: Spellout(A) ⇒ <a>
Step 3: Spellout(C) ⇒ <b> **?** <c,d> • <a> ✘<b> cannot be combined with X•Y

○ NB I: analysis extends to cases in which the RER is violated only in the second conjunct:

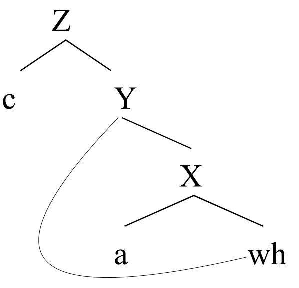
(86) *I congratulated __ and gave__a present **all the winners.**

○ NB II: Some RER violations in the second conjunct are admitted (Wilder 1999). Why?

(87) John should fetch __ and give __ **the book** to Mary

❖ MDed material occurs more than once in movement configurations, as long as the moved category is not c-dominated. The left occurrence of wh satisfies Edge Alignment (wh≤a), while the right one meets the requirements of Conservativity (a ≤ wh).

(88) ➜ Internal Merge/Movement



a. <a> • <wh> ⇒ <a, (wh)>
b. <wh> • <a, (wh)> ⇒ <(<u>wh</u>), a, (*wh*)>

a ≤ wh — a ≤ wh, satisfying Conservativity; wh ≤ wh, satisfying Edge Alignment

✔Edge Alignment: satisfied by <u>left</u> occurence of wh
✔Conservativity: satisfied by *right* occurence of wh

➜ Not all members of a D-list need to satisfy linearization conditions, Edge Alignment and Conservativity must be satisfied only once. Thus, D-lists are not strict linear orders.

● Once further nodes are merged with (88), wh is c-dominated. Hence, wh must occur only once:

(88) c. <c> • <(wh), a, (wh)> ⇏ <c, (wh), a, (wh)>
d. <c> • <(wh), a, (<u>wh</u>)> ⇒ <c, <u>wh</u>, a>

Problem: In (88)d, Conservativity is violated because a≤wh in left conjunct, but wh≤a in result. More generally, movement adds 'expressions in parenthesis' which help to satisfy linearization conditions in the local phase. But these newly created positions introduce unsatisfiable requirements for the next higher phase.

B&K's Suggestion (p. 27): If a D-list contains multiple occurrences of a category, it is possible to ignore all but one of these occurrences in the computation of the next higher D-list. As a result, the right occurrence of wh in the D-list of (88) will not be passed on to the next higher node.

7.2. Legitimate permutations

● Rephrased in terms of movement, Edge Alignment prohibits moving (i) right edges across categories to the right, and (ii) left edges across categories to the left:

(89) a. <a, b>, <c, d> ↑ (✗ b moved rightward across <c, d>)

b. ↑ <a, b>, <c, d> (✗ c moved leftward across <a, b>)

● But both movements can be salvaged if they proceed ATB (i.e. if the edge is shared):

(90) a. <a, b>, <c, b>

b. <a, b>, <a, d>

● Conservativity prohibits reversing order inside categories. But what if the inverted terms are shared material (b below)?

(91) a. <a, b, c> $\not\Rightarrow$ <a, c, b>
b. <a, b, b> $\Rightarrow$ <a, b, b>

? Here, sharing should also be able salvage the derivation. Is this correct?

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9. QUESTIONS, OPEN ENDS & EXTENSIONS

? Right Roof Constraint (RRC): How is RRC accounted for?

(92) a. She told [the reporter t_1] $[_{XP}$ to call her tomorrow [who had asked for an interview]$_1$]
b. *She told [the reporter t_1] $[_{CP}$ that he should call her tomorrow [who had asked for an interview]$_1$]

A possible analysis in terms of linearization: movement to the right proceeds through SpecCP on the left, and movement is subject to order preservation (Fox & Pesetskky 205). Finite clauses include SpecCP, thus the extraposed category needs to move through SpecCP, resulting in an ordering conflict. On plausible assumptions, infinitivals lack CP. Thus, movement proceeds directly to the right, avoiding ordering conflict. This account has the disadvantage of being incompatible with B&K's system, though.

? C-commanding islands: What is the the reason for ATB-movement being sensitive to RM/c-commanding islands? If a category is shared, it is not spelled out inside the conjuncts. As a result, islands are obviated. Why is this strategy not available if the category crosses wh-islands and the like?

9.1. APPARENT VIOLATIONS OF RER

? *Problem*: RER is not absolute (see Sabbagh 2007). There are also systematic exceptions to RER, which come in two types:

○ Type A: gaps are non-final in both conjuncts (and pivot is right-adjacent to conjunction).

(93) Josh will $[_{vP}$ donate _ to the library], and Maria will $[_{vP}$ donate _ to the museum], **each of these old novels** (Sabbagh 2007; (9a))

○ Type B: gaps are non-final, and pivot is separated from final conjunct by overt material:

(94) Joss will [$_{vP}$ sell _ to a library, and donate _ to a shelter] on the same day, **all of his old manuscripts** (Sabbagh 2007; (13a))

ANALYSIS:

○ Remerge pivot first at the right edge of both conjuncts:

(95) First conjunct: <a,b,c> • <b> ⇒ <a, (b), c, (b)>
Second conjunct: <d,b,e> • <b> ⇒ <d, (b), e, (b)>

○ Share pivot across conjuncts:

(96) <a, (b), c, (b)> • <d, (b), e, (b)> ⇒ <a, c, d, e, b>

✔Edge Alignment: satisfied, because b reflexively precedes b

✘Conservativity: violated, because b≤c in left conjunct, but c≤b in result

Solution: ignore parts of input D-lists (see (88))

? *Sabbagh*: Both type X and type Y cases provide an argument against *in-situ* approaches (ellipsis or MD) in that they help to demonstrate that RNR is obligatory - failure to move results in ill-formedness:

(97) *Joss will [$_{vP}$ donate _ to the library], and Maria will [$_{vP}$ donate **several old novels** to the museum]. (= (10a); cf. (92))

Is there a way to answer this challenge for B&K?

ANALYSIS: The obligatoriness of deletion is unexpected on an ellipsis account, but not for B&K - In (96), it holds that <a,(b),c> •<d,(b),e> ⇒ <a, c, d, b ,e>, and this violates Conservativity in the strict reading, i.e. without admitting exceptions as in (88). The difference between (96) and (88) is that in the latter, neither occurrence of the MDed category c-commands the other. In some way, this should be exploited (along the lines of Wilder 1999).

9.2. RIGHTWARD VS. LEFTWARD MOVEMENT

Leftward movement may proceed successive cyclically, while rightward shift is strictly local (RRC). This property does not follow from B&K, because dislocation implicates remerge, which in turn is possible from both edges of a phase. It also does not directly fall out from a linearization/movement based approach like Sabbagh's. (Sabbaghs needs to stipulate that rightward movement proceeds directly to the root node.) Thus, the big question is still out there: how can directional asymmetries be accounted for?

NB: Note on the side that this problem provides extremely strong evidence in support of a theory of locality that incorporates linearization conditions. If locality conditions are exclusively expressed in terms of dominance, the asymmetry is entirely unexpected, even with the inclusion of phases. This is so because in dominance approaches, movement could always proceed successive cyclically through specifiers on the left, switching in the highest phase to movement to the right.

(98) SUMMARY OF ANALYSIS

<table>
<tr><th colspan="2"></th><th>RNR</th><th>ATB-extraction</th></tr>
<tr><td rowspan="2">Islands inside conjuncts</td><td>dominating islands</td><td>✔
pivot is not c-dominated inside conjunction</td><td>✔
⇦ RNR, then ATB</td></tr>
<tr><td>c-commanding islands (RM)</td><td>✔
pivot is not c-dominated inside conjunction</td><td>✘
?</td></tr>
<tr><td colspan="2">Islands located above conjunction</td><td>✘
pivot is c-dominated by island inducing node</td><td>✘
pivot is c-dominated</td></tr>
</table>

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