

Right node raising and Flexible Cyclic Linearization

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Question

- How do we linearize right node raising (RNR) constructions such as (1)?
- 1. Darius found ___ and Jasmine took the book.



Overview

- 1. Right node raising
- 2. Cyclic Linearization
- 3. Flexible Cyclic Linearization
- 4. Consequences
- 5. Conclusion



RIGHT NODE RAISING



Approaches to right node raising

Major approaches

- ATB movement (e.g., Ross 1967, Sabbagh 2007) $[_{CP} [_{\&P} [_{TP} Darius [_{VP} Darius found t_i]] [_{\&'} and [_{TP} Jasmine [_{VP} Jasmine took t_i]]]] [the book]_i]$
- Ellipsis (e.g., Wexler & Culicover 1980, Kayne 1994) $[_{CP} [_{\&P} [_{TP} Darius [_{VP} Darius found [the book]]]] [_{\&'} and [_{TP} Jasmine [_{VP} Jasmine took [the book]]]]]]]$
- Multidominance (e.g., McCawley 1982, Bachrach & Katzir 2017)
 [CP [RP [TP Darius [VP Darius found [the book]]] [RP and [TP Darius [VP Darius found [the book]]]

 $[CP]_{QP} = [CP]_{QP}$ Darius $[CP]_{QP}$ Darius found [the book]_i]] $[CP]_{QP} = [CP]_{QP}$ Jasmine took [the book]_i]]]]]

(see Bachrach & Katzir 2017, Larson 2018)



CYCLIC LINEARIZATION



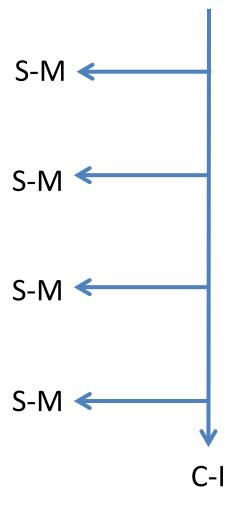
Linearization

- Post-syntactic computation of linear order (Chomsky 1995)
- Linear order must have the following properties (Kayne 1994):
 - Transitive: If a < b and b < c, then a < c.
 - Total: If $a \neq b$, then either a < b or b < a.
 - Asymmetric: If a < b, then not b < a



Cyclic Linearization

- No distinction between phase and Spell-Out domain
- No phase impenetrability
- Order Preservation: "information about linearization, once established at the end of a given Spell-out domain, is never deleted in the course of the derivation" (Fox & Pesetsky 2005a: 6)





Cyclic Linearization: An example (1/2)

2. What did Darius find? [CP] what; did Darius [CP] what; Darius find what; [CP]

what < Darius	what < find
	Darius < find

Table 1: Ordering statements generated 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



Cyclic Linearization: An example (2/2)

2. What did Darius find? [CP] what; did Darius [CP] what; Darius find what; [CP]

what < did	what < Darius	what < find	
	did < Darius	did < find	
	Darius < find		

Table 2: Ordering statements generated in the CP phase of (2). Ordering statements established in the vP phase are in **bold**.

This gives the observed linear order: what < did <
 <p>Darius < find</p>



RNR under Cyclic Linearization (1/4)

1. Darius found __ and Jasmine took <u>the book</u>. $[_{CP} [_{\&P} [_{TP} Darius [_{VP} Darius found [the book]_i]] [_{\&'}]$ and $[_{TP} Jasmine [_{VP} Jasmine took [the book]_i]]]]]]$

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

Table 3. Ordering statements generated during the linearization of [$_{vP}$ Darius found the book].



RNR under Cyclic Linearization (2/4)

1. Darius found __ and Jasmine took <u>the book</u>. $[_{CP} [_{\&P} [_{TP} Darius [_{VP} Darius found [the book]_i]] [_{\&'}]$ and $[_{TP} Jasmine [_{VP} Jasmine took [the book]_i]]]]]]$

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

Table 4. Ordering statements generated during the linearization of [$_{vP}$ Jasmine took the book].

RNR under Cyclic Linearization (3/4)

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 5. Ordering statements generated during the CP phase of (1) under Cyclic Linearization. Ordering statements in red are unlinearizable.



RNR under Cyclic Linearization (4/4)

- There are a number of unlinearizable ordering statements:
 - the < the; book < book (reflexive)
 - the < and BUT and < the; etc. (symmetric)
- There are ordering statements that contradict previously established ordering statements (e.g., book < Jasmine)
- Because there is no way of determining which
 Merge of the book happened first, there is no
 principled way to resolve these ordering conflicts



FLEXIBLE CYCLIC LINEARIZATION

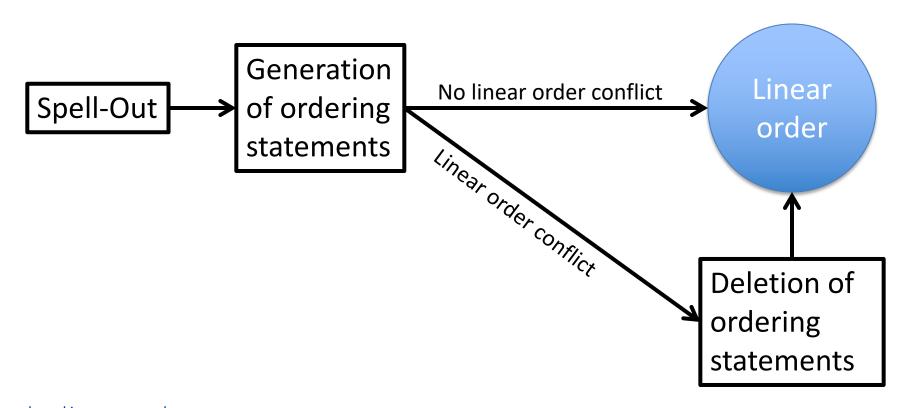


Flexible Cyclic Linearization (FCL)

- All positions count for linearization
- Ordering statements may be deleted <u>in the phase in</u> which they arise as necessary to linearize the structure.
 - cf. Fox & Pesetsky 2005b
- Ordering statements are deleted according to:
 - Order Preservation
 - Transitivity, totality, asymmetry
 - Economy?



How to linearize flexibly





RNR under FCL (1/10)

1. Darius found __ and Jasmine took <u>the book</u>. $[_{CP} [_{\&P} [_{TP} Darius [_{VP} Darius found [the book]_i]] [_{\&'}]$ and $[_{TP} Jasmine [_{VP} Jasmine took [the book]_i]]]]]]$

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

Table 3. Ordering statements generated during the linearization of [$_{vP}$ Darius found the book].



RNR under FCL (2/10)

1. Darius found __ and Jasmine took <u>the book</u>. $[_{CP} [_{\&P} [_{TP} Darius [_{VP} Darius found [the book]_i]] [_{\&'}]$ and $[_{TP} Jasmine [_{VP} Jasmine took [the book]_i]]]]]]$

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

Table 4. Ordering statements generated during the linearization of [$_{vP}$ Jasmine took the book].

RNR under FCL (3/10)

<u> </u>						
Darius < Darius	Darius < found	Darius < and	Darius < Jasmine	Darius < took	Darius < the	Darius < book
		found < and	found < Jasmine	found < took	found < the	found < book
			and < Jasmine	and < took	and < the	and < book
			Jasmine < Jasmine	Jasmine < took	Jasmine < the	Jasmine < book
					took < the	took < book
		the < and	the < Jasmine	the < took	the < the	the < book
		book < and	book < Jasmine	book < took	book < the	book < book

Table 6. Ordering statements generated during the CP phase of (1) under Flexible Cyclic Linearization. Ordering statements in **bold** were established in an earlier phase.



RNR under FCL (4/10)

- We can delete ordering statements which contradict previously established ordering statements
 - the < Jasmine (prior phase: Jasmine < the)
 - the < took (prior phase: took < the)
 - book < Jasmine (prior phase: Jasmine < book)
 - book < took (prior phase: took < book)
 - book < the (prior phase: the < book)
- We can delete reflexive ordering statements
 - Darius < Darius
 - Jasmine < Jasmine
 - the < the
 - book < book

RNR under FCL (5/10)

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

Table 6. Ordering statements generated during the CP phase of (1) under Flexible Cyclic Linearization. Ordering statements in **bold** were established in an earlier phase.

RNR under FCL (6/10)

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

Table 7. Ordering statements established during the CP phase of (1) under Flexible Cyclic Linearization. Ordering statements in **bold** were established in an earlier phase. Ordering statements that are reflexive or that violate Order Preservation have been removed.



RNR under FCL (7/10)

- We have to resolve symmetric ordering statements:
 - the < and BUT and < the
 - book < and BUT and < book
- Keeping the ordering statements on the left will leave a non-transitive ordering:
 - the < and AND and < took BUT NOT the < took
 - book < and AND and < took BUT NOT book < took
- Therefore, we must delete the ordering statements on the left

RNR under FCL (8/10)

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

Table 7. Ordering statements established during the CP phase of (1) under Flexible Cyclic Linearization. Ordering statements in **bold** were established in an earlier phase. Ordering statements that are reflexive or that contradict previously established ordering statements have been removed.

RNR under FCL (9/10)

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

Table 8. Ordering statements established during the CP phase of (1) under Flexible Cyclic Linearization. Ordering statements in **bold** were established in an earlier phase. Problematic ordering statements have been removed.



RNR under FCL (10/10)

 Flexible Cyclic Linearization derives the observed linear order of (1): Darius < found < and < Jasmine < took < the < book



CONSEQUENCES



Edge Restriction (1/2)

- Edge Restriction (Bachrach & Katzir 2017: 2):
 - a. Either [the shared string] α 's position is rightmost in all the nonrightmost constituents containing it, in which case it surfaces within the rightmost constituent;
 - b. Or α's position is leftmost in all the nonleftmost constituents containing it, in which case it surfaces in the leftmost constituent
- 3. (As for the dishes,) [Brady rinsed ___ (*off)] and [Yngvarr dried them].



Edge Restriction (2/2)

 The Edge Restriction is Order Preservation: if the shared string appears in the final (initial) conjunct, then it must follow (precede) all the material in the non-final (non-initial) conjuncts.



Right node wrapping

- In RNR, shared material can be followed by nonshared material
- 4. Nkiru washed ___ and put the dishes away.
- FCL predicts right node wrapping: Order
 Preservation requires the shared string to follow
 the material in non-final conjuncts, but not in final
 conjuncts



RNR outside of coordination

- RNR can occur outside of coordination
- 5. Those who ignore ___ dislike those who obey authority.
- This is predicted by FCL: RNR is the result of Order Preservation in parallel phases, so we expect it to be possible wherever there are parallel phases



Overt movement (1/15)

Flexible Cyclic Linearization allows a new account of covert movement



Overt movement (2/15)

6. Who did you see? [CP who did you who you see who]]

who < you	who < see	who < who
	you < see	you < who
		see < who

Table 9: Ordering statements generated in the vP phase of (6).



Overt movement (3/15)

• We can delete reflexive ordering statements

who < you	who < see	who
	you < see	you < who
		see < who

Table 9: Ordering statements generated in the vP phase of (6).



Overt movement (4/15)

We can delete reflexive ordering statements

who < you	who < see	
	you < see	you < who
		see < who

Table 10: Ordering statements generated in the vP phase of (6). Reflexive ordering statements have been removed.



Overt movement (5/15)

- We have to resolve symmetric ordering statements
 - who < you BUT you < who
 - who < see BUT see < who
- We can keep the ordering statements on the left or the ones on the right
- For now, we stipulate that we keep the ordering statements on the left because who is pronounced before you and see



Overt movement (6/15)

who < you	who < see	
	you < see	youwho
		see who

Table 10: Ordering statements generated in the vP phase of (6). Reflexive ordering statements have been removed.



Overt movement (7/15)

who < you	who < see
	you < see

Table 11: Ordering statements generated in the vP phase of (6). Reflexive and symmetric ordering statements have been resolved.



Overt movement (8/15)

6. Who did you see? [CP who did you ve who]]

who < did	who < you	who < see	who < who
	did < you	did < see	did < who
	you < you	you < see	you < who
			see < who

Table 12: Ordering statements generated in the CP phase of (6). Ordering statements in **bold** were established in a prior phase.



Overt movement (9/15)

- We can delete ordering statements which contradict previously established ordering statements
 - you < who (prior phase: who < you)
 - see < who (prior phase: who < see)
- We can delete reflexive ordering statements
 - who < who
 - you < you



Overt movement (10/15)

6. Who did you see? [CP who did you who you see who]]

who < did	who < you	who < see	who who
	did < you	did < see	did < who
	youxyou	you < see	youxwho
			see × who

Table 12: Ordering statements generated in the CP phase of (6). Ordering statements in **bold** were established in a prior phase.



Overt movement (11/15)

6. Who did you see? [CP who did you ve who]]

who < did	who < you	who < see	
	did < you	did < see	did < who
		you < see	

Table 13: Ordering statements generated in the CP phase of (6). Ordering statements in **bold** were established in a prior phase. Ordering statements that are reflexive or that contradict previously established ordering statements have been removed.



Overt movement (12/15)

- We have to resolve symmetric ordering statements
 - who < did BUT did < who
- We can keep the ordering statement on the left or the one on the right
- We stipulate that we keep the ordering statements on the left because who is pronounced before did



Overt movement (13/15)

6. Who did you see? [CP who did you ve who]]

who < did	who < you	who < see	
	did < you	did < see	aid who
		you < see	

Table 13: Ordering statements generated in the CP phase of (6). Ordering statements in **bold** were established in a prior phase. Ordering statements that are reflexive or that contradict previously established ordering statements have been removed.



Overt movement (14/15)

6. Who did you see? [CP who did you ve who]]

who < did	who < you	who < see
	did < you	did < see
		you < see

Table 14: Ordering statements generated in the CP phase of (6). Ordering statements in **bold** were established in a prior phase. Problematic ordering statements have been removed.



Overt movement (15/15)

- Stipulating in the vP that who is pronounced before you and see leads to an overt movement configuration
- What happens if who is linearized after you and see in the vP?



Covert movement (1/11)

7. nǐ kànjiàn-le shéi?
you see-ASP who?
[CP shéi nǐ [VP shéi nǐ kànjiàn-le shéi]]
(Adapted from Huang 1982: 253)

shéi < nǐ	shéi < kànjiànle	shéi < shéi
	nĭ < kànjiànle	nĭ < shéi
		kànjiànle < shéi

Table 15: Ordering statements generated in the vP phase of (7).



Covert movement (2/11)

• We can delete reflexive ordering statements

shéi < nǐ	shéi < kànjiànle	shéi < shéi
	nǐ < kànjiànle	nĭ < shéi
		kànjiànle < shéi

Table 15: Ordering statements generated in the vP phase of (7).



Covert movement (3/11)

We can delete reflexive ordering statements

shéi < nǐ	shéi < kànjiànle	
	nǐ < kànjiànle	nĭ < shéi
		kànjiànle < shéi

Table 16: Ordering statements generated in the vP phase of (7). Reflexive ordering statements have been removed.



Covert movement (4/11)

- We have to resolve symmetric ordering statements
 - shéi < ní BUT ní < shéi
 - shéi < kànjiànle BUT kànjiànle < shéi
- We can keep the ordering statements on the left or the ones on the right
- For now, we stipulate that we keep the ordering statements on the right because shéi is pronounced after ni and kànjiànle



Covert movement (5/11)

7. nǐ kànjiàn-le shéi?
you see-ASP who?
[CP shéi nǐ [VP shéi nǐ kànjiàn-le shéi]]
(Adapted from Huang 1982: 253)

shéisní	shéi< kènjiànle	
	nĭ < kànjiànle	nĭ < shéi
		kànjiànle < shéi

Table 16: Ordering statements generated in the vP phase of (7). Reflexive ordering statements have been removed.



Covert movement (6/11)

7. nǐ kànjiàn-le shéi?
you see-ASP who?
[CP shéi nǐ [VP shéi nǐ kànjiàn-le shéi]]
(Adapted from Huang 1982: 253)

nǐ < kànjiànle	nǐ < shéi
	kànjiànle < shéi

Table 17: Ordering statements generated in the vP phase of (7). Problematic ordering statements have been removed.



Covert movement (7/11)

7. nǐ kànjiàn-le shéi?
you see-ASP who?
[CP shéi nǐ [VP shéi nǐ kànjiàn-le shéi]]
(Adapted from Huang 1982: 253)

shéi < nǐ	shéi < kànjiànle	shéi < shéi
nǐ < nǐ	nǐ < kànjiànle	nĭ < shéi
		kànjiànle < shéi

Table 18: Ordering statements generated in the CP phase of (7). Ordering statements in **bold** were established in a prior phase.



Covert movement (8/11)

- We can delete ordering statements which contradict previously established ordering statements
 - shéi < nǐ (prior phase: nǐ < shéi)
 - shéi < kànjiànle (prior phase: kànjiànle < shéi)
- We can delete reflexive ordering statements
 - shéi < shéi
 - nǐ < nǐ



Covert movement (9/11)

7. nǐ kànjiàn-le shéi?
you see-ASP who?
[CP shéi nǐ [VP shéi nǐ kànjiàn-le shéi]]
(Adapted from Huang 1982: 253)

snéi e ni	shéi « kanjiànle	shéicshéi
nř př	nĭ < kànjiànle	nĭ < shéi
		kànjiànle < shéi

Table 18: Ordering statements generated in the CP phase of (7). Ordering statements in **bold** were established in a prior phase.



Covert movement (10/11)

7. nǐ kànjiàn-le shéi?
you see-ASP who?
[CP shéi nǐ [VP shéi nǐ kànjiàn-le shéi]]
(Adapted from Huang 1982: 253)

nǐ < kànjiànle	nǐ < shéi
	kànjiànle < shéi

Table 19: Ordering statements generated in the CP phase of (7). Ordering statements in **bold** were established in a prior phase. Problematic ordering statements have been removed.



Covert movement (11/11)

- Stipulating in the vP that shéi 'who' is pronounced after ni 'you' and kànjiànle 'see.ASP' leads to a covert movement configuration
- We attribute variation between overt and covert movement to variation in which ordering statements are deleted
- "the complexity, the variety of language arise overwhelmingly if not completely from the ancillary operations which lead to externalization which we know draws upon our sensory motor system" (Chomsky, 2019, 265)



Conclusion

- Cyclic Linearization cannot linearize multidominant right node raising structures
- Flexible Cyclic Linearization, which allows deletion of ordering statements, can
- The Edge Restriction on right node raising is Order Preservation
- Flexible Cyclic Linearization permits a purely phonological account of covert movement



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