RIGHT NODE RAISING AND FLEXIBLE CYCLIC LINEARIZATION

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Overview

- **Question:** How do we linearize (assign linear order to) to right node raising (RNR) constructions such as (1)?

1. Darius found and Jasmine took the book?

- **Claim:** RNR constructions can be linearized through an extension of Fox & Pesetsky's (2005) Cyclic Linearization, which I term Flexible Cyclic Linearization

Contents

THEORETICAL BACKGROUND AND ASSUMPTIONS

Assumptions

- "Movement" creates multidominant structures (as opposed to copies)
- In right node raising, the constituent is shared between the conjuncts (without rightward movement)

1. Darius found and Jasmine took the book?
   $[_{CP}\ [_{\&P}\ [_{TP}$ Darius found $[_{DP}$ the book$]_i]$ and $[_{TP}$ Jasmine took $[_{DP}$ the book$]_i]]]$

Cyclic Linearization (CL)

- Transfer of syntax to PF happens in **phases**: CP, vP, maybe DP
- At PF, **linearization** occurs, establishing ordering relations between the terminal nodes of the structures
- Linearization obeys the property of **Order Preservation**: when a phase is linearized, new orderings are added, but orderings from previous phases are never deleted
  - New orderings must be compatible with previously established orderings

Example: Cyclic linearization

2. What did Darius find?
   $[_{CP}$ what$_i$ did Darius $[_{vP}$ what$_i$ Darius find what$_i$]]

what < Darius	what < find
	Darius < find

Table 1: Ordering relations established in the vP phase of (2).

- To avoid unlinearizable orderings (e.g., *what* < *what*), Fox & Pesetsky assume that **only the most recent Merge of a constituent counts for linearization**

Example: Cyclic linearization

2. What did Darius find?
   $[_{CP}$ what$_i$ did Darius $[_{vP}$ what$_i$ Darius find what$_i$]]

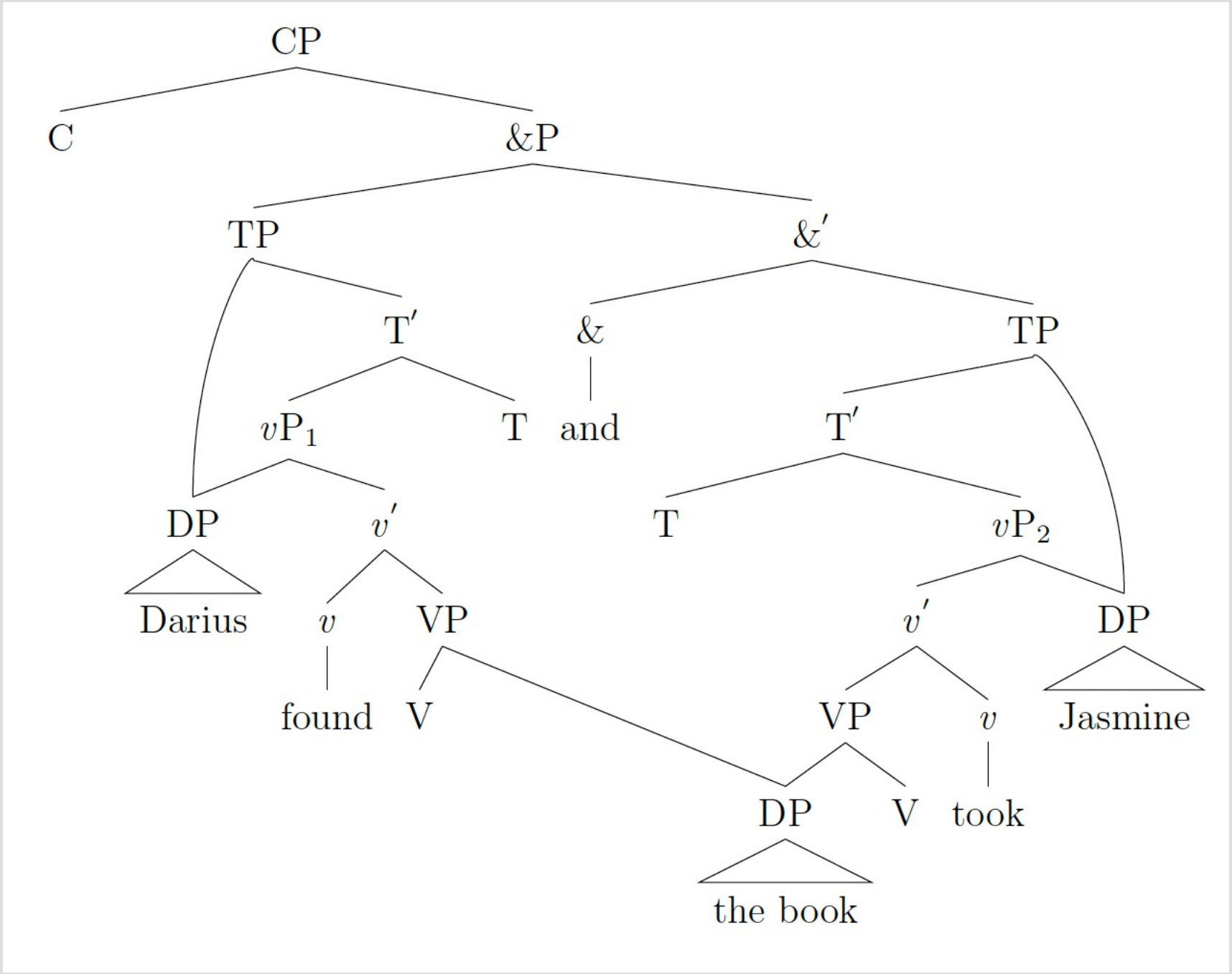
what < did	<u>what < Darius</u>	<u>what < find</u>
	did < Darius	did < find
		<u>Darius < find</u>

Table 3: Ordering relations established in the CP phase of (2). Orderings already established in the vP phase are underlined.

Wilder's constraints on coordinate structure

- Wilder (1999, 2008) proposes two constraints on the position of gaps in coordinate structures
  - If a shared constituent surfaces in the final conjunct (as in RNR), then gaps corresponding to the shared constituent at the right edge of the conjuncts at which they appear (**right edge condition**)
  - If a shared constituent surfaces in or to the left of the initial conjunct (as in gapping and across-the-board movement)
- I will demonstrate that the right edge condition is a subcase of Order Preservation

RNR UNDER CYCLIC LINEARIZATION


CP
C
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&
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and
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VP
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DP
found
V
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Jasmine
DP
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took
the book

1. Darius found and Jasmine took the book.
   [$_{CP}$ [$_{\&P}$ [$_{TP}$ Darius [$_{vP}$ Darius found [$_{DP}$ the book]$_i$]] and [$_{TP}$ Jasmine [$_{vP}$ Jasmine took [$_{DP}$ the book]$_i$]]]]

Darius < found	Darius < the	Darius < book
	found < the	found < book
		the < book

Table 4. Ordering relations established during the linearization of [$_{vP}$ Darius found the book].

Jasmine < took	Jasmine < the	Jasmine < book
	took < the	took < book
		the < book

Table 5. Ordering relations established during the linearization of [$_{vP}$ Jasmine took the book].

1. Darius found and Jasmine took the book.
   $[_{CP}\ [_{\&P}\ [_{TP}$ Darius $[_{vP}$ Darius found $[_{DP}$ the book$]_i]]]$ and $[_{TP}$ Jasmine $[_{vP}$ Jasmine took $[_{DP}$ the book$]_i]]]]$

Darius < found	Darius < and	Darius < Jasmine	Darius < took	Darius < the	Darius < book
	found < and	found < Jasmine	found < took	found < the	found < book
	the < and	~~**the < Jasmine**~~	~~**the < took**~~	*the < the*	**the < book**
	book < and	~~**book < Jasmine**~~	~~**book < took**~~	~~**book < the**~~	*book < book*
		and < Jasmine	and < took	**and < the**	**and < book**
			Jasmine < took	**Jasmine < the**	**Jasmine < book**
				took < the	**took < book**

Table 6. Ordering relationships established during the CP phase of (1), under Cyclic Linearization. Italic orderings are reflexive, bold orderings are symmetric, and crossed-out orderings violate Order Preservation.

- There are number of unlinearizable orderings
- Because there is no way of determining which Merge of *the book* happened first, there is no principled way to resolve these orderings

RNR UNDER FLEXIBLE CYCLIC LINEARIZATION

Flexible Cyclic Linearization

- **Flexible Cyclic Linearization (FCL)**: Ordering statements may be deleted in the phase in which they arise as necessary to linearize the structure
- Flexible Cyclic Linearization is compatible with Order Preservation, which requires that orderings established in previous phases must be respected
- Where a constituent surfaces is determined by:
  - Order Preservation
  - linearizability (no reflexive, symmetric, or non-transitive orderings)
  - economy? (the less orderings removed, the better)

1. Darius found and Jasmine took the book.

   $[_{CP}\ [_{\&P}\ [_{TP}$ Darius $[_{vP}$ Darius found $[_{DP}$ the book$]_i]]]$ and $[_{TP}$ Jasmine $[_{vP}$ Jasmine took $[_{DP}$ the book$]_i]]]]$

Darius < Darius	Darius < found	Darius < and	Darius < Jasmine	Darius < took	Darius < the	Darius < book
		found < and	found < Jasmine	found < took	found < the	found < book
		~~the < and~~	**~~the < Jasmine~~**	**~~the < took~~**	*the < the*	**the < book**
		~~book < and~~	**~~book < Jasmine~~**	**~~book < took~~**	**~~book < the~~**	*book < book*
			and < Jasmine	and < took	**and < the**	**and < book**
			Jasmine < Jasmine	Jasmine < took	**Jasmine < the**	**Jasmine < book**
					took < the	**took < book**

Table 7. Ordering relationships established during the CP phase of (1), under Flexible Cyclic Linearization. Italic orderings are reflexive, bold orderings are symmetric, and crossed-out orderings violate Order Preservation. Orderings that will be deleted are underlined and in red.

- The following statements are deleted for violating Order Preservation
  - the < Jasmine
  - the < took
  - book < Jasmine
  - book < took
  - book < the
- The following statements are deleted because they are reflexive
  - Darius < Darius
  - the < the
  - book < book
  - Jasmine < Jasmine

- One of each of the following pairs of symmetric ordering statements must be deleted

the < and	and < the
book < and	and < book

- If we delete the orderings in the second column (keeping the ones in the first column), then we will be left with non-transitive orderings, such as:
  - "the < and" and "and < took" but "took < the"
  - "book < and" and "and < took" but "took < book"
- Thus, we delete the orderings in the first column, and keep the orderings in the second column

1. Darius found and Jasmine took the book.
   $[_{CP}\ [_{\&P}\ [_{TP}$ Darius $[_{vP}$ Darius found $[_{DP}$ the book$]_i]]]$ and $[_{TP}$ Jasmine $[_{vP}$ Jasmine took $[_{DP}$ the book$]_i]]]]$

Darius < Darius	Darius < found	Darius < and	Darius < Jasmine	Darius < took	Darius < the	Darius < book
		found < and	found < Jasmine	found < took	found < the	found < book
		~~the < and~~	**~~the < Jasmine~~**	**~~the < took~~**	*the < the*	**the < book**
		~~book < and~~	**~~book < Jasmine~~**	**~~book < took~~**	**~~book < the~~**	*book < book*
			and < Jasmine	and < took	**and < the**	**and < book**
			Jasmine < Jasmine	Jasmine < took	**Jasmine < the**	**Jasmine < book**
					took < the	**took < book**

Table 7. Ordering relationships established during the CP phase of (1), under Flexible Cyclic Linearization. Italic orderings are reflexive, bold orderings are symmetric, and crossed-out orderings violate Order Preservation. Orderings that will be deleted are underlined and in red.

- After deleting the indicated orderings (underlined and in red), we derive the observed order: *Darius found and Jasmine took the book*

The right edge condition

- The right edge constraint is nothing but Order Preservation
- In the vP phases, *the book* is linearized so that it follows the material in the vPs both conjuncts.
- If *the book* were pronounced in the first conjunct (giving **Darius found the book and Jasmine took*), then it would not follow the material in the vP of the second conjunct, violating Order Preservation

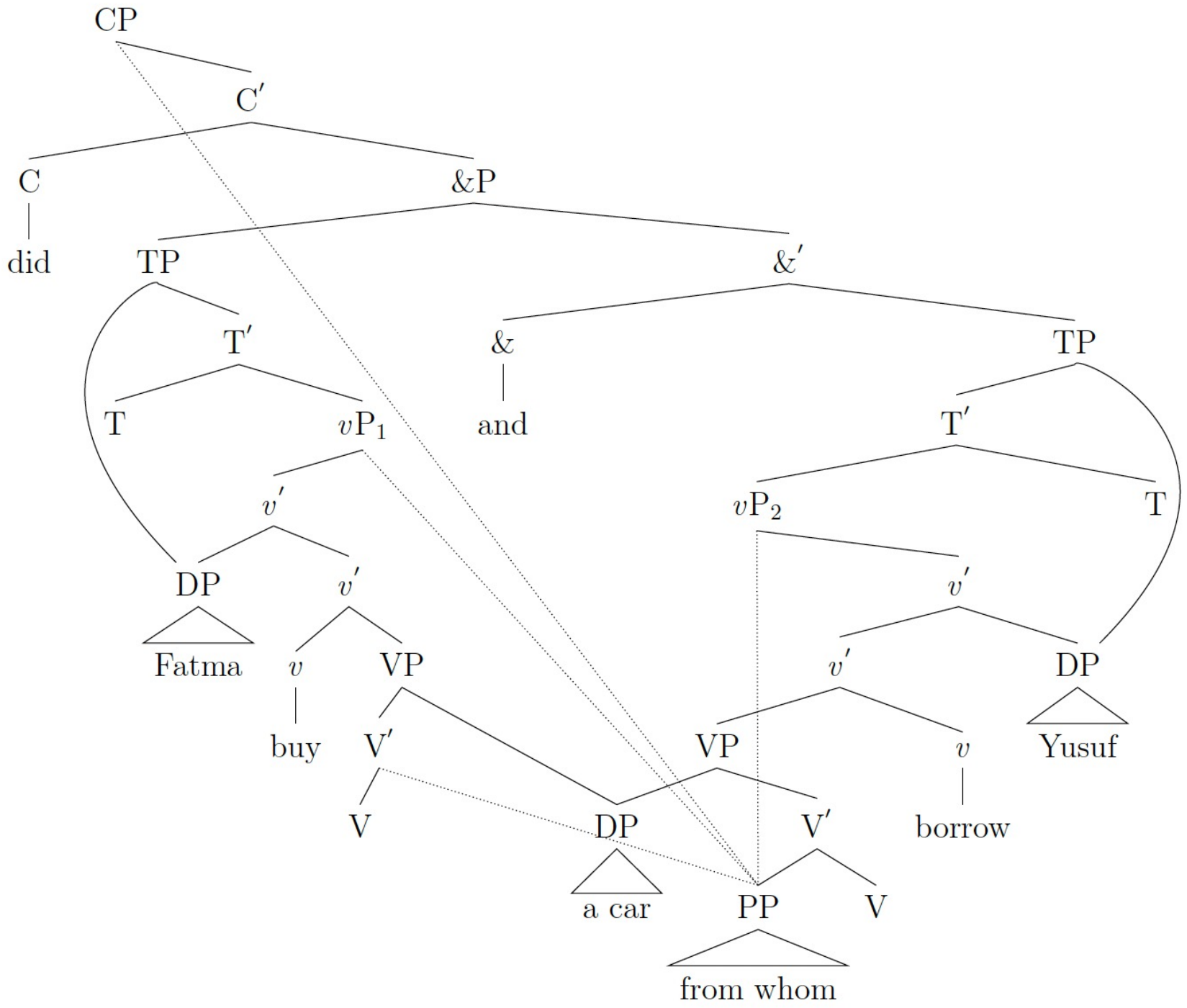
CONSEQUENCES OF THE PROPOSAL

Consequence 1: RNR gaps need not appear at the right edge

- Before explaining why, we must ask: what is the right edge?
- Syntactic view: Roughly speaking, the right edge of a constituent is the most embedded constituent that it dominates
- PF view (under (F)CL): A string σ is at the right edge of a phase if there are no other strings τ in the phase such that $\sigma<\tau$
- PF (under Wilder's proposal): A gap is at the right edge of a conjunct if, were the conjunct to be uttered as its own sentence, the constituent to which the gap corresponds would be pronounced at the end of that sentence

Consequence 1: RNR gaps need not appear at the syntactic right edge

- In right node raising, the shared constituent is linearized in the second conjunct because it is linearized at the end of both vP phases
  - This is a result of PF processes, rather than narrow syntactic ones, so we predict that the right edge condition is a PF constraint
- When there is phase-internal displacement, the syntactic right edge and the PF right edge may not be the same!
  - Such as a case will allow us to determine what sense of "right edge" is relevant in the right edge condition
  - This can be observed when across-the-board (ATB) movement and right node raising co-occur


CP
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vP1
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T′
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vP2
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v′
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Fatma
v
VP
v′
DP
buy
V′
VP
v
Yusuf
V
DP
V′
borrow
a car
PP
V
from whom

3. From whom did Fatma buy and Yusuf borrow a car?

   $[_{CP}\ [_{PP}$ from whom$]_i$ did $[_{\&P}\ [_{TP}$ Fatma $[_{vP}\ [_{PP}$ from whom$]_i$ Fatma buy $[_{DP}$ a car$]_j$ $[_{PP}$ from whom$]_i]]]$ and $[_{TP}$ Yusuf $[_{vP}\ [_{PP}$ from whom$]_i$ Yusuf borrow $[_{DP}$ a car$]_j$ $[_{PP}$ from whom$]_i]]]]$

from < Fatma	**from < buy**	**from < a**	**from < car**	*from < from*	**from < whom**
whom < Fatma	**whom < buy**	**whom < a**	**whom < car**	**whom < from**	*whom < whom*
	Fatma < buy	Fatma < a	Fatma < car	**Fatma < from**	**Fatma < whom**
		buy < a	buy < car	**buy < from**	**buy < whom**
			a < car	**a < from**	**a < whom**
				car < from	**car < whom**

Table 8. Ordering relations established during the linearization of $[_{vP}$ [from whom]$_i$ Fatma buy a car [from whom]$_i]$. Italic orderings are reflexive and bold orderings are symmetric. Orderings that will be deleted are underlined and in red.

- The following statements are deleted for being reflexive
  - from < from
  - whom < whom
- One of each of the following pairs of symmetric ordering statements must be deleted

from < whom	whom < from
from < Fatma	Fatma < from
from < buy	buy < from
from < a	a < from
from < car	car < from
whom < Fatma	Fatma < whom
whom < buy	buy < whom
whom < a	a < whom
whom < car	car < whom

- We must assume that orderings in second column are deleted
  - Because of recoverability?
  - Because of a parameter?

3. From whom did Fatma buy and Yusuf borrow a car?

   $[_{CP}\ [_{PP}$ from whom$]_i$ did $[_{\&P}\ [_{TP}$ Fatma $[_{vP}\ [_{PP}$ from whom$]_i$ Fatma buy $[_{DP}$ a car$]_j$ $[_{PP}$ from whom$]_i]]]$ and $[_{TP}$ Yusuf $[_{vP}\ [_{PP}$ from whom$]_i$ Yusuf borrow $[_{DP}$ a car$]_j$ $[_{PP}$ from whom$]_i]]]]$

from < Yusuf	**from < borrow**	**from < a**	**from < car**	*from < from*	**from < whom**
whom < Yusuf	**whom < borrow**	**whom < a**	**whom < car**	**whom < from**	*whom < whom*
	Yusuf < borrow	Yusuf < a	Yusuf < car	**Yusuf < from**	**Yusuf < whom**
		borrow < a	borrow < car	**borrow < from**	**borrow < whom**
			a < car	**a < from**	**a < whom**
				car < from	**car < whom**

Table 9. Ordering relations established during the linearization of $[_{vP}$ [from whom]$_i$ Yusuf borrow a car [from whom]$_i]$. Italic orderings are reflexive and bold orderings are symmetric. Orderings that will be deleted are underlined and in red.

- The following statements are deleted for being reflexive
  - from < from
  - whom < whom
- One of each of the following pairs of symmetric ordering statements must be deleted

from < whom	whom < from
from < Yusuf	Yusuf < from
from < borrow	borrow < from
from < a	a < from
from < car	car < from
whom < Yusuf	Yusuf < whom
whom < borrow	borrow < whom
whom < a	a < whom
whom < car	car < whom

- We must assume that orderings in second column are deleted

from < did	**from < Fatma**	**from < buy**	**from < and**	**from < Yusuf**	**from < borrow**	**from < a**	**from < car**	*from < from*	**from < whom**
whom < did	**whom < Fatma**	**whom < buy**	**whom < and**	**whom < Yusuf**	**whom < borrow**	**whom < a**	**whom < car**	~~**whom < from**~~	*whom < whom*
	did < Fatma	did < buy	did < and	did < Yusuf	did < borrow	did < a	did < car	**did < from**	**did < whom**
	Fatma < Fatma	Fatma < buy	Fatma < and	Fatma < Yusuf	Fatma < borrow	Fatma < a	Fatma < car	~~**Fatma < from**~~	~~**Fatma < whom**~~
			buy < and	buy < Yusuf	buy < borrow	buy < a	buy < car	~~**buy < from**~~	~~**buy < whom**~~
			a < and	~~**a < Yusuf**~~	~~**a < borrow**~~	*a < a*	**a < car**	~~**a < from**~~	~~**a < whom**~~
			car < and	~~**car < Yusuf**~~	~~**car < borrow**~~	~~**car < a**~~	*car < car*	~~**car < from**~~	~~**car < whom**~~
				and < Yusuf	and < borrow	**and < a**	**and < car**	**and < from**	**and < whom**
				Yusuf < Yusuf	Yusuf < borrow	**Yusuf < a**	**Yusuf < car**	~~**Yusuf < from**~~	~~**Yusuf < whom**~~
						borrow < a	**borrow < car**	~~**borrow < from**~~	~~**borrow < whom**~~

Table 10. Ordering relations established during the linearization of CP phase of (3). Italic orderings are reflexive, bold orderings are symmetric, and crossed-out orderings violate Order Preservation. Orderings that will be deleted are underlined and in red.

- The following statements are deleted for violating Order Preservation

whom < from	a < borrow	car < from
Fatma < from	a < from	car < whom
Fatma < whom	a < whom	Yusuf < from
buy < from	car < Yusuf	Yusuf < whom
buy < whom	car < borrow	borrow < from
a < Yusuf	car < a	borrow < whom

- The following statements are deleted for being reflexive
  - from < from
  - whom < whom
  - Fatma < Fatma
  - a < a
  - car < car
  - Yusuf < Yusuf

- One of each of the following pairs of symmetric ordering statements must be deleted

from < did	did < from
from < and	and < from
whom < did	did < whom
whom < and	and < whom
and < a	a < and
and < car	car < and

- If we delete the orderings in the first column (keeping the ones in the second column), then we will be left with non-transitive orderings, such as:
  - "and < from" and "from < Fatma" but "Fatma < and"
  - "and < whom" and "whom < Fatma" but "Fatma < and"
  - "a < and" and "and < Yusuf" but "Yusuf < a"
  - "car < and" and "and < Yusuf" but "Yusuf < car"
- Thus, we delete the orderings in the second column, and keep the orderings in the first column

Refining the right edge condition

- After deleting the indicated orderings, we end up with the observed surface order: *From whom did Fatma buy and Yusuf borrow a car*
- The RNR-ed constituent [a car] does not appear at the syntactic right edge of the first conjunct (that position is occupied by [from whom]). Thus, as predicted, the right edge condition cannot be a constraint on syntactic representations

Consequence 2: An RNR-ed string need not be a constituent

- Because right node raising is a PF phenomenon rather than a syntactic one, we predict that the shared string *need not* be a constituent
- This prediction is borne out by sentences such as the following:

4. Who(m) did Jõao bake and Pedro ice a cake for?

4. Who(m) did João bake and Pedro ice a cake for?
   $[_{CP}$ who$_i$ did $[_{\&P}$ $[_{TP}$ João $[_{vP}$ who$_i$ João bake $[$a cake$]_j$ $[$for who$_i]_k]]$ and $[_{TP}$ Pedro $[_{vP}$ who$_i$ Pedro ice $[$a cake$]_j$ $[$for who$_i]_k]]]]$

who < João	**who < bake**	**who < a**	**who < cake**	**who < for**	*who < who*
	João < bake	João < a	João < cake	João < for	**João < who**
		bake < a	bake < cake	bake < for	**bake < who**
			a < cake	a < for	**a < who**
				cake < for	**cake < who**
					for < who

Table 11. Ordering relations established during the linearization of $[_{vP}$ who$_i$ João bake a cake for who$_i]$. Italic orderings are reflexive and bold orderings are symmetric. Orderings that will be deleted are underlined and in red.

- The following statements are deleted for being reflexive
  - who < who
- One of each of the following pairs of symmetric ordering statements must be deleted

who < João	João < who
who < bake	bake < who
who < a	a < who
who < cake	cake < who
who < for	for < who

- We assume that orderings in second column are deleted

4. Who(m) did João bake and Pedro ice a cake for?
   $[_{CP}$ who$_i$ did $[_{\&P}$ $[_{TP}$ João $[_{vP}$ who$_i$ João bake [a cake]$_j$ [for who$_i$]$_k$]] and $[_{TP}$ Pedro $[_{vP}$ who$_i$ Pedro ice [a cake]$_j$ [for who$_i$]$_k$]]]]

who < Pedro	**who < ice**	**who < a**	**who < cake**	**who < for**	*who < who*
	Pedro < ice	Pedro < a	Pedro < cake	Pedro < for	**Pedro < who**
		ice < a	ice < cake	ice < for	**ice < who**
			a < cake	a < for	**a < who**
				cake < for	**cake < who**
					for < who

Table 12. Ordering relations established during the linearization of $[_{vP}$ who$_i$ Pedro ice a cake for who$_i$]. Italic orderings are reflexive and bold orderings are symmetric. Orderings that will be deleted are underlined and in red.

- The following statements are deleted for being reflexive
  - who < who
- One of each of the following pairs of symmetric ordering statements must be deleted

who < Pedro	Pedro < who
who < ice	ice < who
who < a	a < who
who < cake	cake < who
who < for	for < who

- We assume that orderings in second column are deleted

who < did	**who < João**	**who < bake**	**who < and**	**who < Pedro**	**who < ice**	**who < a**	**who < cake**	**who < for**	*who < who*
	did < João	did < bake	did < and	did < Pedro	did < ice	did < a	did < cake	did < for	**did < who**
	João < João	João < bake	João < and	João < Pedro	João < ice	João < a	João < cake	João < for	~~**João < who**~~
			bake < and	bake < Pedro	bake < ice	bake < a	bake < cake	bake < for	~~**bake < who**~~
			a < and	~~a < Pedro~~	~~a < ice~~	*a < a*	a < cake	a < for	~~**a < who**~~
			cake < and	~~cake < Pedro~~	~~cake < ice~~	~~cake < a~~	*cake < cake*	cake < for	~~**cake < who**~~
				and < Pedro	and < ice	**and < a**	**and < cake**	and < for	**and < who**
				Pedro < Pedro	Pedro < ice	Pedro < a	Pedro < cake	Pedro < for	~~**Pedro < who**~~
						ice < a	ice < cake	ice < for	~~**ice < who**~~
								for < for	~~**for < who**~~

Table 13. Ordering relations established during the linearization of CP phase of (3). Italic orderings are reflexive, bold orderings are symmetric, and crossed-out orderings violate Order Preservation. Orderings that will be deleted are underlined and in red.

- The following statements are deleted for violating Order Preservation

a < Pedro	bake < who
a < ice	a < who
cake < Pedro	cake < who
cake < ice	Pedro < who
cake < a	ice < who
João < who	for < who

- The following statements are deleted for being reflexive
  - who < who
  - João < João
  - a < a
  - cake < cake
  - Pedro < Pedro
  - for < for

- One of each of the following pairs of symmetric ordering statements must be deleted

who < did	did < who
who < and	and < who
and < a	a < and
and < cake	cake < and

- If we delete the orderings in the first column (keeping the ones in the second column), then we will be left with non-transitive orderings, such as:
  - "and < who" and "who < João" but "João < and"
  - "a < and" and "and < Pedro" but "Pedro < a"
  - "cake < and" and "and < Pedro" but "Pedro < cake"
- Thus, we delete the orderings in the second column, and keep the orderings in the first column

An RNR-ed string need not be a constituent

- After deleting the indicated orderings, we are left with: *Who did João bake and Pedro ice a cake for?*
- However, *a cake for* is not a constituent!
- This shows that right node raising doesn't target (constituents
- Strongly suggests that right node raising does not involve movement (as I've assumed), since movement (Merge) targets constituents

QUESTIONS?

Conclusion

- Flexible Cyclic Linearization…
  - allows us to linearize parallel structures (such as right node raising)
  - allows us to (mostly) avoid stipulating where a string is pronounced
- Questions for future work:
  - How can FCL help us analyze other constructions?
  - How can we resolve "perfectly" symmetric orderings in a principled way?
  - Are there cases in which economy (*i.e.*, number of deletions) affects the outcome of linearization?

Thank you

- Jason Kandybowicz
- Matt Pearson
- Everybody who gave me acceptability judgments

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