

Linearizing Disintegrated Traces[‡]

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How Many Mothers?
Multidominance in Syntax

Workshop at LSA Summer Institute 2023

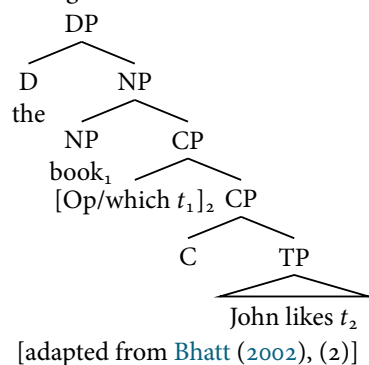
June 24, 2023

1 THE PUZZLE

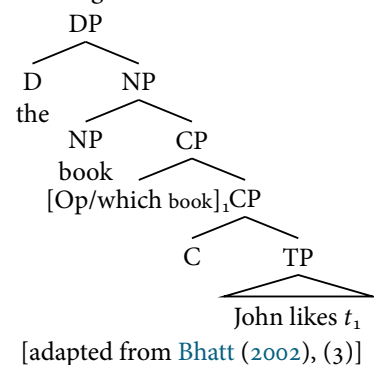
➤ *Incompatibility between Late Merge (LM) and Raising RCs: Hulse and Sauerland (2006)*

► RCs: Raising and Matching

(1) a. *Raising*



b. *Matching*



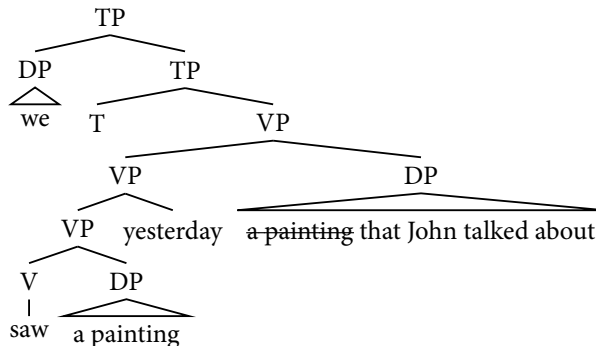
► Fox and Nissenbaum (1999)

▷ RC extraposition

= QR of the host DP + LM of the RC to the NP restrictor of the DP

(2) a. We saw a painting yesterday that John talked about.

b.



[Fox (2017), (6): 28]

[‡]Special thanks to Danny Fox and Amir Anvari for helping with the structure of the content, among many other things. All errors are mine.

► **Hulsey and Sauerland (2006)**

- ▷ If there's LM, then the RC isn't present with the head of the RC from the outset.
- ▷ Therefore,
RC extraposition → **no Raising**.
- ▷ **Hulsey and Sauerland (2006)** give some initial data that corroborate this reasoning (3). (“#_{IC}” stands for “infelicitous with idiomatic interpretation”.) I'm going to call these **the incompatibility sentences**.

- (3) a. Mary praised the headway (#_{IC}last year) that John made.
b. I was shocked by the advantage (#_{IC}yesterday) that she took of her mother.

[Hulsey and Sauerland (2006), (9)]

- (4) a. I found the picture of himself₁ (*yesterday) that every boy₁ saw.
b. Mary discovered the book about himself₁ (*yesterday) that every boy₁ read.

[based on Hulsey and Sauerland's (2006) (13)]

► **However, there are cases mentioned by Henderson (2007) which present examples of the following sort that counterexemplify this incompatibility claim.** I'm going to call these **the compatibility sentences**.

- (5) a. John paid the same heed last year that Mary paid.
b. John took the same advantage last week that Mary took.
c. John made the same headway last year that Mary made.

[(5a) from Henderson (2007), (28): 215; the rest mine]

- (6) a. John₁ saw the picture of himself₁ last year that he₁ painted.
b. Every student₁ saw the photo of his₁ mother last night that he₁ brought.

[Henderson (2007), (28b-c)]

► **What I will do**

- ▷ I will give an account of the incompatibility sentences and the compatibility sentences using multidominance, as developed in **Johnson (2012, 2018)**.
- ▷ Then I will explain **Henderson's (2007)** account and point out why it doesn't work.

2 MULTIDOMINANCE

➤ *Plain DP movement*

► **Parallel Merge (Citko 2005, 2006, 2007, 2011a,b, Citko and Gračanin-Yukse 2020; Johnson 2009, 2012, 2018; Fox and Johnson 2016)**

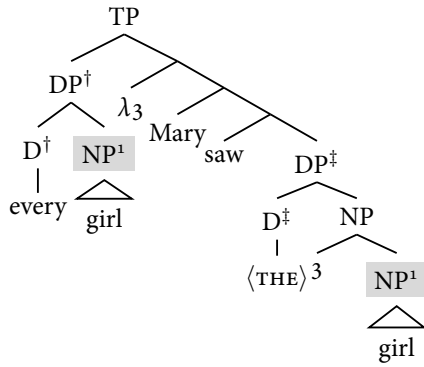
- ▷ The result of Trace Conversion ((7), **Fox 2002**) is built into the structure from the outset.
- ▷ The NP of the DP in the “converted trace” is shared between this lower DP and the higher DP (8).

(7) **Trace Conversion**

- a. **Variable Insertion:**
(Det) Pred → (Det) [Pred λy . y = x]
- b. **Determiner Replacement:**
(Det) [Pred λy . y = x] → the [Pred λy . y = x]

[Fox (2002), (10): 67]

(8) Mary saw every girl.



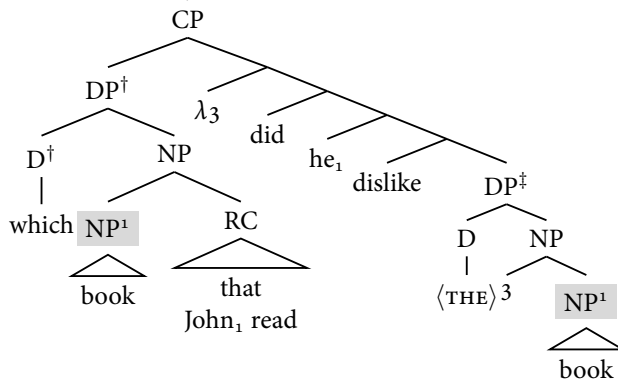
► “3” → shorthand for “ $\lambda y . y = g(3)$ ”

▷ “n” → shorthand for “ $\lambda y . y = g(n)$ ”

► D[‡] → the replacing determiner; silent; same semantics as *the*

➤ *The “Late Merge” effect with RCs*

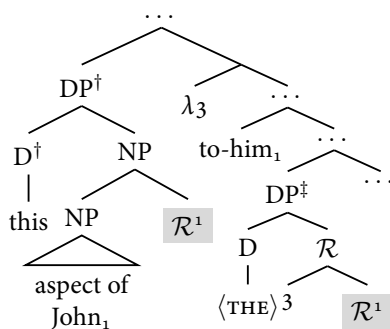
► Parallel Merge the NP to the RC which contains the R-expression coreferent with the relevant pronoun (9).

(9) Which book that John₁ read did he₁ dislike?

➤ *Wholesale Late Merge (WLM) (Takahashi and Hulseley 2009)*

► **LM of entire NP restrictors instead of just the RC attached to the NP**

► Parallel Merge the \mathcal{R} to the NP which contains the R-expression coreferent with the relevant pronoun (10).

(10) [This aspect of John₁] seems to him₁ to be annoying.

► What governs/restricts how long we can delay the first-merge of the NP restrictor?

- ▷ Something very close to the original version of WLM, as proposed in Takahashi and Hulsey (2009), given in (11).

(11) **CONSTRAINT ON THE FIRST-MERGE OF NPs (CFMNP)**

An NP must have at least one path extending from it to the root such that the first DP in this path, counting from the NP, is in an A-position.

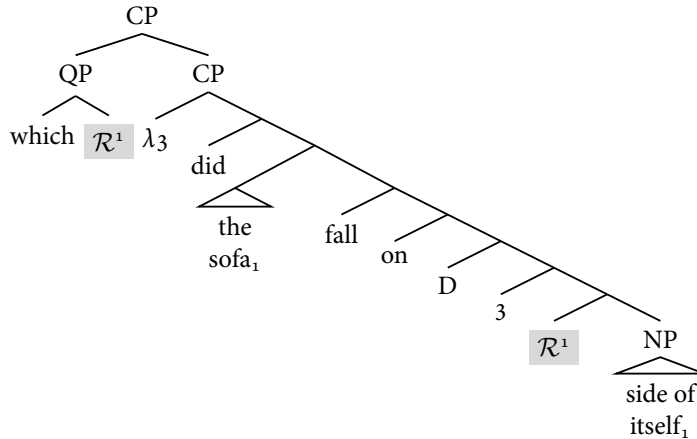
► This makes sure that the ungrammaticality of (12) can be derived.

(12) *Which aspect of John₁ does he₁ dislike?

➤ **Reconstruction**

- (13) a. Which side of itself₁ did the sofa₁ fall on?
 b. **Structure:**
 [which \mathcal{R}^1] λ_3 did the sofa₁ fall on [D [3 [\mathcal{R}^1 [NP side of itself₁]]]]

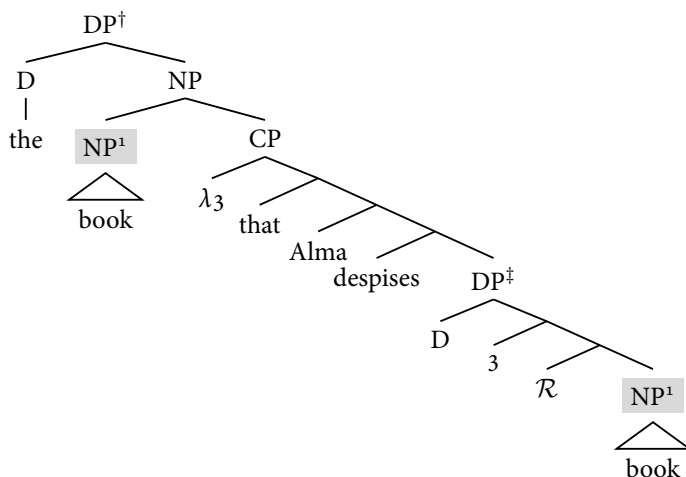
(14) Which side of itself₁ did the sofa₁ fall on?

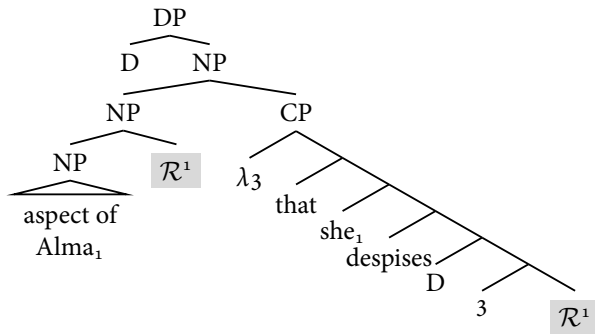
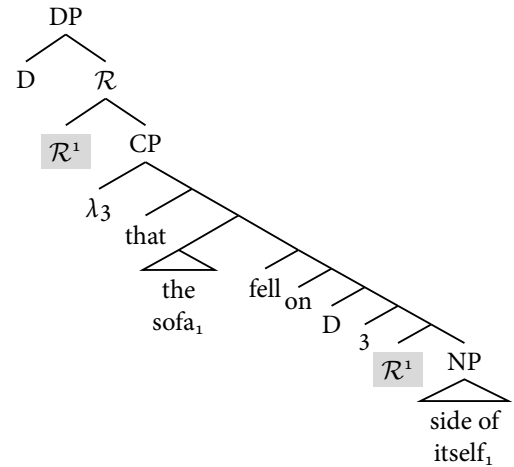


➤ **Relative clauses**

► Cases that do not disambiguate between reconstruction and antireconstruction

(15) The book that Alma despises is on the table.
 Structure for the relativized DP



► **Antireconstruction**(16) the aspect of Alma₁ that she₁ despises► **Reconstruction**(17) the side of itself₁ that the sofa₁ fell on➤ **Linearization**

The Linearization Algorithm

(18) **The Linearization Algorithm**

- a. In English, when you have a phonologically contentful determiner, you must pronounce its phonologically contentful restrictor immediately to its right.
- b. If there's a phonologically contentful restrictor NP dominated by the mother of the determiner, then pronounce that NP immediately to the right of the determiner.
- c. If there isn't, then **find the phonologically contentful NP that is a sister to the shared/multidominated \mathcal{R} node inside the DP**, and pronounce this NP immediately to the right of the determiner.

3 INTERPRETATION OF NPs

- (19) a. **Dependent NP**
An NP is a dependent NP if it contains a *plain* anaphor¹ or a bound pronoun or if it's an NP that's part of an idiom chunk.
- b. **Independent NP**
An NP that is not a dependent NP is an independent NP.

- (20) **Complete dominance**
A completely dominates B in some structure C iff A is included in every path from B to C.

[O'Brien (2017), 52: 36]

¹As opposed to an *exempt* anaphor. See Charnavel (2020), Charnavel and Sportiche (2016).

(21) **Generalized NP-Interpretation Theory (GNPIT)²**

a. **Generalized Dependent NP-Interpretation (GDNPI)**

The position in which a dependent NP is to be interpreted must be the position where it's **completely dominated by the sister of every node it's dependent upon for interpretation.**

b. **Condition A**

(*corollary of GDNPI*)

There must be a DP coindexed with a reflexive/reciprocal such that a sister of this DP **completely** dominates it **within its binding domain.**

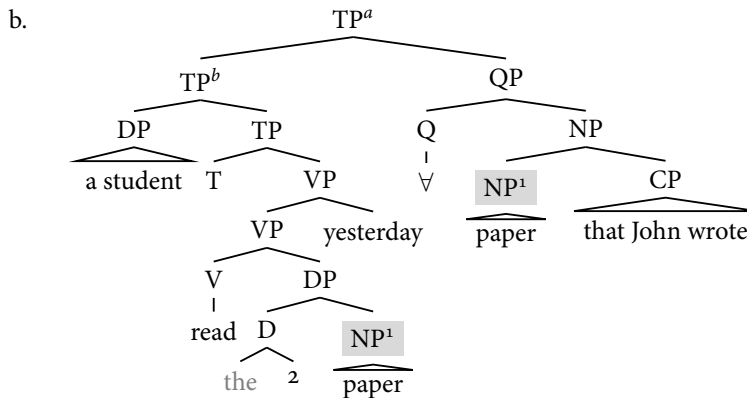
c. **Condition C**

There must not be a DP coindexed with an R-expression such that a sister of this DP **completely or incompletely** dominates the R-expression.

4 EXTRAPOSITION

4.1 PRELIMINARIES 1

(22) a. A student read every paper yesterday that John wrote.



c. **Linearization of TP^b**

a < student < read < D < paper < yesterday

Linearization of QP

∇ < paper < that < John < wrote

[based on Johnson (2012), (54)]

► **Fusion under Adjacency (Johnson 2012) between D and ∇:**

(23) a < student < read < every < paper < yesterday

► **But how to decide between the following?**

(24) a. a < student < read < every < paper < yesterday < that < John < wrote

b. a < student < read < every < paper < that < John < wrote < yesterday

²The formalization of these notions, especially their definition in terms of (in)complete dominance, has benefited greatly from Danny Fox's help.

(25) **Revised Linear Edge Condition (RLEC)**

An element α parallel merged to an object in a spelled-out phase XP or any mother of α that only partially dominates the object to which α is being parallel merged to cannot surface in the linear interior of XP, and thus must appear at the edge of or external to XP.

[based on Davis (2020), (6.46): 284]

► **RLEC**▷ **Perserves:**

a < student < read < every < paper < yesterday < that < John < wrote

▷ **Eliminates:**

a < student < read < every < paper < that < John < wrote < yesterday

4.2 PRELIMINARIES 2

► **Haldar (2022)**▷ **RC extraposition**

= QR of host DP + LM of RC to the NP restrictor of the QRed DP

= sharing the R/NP restrictor among the matrix clause, the RC-internal position and the head-of-RC position

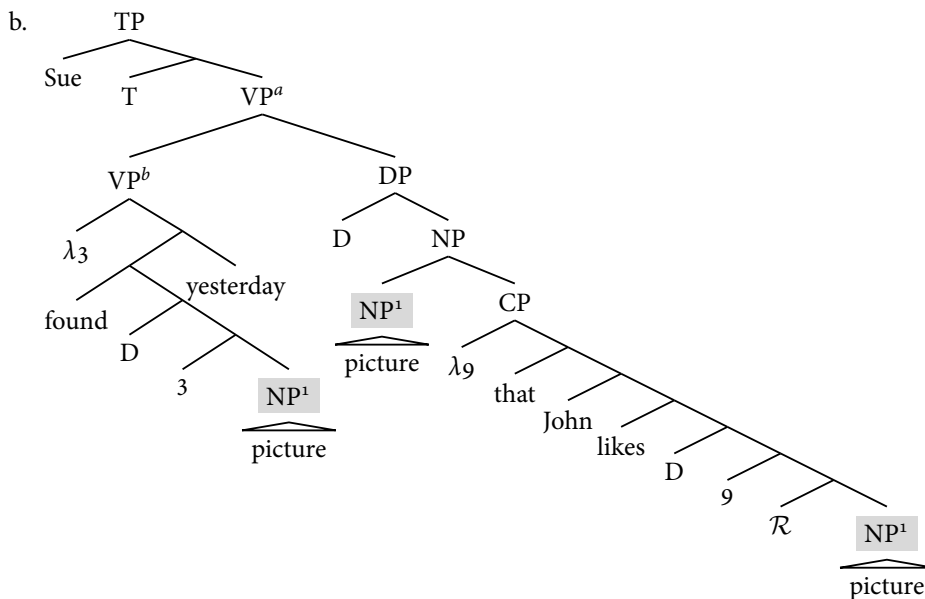
= “Sideward Movement” + “Raising”

(This is subtly but crucially different from what Henderson (2007) does. See section 5.)

► **But this makes “Late Merge” and “Raising” compatible!**

▷ Yes, and that’s exactly what the initial extraposition data show us we need!

(26) a. Sue found the picture yesterday that John likes.

c. **Linearization of VP^b**

found < D < picture < yesterday

Linearization of DP

D < picture < that < John < likes

Linearization of VP^a

found < the < picture < yesterday < that < John < likes

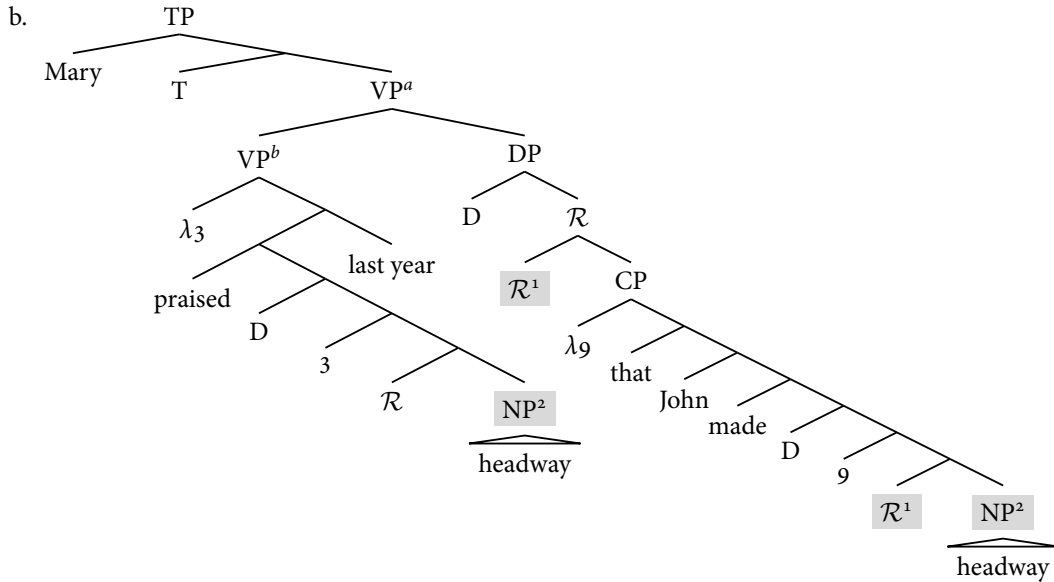
RLEC → ✓

☆ **Nothing makes this sentence bad.**

4.3 THE DATA

4.3.1 The Incompatibility Sentences

(27) a. Mary praised the headway (#_{IC}last year) that John made.

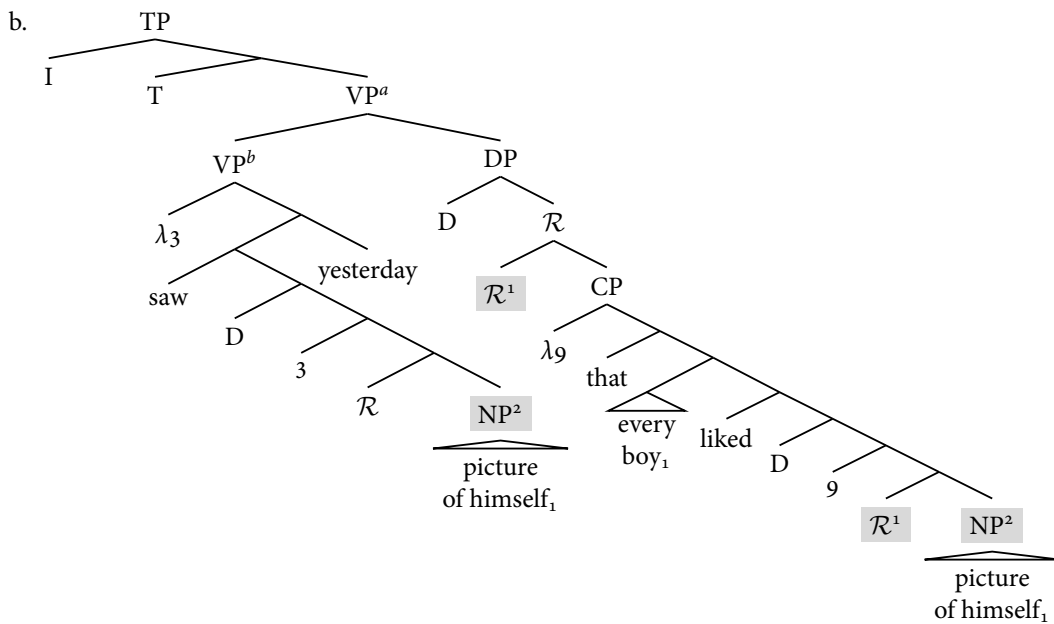


c.

► Same linearization as before.

★ There's no node c-commanding or dominating VP^a that's part of a clause containing an idiom chunk in which *headway* can be interpreted idiomatically: because the predicate we have in the matrix clause is *praise*. And this is what makes this bad.

(28) a. I saw the picture of himself₁ (*yesterday) that every boy₁ liked.



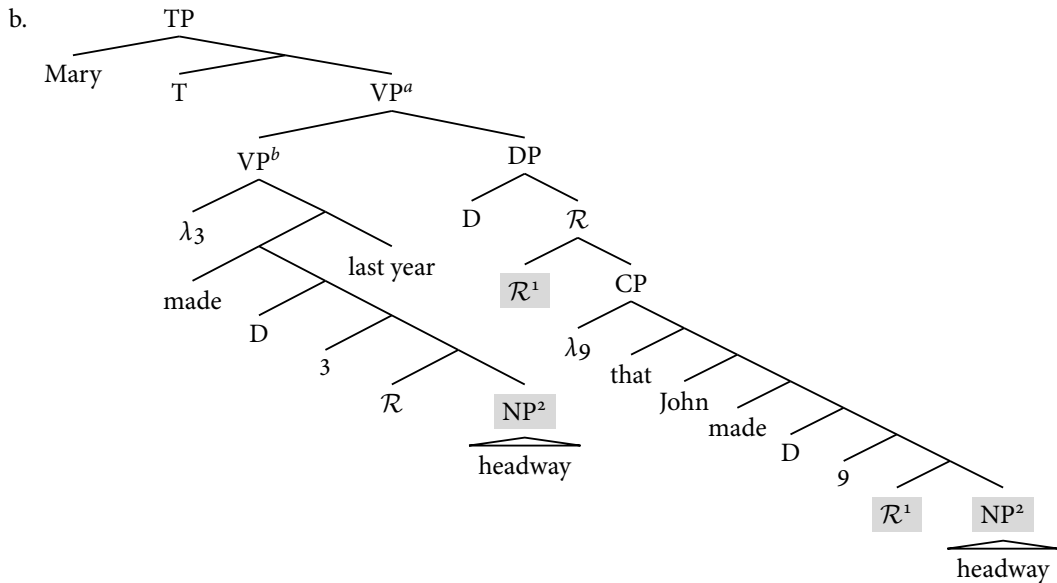
c.

► Same linearization as before.

★ But *picture of himself* isn't completely dominated by the sister of *every boy*, and this is what makes this bad.

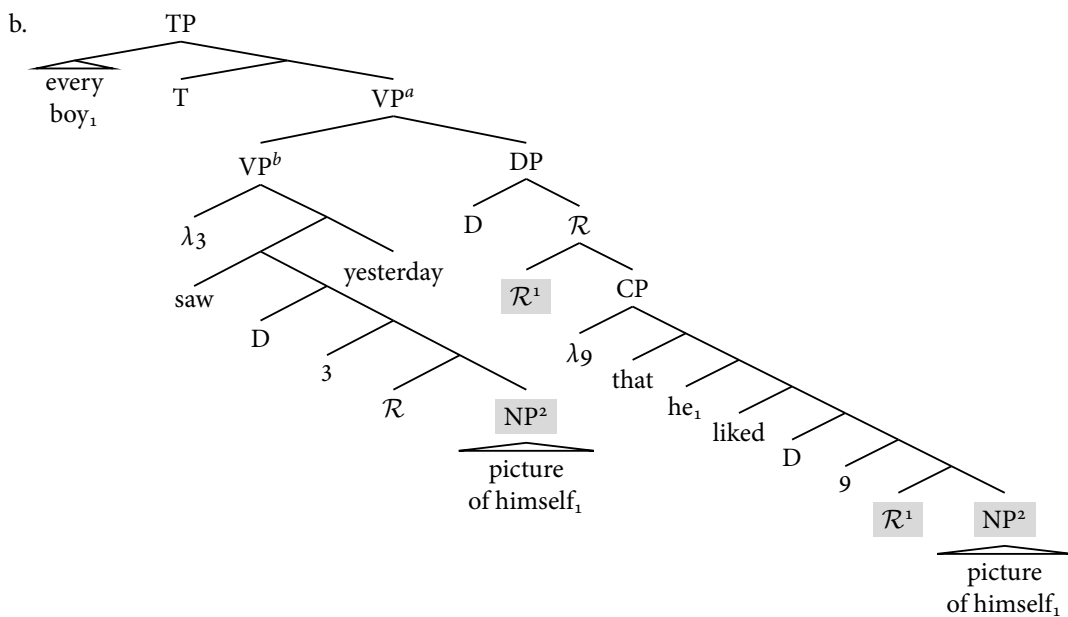
4.3.2 *The Compatibility Sentences*

- (29) a. Mary made the headway (last year) that John made.



- c.
- Same linearization as before.
 - ★ **The hierarchically lowest node that completely dominates *headway* is VP^a and the nodes that c-command and dominate VP^a are part of a clause, the matrix clause, that contains the idiom chunk *make headway*. So, the sentence is fine.**

- (30) a. Every boy
- ₁
- saw the picture of himself
- ₁
- (yesterday) that he
- ₁
- liked.



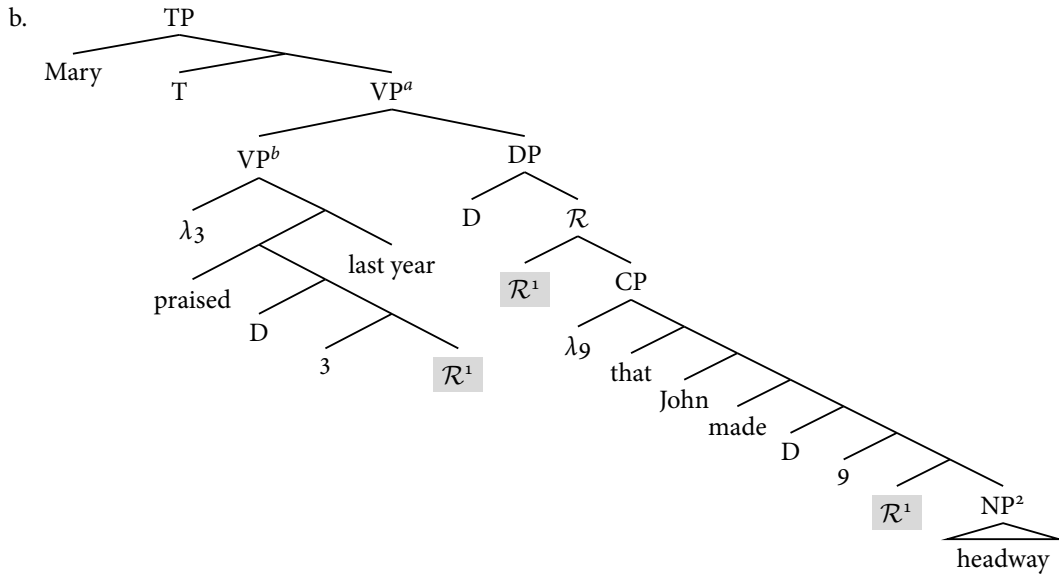
- c.
- Same linearization as before.
 - ★ **But *picture of himself* is completely dominated by the sister of *every boy*, and this is what makes this good.**

4.4 THE “WLM” POSSIBILITIES FOR THE INCOMPATIBILITY SENTENCES

- ▶ Delaying the first-merge of the NP until the RC-internal position can rescue its interpretation because it'll then not be multidominated.

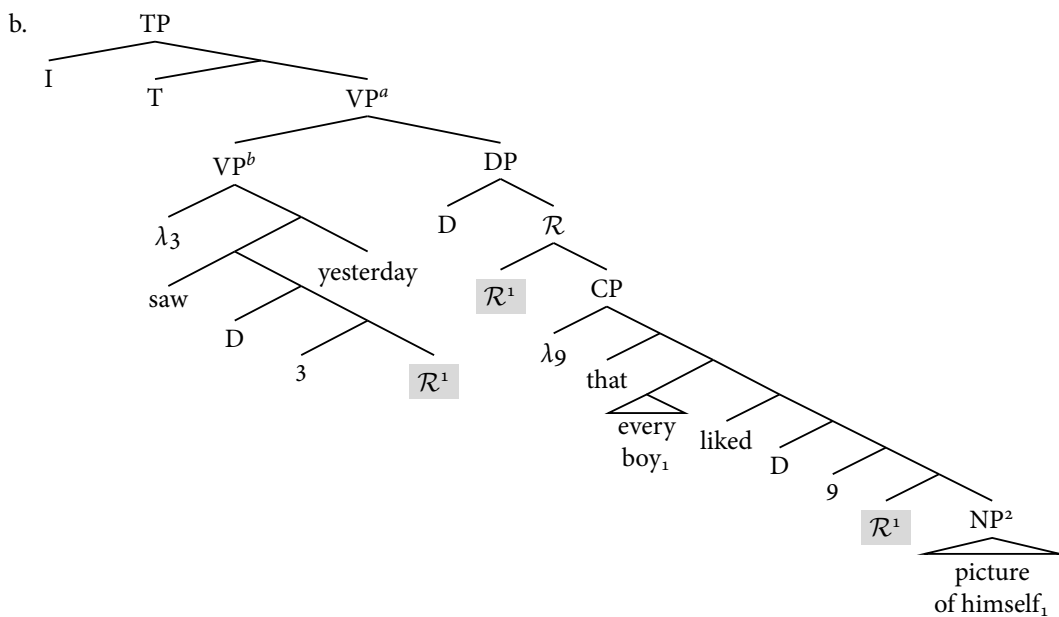
▶ **But the RLEC makes such structures nonlinearizable.**

(31) a. Mary praised the headway (#_{IC}last year) that John made.



- c. **Linearization of VP^b**
 praised < D < \mathcal{R}^1
Linearization of DP
 D < \mathcal{R}^1 < headway < that < John < made
Linearization of VP^a
 praised < the < headway < that < John < made
RLEC → ✗

(32) a. I saw the picture of himself₁ (*yesterday) that every boy₁ liked.



- c. Linearization and application of RLEC same as above.

5 HENDERSON (2007)

► Henderson (2007)

▷ I borrow from Henderson some insight, so there are similarities.

▷ RC extraposition

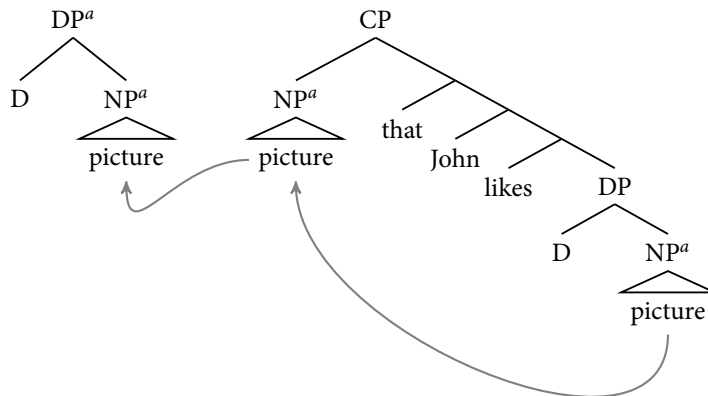
= “Raising” + ‘Sideward Movement’ + QR + LM

► This is how Henderson makes “Late Merge” and “Raising” compatible.

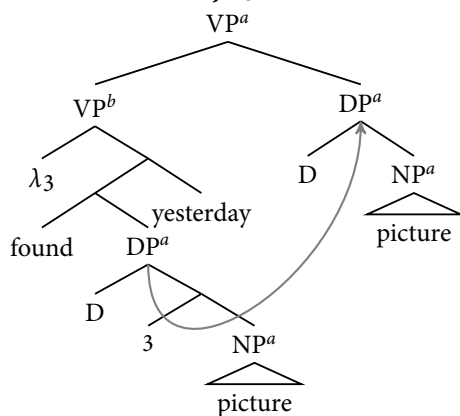
► An illustrative example is in (33). (Some irrelevant aspects have been abstracted away from.)

(33) Sue found the picture yesterday that John likes.

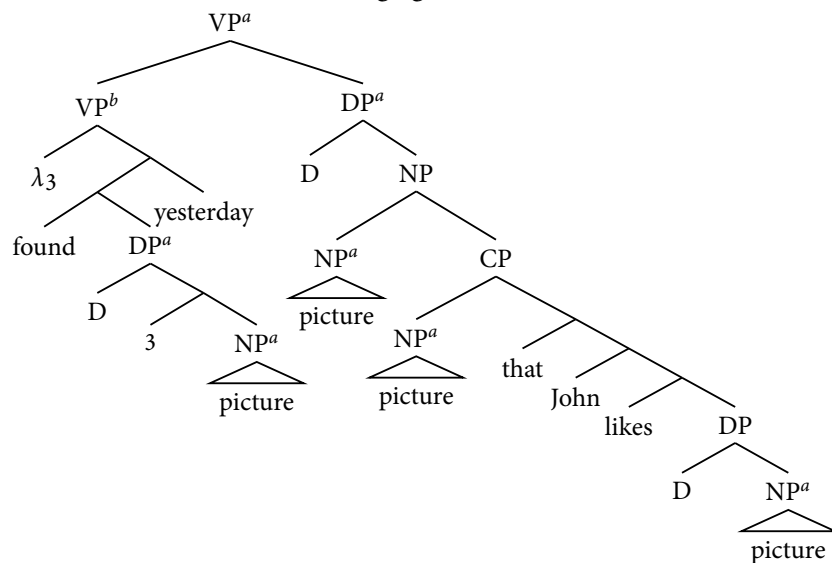
(34) a. *Relativization by Raising NPs from inside the RC and Sideward Movement of the NP*



b. *Building the matrix VP, followed by QR*



c. *Late merging the RC*



► Chain formation can happen only if the higher copy c-commands the lower copy.

► Therefore, we have chains in the relativization in (34a) and the QR (34b), but not in the Sideward Movement in (34c).

► Requirement

“An NP with special interpretative licensing requirements must be licensed within each chain it is a member of.”

[Henderson (2007: 214-215)]

► That’s why Hulsev and Sauerland’s (2006) incompatibility sentences are bad and Henderson’s (2007) compatibility sentences are good: neither the NP in the object position of *found* and *likes* can be ignored, while the NP^a in the higher copy in the QR chain and the NP^a in the higher copy in the relativizing movement can be ignored.

► Below is what I think are some problems with Henderson’s approach.

5.1 PROBLEM 1

- ▶ Henderson (2007) proposes uniform Raising in all RCs. Vehicle Change is \bar{A} -movement to account for anti-reconstruction effects in the heads of RCs (35).

- (35) a. the picture of John₁ that he₁ likes
 b. $[_{DP} \text{the} [_{NP} \text{picture of John}_1] [_{CP} [_{NP} \text{picture of him}_1] \text{that} [_{TP} \text{he}_1 [_{VP} \text{likes} [_{NP} \text{picture of him}_1]]]]]]]$

[Henderson (2007), (10): 206]

- ▶ But we know Vehicle Change can't be possible in \bar{A} -movements like *Wh*-Movement and QR (36-37).³

- (36) a. *Which aspect of Alma₁ does she₁ dislike?
 b. *Derivation without Vehicle Change*
 *Which aspect of Alma₁ does she₁ dislike ⟨which aspect of Alma₁⟩?
 c. *Derivation with Vehicle Change*
 ✓ Which aspect of Alma₁ does she₁ dislike ⟨which aspect of herself₁⟩?

- (37) a. *Someone talked to him₁ about every relative of John₁.
 b. *Only interpretation considered* → $\forall > \exists$
 c. *Derivation without Vehicle Change*
 *⟨Every relative of John₁⟩ someone talked to him₁ about every relative of John₁?
 d. *Derivation with Vehicle Change*
 ✓ ⟨Every relative of John₁⟩ someone talked to him₁ about every relative of him₁?

- ▶ **Therefore, Vehicle Change of this sort can't be maintained.**

- ▶ If it can't be, then a uniform Raising account of RCs can't be maintained because of the asymmetry between (35), on the one hand, and (36-37), on the other.

- ▶ If a uniform Raising account of RCs can't be maintained, then the way Henderson makes LM and Raising compatible can't be maintained either and his account falls apart.

5.2 PROBLEM 2

- ▶ One could still argue the following.

- ▷ The derivation in (34) still stands for examples like (29a) and (30a).
- ▷ The only thing that we lose, then, is the alternative of Vehicle Change for Matching, that is, anti-reconstruction effects in the heads of RCs.
- ▷ And, since, according to Fox and Nissenbaum (1999) and Hulsey and Sauerland (2006) LM and Matching are perfectly compatible, there's nothing about the anti-reconstruction effects that should affect the way we do RC extraposition.
- ▷ That is, we could just go back to square one and keep the distinction between Raising and Matching.

- ▶ **Here's another problem that's still not solved by Henderson's (2007) account.**

- ▷ Henderson (2007) predicts that NP^a in the object position of *found* in the matrix clause in (34c) must be licensed there.

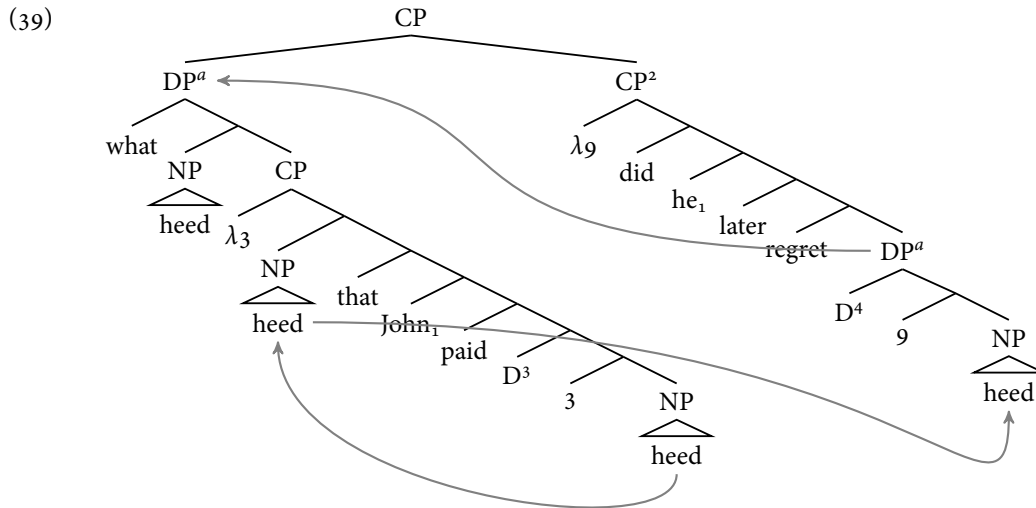
³Henderson claims that data like (36) are questionable and therefore takes them to be in favor of his Vehicle Change idea. But see Stockwell, Meltzer-Asscher, and Sportiche (2021, 2022) for experimental evidence in favor of Condition C reconstruction effects being pretty robust in English, and Georgi, Salzmann, and Wierzba (2018, 2021) and Wierzba, Salzmann, and Georgi (2021), in German. There is also more evidence that points to the fact the Vehicle Change doesn't apply to lower copies of movement, explored in Hunter and Yoshida (2016) and Yoshida, Potter, and Hunter (2019).

▷ But this is clearly not true, as shown in (38), and this is acknowledged by Henderson himself.

(38) What heed that John₁ paid did he₁ later regret?

[Henderson (2007), (32): 216]

► Henderson posits a derivation for (38) identical to the one in (34), abbreviated in (39).



► But there is no explanation for why the sentence is fine despite neither the NP *heed* in the lower copy of DP^a nor the NP *heed* in the higher copy of DP^a is interpretable, which would mean that this NP isn't licensed in the chain it's part of.

► That is, **what is the difference between the chain formed by the movement of DP^a in (39) and the chain formed by QR of DP^a in (34b)?**

► Henderson does have an idea about this. He says that this is attributable to the fact that the NP restrictor of a DP *wh*-moving may not always be interpreted in its base position, but the NP restrictor of a DP being QRed always must (40).

(40) a. John₁ wonders which picture of himself_{1/2} Bill₂ likes best.

b. *Someone gave him₁ every picture of John₁.
Interpretation considered → $\forall > \exists$

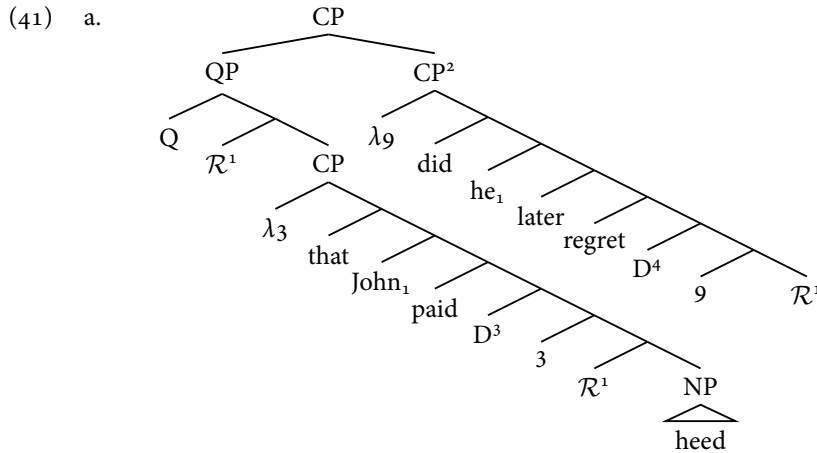
[Henderson (2007), (31a): 216; (34a): 217]

► However, this is not an explanation.

► **Moreover, Henderson invokes (40b) without saying anything about how this datum can be reconciled with what I show in (37).** This is therefore an internal inconsistency in Henderson's account.

► **Also observe that, within my account, there are clear explanations for these.**

▷ Because of the possibility of delayed first-merge of *heed*, it can be first-merged only in the RC-internal position (41).



- b. **Linearization of QP**
 $Q < \mathcal{R}^1 < heed < that < John < paid < D^3$
Linearization of CP²
 $did < he < later < regret < D^4 < \mathcal{R}^1$
Linearization of CP
 $what < heed < that < John < paid < did < he < later < regret$

- ▷ This is different from (31b) despite having the NP restrictor not being first-merged in the matrix clause because this leftward movement and the question of RLEC violation wouldn't arise here.
- ▷ Moreover, within my system, there are clear reasons for why (40b) is bad: because delayed first-merge is impossible here, since QR is \bar{A} -Movement.

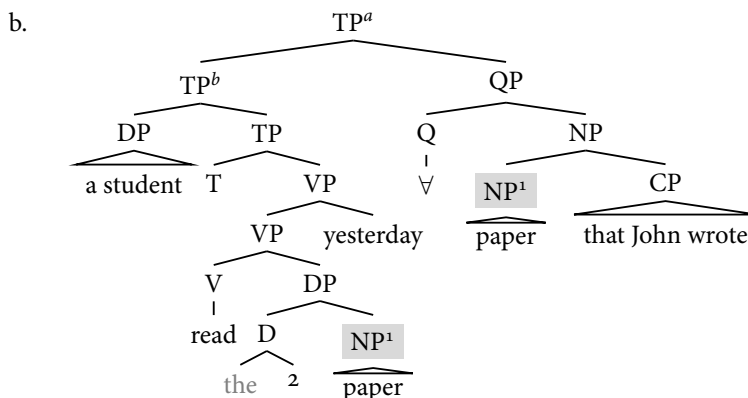
6 CONCLUSION

- ▶ LM and Raising aren't always incompatible, *pace* Hulsey and Sauerland (2006).
- ▶ I've developed multidominant derivations that would make them compatible with each other (much as in prior work in Haldar 2022).
- ▶ I've also developed a linearization algorithm to linearize these multidominant structures.
- ▶ This algorithm also rules out some otherwise possible structures that my system is able to generate.
- ▶ I've pointed out why Henderson's (2007) account of the same set of data can't be maintained.

7 APPENDIX 1

- ▶ Recall (22).

(22) a. A student read every paper yesterday that John wrote.



- c. **Linearization of TP^b**
 a < student < read < D < paper < yesterday
Linearization of QP
 ∀ < paper < that < John < wrote

[based on Johnson (2012), (54)]

- We were asking ourselves how to decide between the following (24).

- (24) a. a < student < read < every < paper < yesterday < that < John < wrote
 b. a < student < read < every < paper < that < John < wrote < yesterday

- But one could ask:

Is there any dilemma at all?

- That is, **why can't one say the following?**

- ▷ We get the phonologically contentful restrictor *every*.
- ▷ So, we know that the restrictor will be *paper*.
- ▷ And we can stop our linearization business here.
- ▷ And then, when TP^b and QP merge, the RC inside the QP is linearized to the right, since it's part of a right-adjoined constituent.

- **The following is how this argument doesn't work.**

- ▷ **How do we know what the phonologically contentful restrictor is and where it is?**
- ▷ That is, Fusion under Adjacency (FuA) can only yield the determiner *every* if the linearization algorithm puts nothing between D and ∀.
- ▷ But if we accept the reasoning above, then there must be phonological material between these two objects, *i.e.*, *paper* and *yesterday*.
- ▷ And this is because, TP^b and QP have been linearized with respect to each other.
- ▷ That is, if these two are linearized with respect to each other, then we can't derive anything.
- ▷ So, we want some condition that blocks such an ordering at that stage, and once we do, the reasoning presented above will no longer stand.
- ▷ One iteration of such a condition is found in Davis (2020), given below in (42), modified for my purposes by recasting it in the language of multidominance.

- (42) **Local Relinearization Condition (LRC)**

Merge of two objects to compose via Predicate Modification updates the linearization information of the minimal phase containing at least one of these two objects.

[Davis (2020), (6.39): 280; modified for my purposes]

- Basically, the LRC says that there's nothing that orders TP^b and QP with respect to each other because TP^b isn't the minimal phase containing NP¹.
- The way we get the final linear order is the following.
 - ▷ FuA tells us the determiner is *every*.
 - ▷ The linearization algorithm tells us to pronounce *paper* immediately to the right of *every*, *every paper* must be pronounced together inside the VP or the previously established ordering of *paper* to the left of *yesterday* when the VP was linearized would be violated.
 - ▷ After that, once TP^b and QP are merged together, the only way to pronounce the RC to the right of *paper* without violating the RLEC is to pronounce it to the right of *yesterday*.
 - ▷ That how we get *A student read every paper yesterday that John wrote*.

8 APPENDIX 2

- ▶ How do we get these linearizations?

- ▷ (27)

- Linearization of the relativized DP**

- D < \mathcal{R}^1 < headway < that < John < made

- ▷ (28)

- Linearization of the relativized DP**

- D < \mathcal{R}^1 < picture < of < himself < that < every < boy < liked

- ▶ **The LRC derives these.**

- ▶ Here's how. (I will only explain with (27).)

- ▷ **Linearization of the RC**

- that < \mathcal{R}^1 < John < made < D < headway

- ▷ **Linearization of the DP³**

- D < \mathcal{R}

- ▷ **Combining the two with the help of the linearization algorithm**

- the < \mathcal{R}^1 < headway < that < John < made < D

(by FuA)

- ⇒ the < headway < that < John < made

- ▶ The reason we get only as much as “D < \mathcal{R} ” for the DP is because of the LRC.

- ▶ But then, we get the whole linearization by combining the linearization of the RC and the DP.

- ▶ When we're working on the linearization of VP^a, the structure of DP³, with the two determiners, in the unfused state, is still very much present and that does end up affecting how we end up applying FuA once more, as shown in the linearization of VP^a in (26c) before.

- ▶ This is fine because it doesn't end up undoing anything established for the RC.

9 APPENDIX 3: A SCHEMA

➤ *What we have seen so far*

- ▶ A common understanding of Condition A of the Binding Theory:

(43) **Condition A**

The structurally highest copy of an anaphor must be bound in its binding domain.

- ▶ But this seems to be wrong (44).

(44) a. **Pronunciation:**

Which side of itself₁ did the sofa₁ fall on?

b. **Interpretation:**

[which] did the sofa₁ fall on [side of itself₁]

- ▶ **Sportiche (2016)**

Independent *Neglect* of parts of copies at interfaces.

- (45) a. **Syntax:**
 [which side of itself₁]
 did the sofa₁ fall on [which side of itself₁]
- b. **PF:**
 [which side of itself₁]
 did the sofa₁ fall on [which side of itself₁]
- c. **LF:**
 [which side of itself₁]
 did the sofa₁ fall on [which side of itself₁]

➤ **Problem**

▶ **Problem:**

Basically: how do we systematize the link between what is neglected at PF and what is neglected at LF?

- ▷ A modularity issue; the operation is too uncontrolled because syntax feeds maximally articulate copies to both interfaces.
- ▷ Therefore, there's no link between what the interfaces do.

➤ **Solution**

▶ An extension of Johnsonian multidominance.

▶ Transparent LFs like (46) are generated in the syntax directly.

▶ **What does this structure do?**

- ▷ *Side of itself* will have only one occurrence: downstairs.
- ▷ The silent domain restriction pronoun \mathcal{R} that's sister to the NP in the lower copy will be remerged (as in multidominance) with Q^0 . That is, \mathcal{R} has two occurrences because of this multidominance.
- ▷ The node dominating this Q^0 and \mathcal{R} will sit in the higher copy position in SpecCP.
- ▷ D^0 heads the converted trace (Fox 2002).

(46) [which \mathcal{R}^1] λ_3 did the sofa₁ fall on [D [₃ [\mathcal{R}^1 [NP side of itself₁]]]]⁴

▶ **Linearization**

- ▷ I devise a linearization algorithm that is sensitive to a concept we can call **supersisterhood**, instead of regular sisterhood (47).
- ▷ That is, *side of itself* is pronounced immediately to the right of *which* based on the supersisterhood relation between them.

Supersisterhood

(47) **Supersisterhood**

A and C are supersisters iff there is a B such that A and B are regular sisters, and B and C are regular sisters.

⁴I'm abstracting away from how *which* is spelled out by what Johnson (2012) calls *Fusion under Adjacency*.

► *Quickly summarizing*

- ▷ The linearization algorithm makes some parses for the incompatibility sentences unlinearizable, coupled with the other independently motivated constraint on linearization (the Revised Linear Edge Condition), by making certain linear orderings impermissible.
- ▷ The linearization algorithm can't be written without recourse to the language of Johnsonian multidominance, because one needs to exploit the concept of supersisterhood.
- ▷ This, coupled with the conceptual problems with Neglect, makes Johnsonian multidominance necessary for the account to unfold.

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