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# 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.

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## Overview

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

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## RIGHT NODE RAISING

## Approaches to right node raising

Major approaches

- ATB movement (e.g., Ross 1967, Sabbagh 2007 )
$\left[_{C P}\left[_{\& P}\left[_{T P} \text { Daritus }\left[_{V P} \text { Darius found } \tau_{i}\right]\right]_{\&}\right.\right.$ and [TP Jasmine [ ${ }_{\text {vpe }}$ Jasmine took $\left.t_{i}\right]$ ] $]$ [thebook $\left.]_{j}\right]$
- Eltipsis (e.g., Wexler \& Culicover 1980, Kayne- 999 ) [CP [\&P [TP Darius tvp Darius found the book]]] [\&' and [Tp Jasmine Ivp Jasmine took [the book]]l1]]
- Multidominance (e.g., McCawley 1982, Bachrach \& Katzir 2017)
[ ${ }_{C P}\left[{ }_{\& P}\left[_{T P} \text { Darius }{ }_{\text {VPP }} \text { Darius found [the book] }\right]_{i}\right]\left[_{\&^{\prime}}\right.$ and [Tp Jasmine [vp Jasmine took [the book]]]]]]
(see Bachrach \& Katzir 2017, Larson 2018)

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## CYCLIC LINEARIZATION

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## 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 ${ }_{i}$ did Darius [ ${ }_{\mathrm{vP}}$ what ${ }_{\mathrm{i}}$ Darius find what ${ }_{\mathrm{j}}$ ]

| 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？


| 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＜ Darius＜find

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## RNR under Cyclic Linearization (1/4)

1. Darius found __ and Jasmine took the book. $\left[_{C P}\left[{ }_{\& P}\left[{ }_{T P}\right.\right.\right.$ Darius $\left[_{\mathrm{VP}}\right.$ Darius found $\left.[\text { the book }]_{i}\right]{ }_{\&_{\mathcal{\prime}}}$ and [Tp Jasmine [ ${ }_{\mathrm{vP}}$ Jasmine took [the book] $\left.\left.\left.]_{i}\right]\right]\right]$ ]

| 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].

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## RNR under Cyclic Linearization (2/4)

1. Darius found __ and Jasmine took the book. [CP $\left.{ }_{\& P}\left[_{T P} \text { Darius }{ }_{\text {VP }} \text { Darius found [the book }\right]_{i}\right]{ }_{{ }_{Q^{\prime}}}$ and [Tp Jasmine [ ${ }_{\mathrm{vP}}$ Jasmine took [the book] $\left.\left.\left.]_{i}\right]\right]\right]$ ]

| 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 < <br> found | Darius < and | Darius < <br> Jasmine | Darius < took | Darius < the | Darius < book |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  | found < and | found < <br> Jasmine | found < took | found < the | found < book |
|  | the < and | the < Jasmine | the < took | the < the | the < book |
|  | book < and | book < <br> Jasmine | book < took | book < the | book < book |
|  | and < Jasmine | and<took | and<the | and<book |  |
|  |  | Jasmine < <br> took | Jasmine <the | Jasmine < <br> 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

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## FLEXIBLE CYCLIC LINEARIZATION

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## Flexible Cyclic Linearization (FCL)

- All positions count for linearization
- Ordering statements may be deleted in the phase in 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

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## RNR under FCL (1/10)

1. Darius found __ and Jasmine took the book. $\left[_{C P}\left[{ }_{\& P}\left[{ }_{T P}\right.\right.\right.$ Darius $\left[_{\mathrm{VP}}\right.$ Darius found $\left.[\text { the book }]_{i}\right]{ }_{\&_{\mathcal{\prime}}}$ and [Tp Jasmine [ ${ }_{\mathrm{vP}}$ Jasmine took [the book] $\left.\left.\left.]_{i}\right]\right]\right]$ ]

| 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].

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## RNR under FCL (2/10)

1. Darius found __ and Jasmine took the book. [CP ${ }_{\& P}\left[{ }_{T P}\right.$ Darius $\left.\left[_{V P} \text { Darius found [the book }\right]_{i}\right]\left[_{\mathcal{Z}^{\prime}}\right.$ and [Tp Jasmine [ ${ }_{\mathrm{vP}}$ Jasmine took [the book] $\left.\left.\left.]_{i}\right]\right]\right]$ ]

| 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)

| Darius < <br> Darius | Darius < <br> found | Darius < and | Darius < <br> Jasmine | Darius < took | Darius < the | Darius < <br> book |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  | found < and | found < <br> Jasmine | found < took | found < the | found < <br> book |
|  |  | and < <br> Jasmine | and < took | and < the | and < book |  |
|  |  | Jasmine < <br> Jasmine | Jasmine < <br> took | Jasmine < <br> the | Jasmine < <br> book |  |
|  |  | the < and | the < <br> Jasmine | the < took | the < the | the < book |
|  |  | book < and | book < <br> 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.

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## 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)

| Dariug <br> Darius | Darius < <br> found | Darius < and | Darius < <br> Jasmine | Darius < took | Darius < the | Darius < <br> book |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  | found < and | found < <br> Jasmine | found < took | found < the | found < <br> book |
|  |  | and < <br> Jasmine | and < took | and < the | and < book |  |
|  |  | Jasmine < <br> Jasmine | Jasmine < <br> took | Jasmine < <br> the | Jasmine < <br> book |  |
|  |  | the < and | the <br> Jasmine | the zook | the<the | the < book |
|  |  | book < and | book< <br> Jasnine | book<took | book<tre | 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 < <br> found | Darius < and | Darius < <br> Jasmine | Darius < took | Darius < the | Darius < book |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  | found < and | found < <br> Jasmine | found < took | found < the | found < book |
|  | and < <br> Jasmine | and < took | and < the | and < book |  |
|  |  | Jasmine < took | Jasmine < the | Jasmine < <br> 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 < <br> found | Darius < and | Darius < <br> Jasmine | Darius < took | Darius < the | Darius < book |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  | found < and | found < <br> Jasmine | found < took | found < the | found < book |
|  | and < <br> Jasmine | and < took | and < the | and < book |  |
|  |  | Jasmine < took | Jasmine < the | Jasmine < <br> book |  |
|  |  |  |  | took < the | took < book |
|  | therand |  |  | 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 < <br> found | Darius < and | Darius < <br> Jasmine | Darius < took | Darius < the | Darius < book |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  | found < and | found < <br> Jasmine | found < took | found < the | found < book |
|  | and < <br> Jasmine | and < took | and < the | and < book |  |
|  |  |  | Jasmine < took | Jasmine < the | Jasmine < <br> 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

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## CONSEQUENCES

## Edge Restriction（1／2）

－Edge Restriction（Bachrach \＆Katzir 2017：2）：
a．Either［the shared string］$\alpha$＇s position is rightmost in all the nonrightmost constituents containing it，in which case it surfaces within the rightmost constituent；
b．Or $\alpha$＇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 non－ shared 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 [vp 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 s 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 | you sho |
|  |  | 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 [vp who you see 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 [vp who you see who]]

| who < did | who < you | who < see | who who |
| :--- | :--- | :--- | :--- |
|  | did < you | did < see | did < who |
|  | you you | you < see | you who |
|  |  |  | sees inno |

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 [vp who you see 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 [vp who you see who]]

| who < did | who < you | who < see |  |
| :--- | :--- | :--- | :--- |
|  | did < you | did < see | dit |
|  |  | 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 [vp who you see 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 [ ${ }_{V P}$ shéi nǐ kànjiàn-le shéi]]
(Adapted from Huang 1982: 253)

| shéi < nǐ | shéi < kànjiànle | shéi < shéi |
| :--- | :--- | :--- |
|  | nǐ < kànjiànle | nǐ < 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 | shêtshéi |
| :--- | :--- | :--- |
|  | nǐ < kànjiànle | nǐ < 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 | nǐ < 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 <nǐ BUT nǐ < 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 nǐ and kànjiànle


## Covert movement (5/11)

7. nǐ kànjiàn-le shéi?
you see-ASP who?
[CP shéi nǐ [ ${ }_{V P}$ shéi nǐ kànjiàn-le shéi]]
(Adapted from Huang 1982: 253)

| shéésili | shěi ksànjiànle |  |
| :--- | :--- | :--- |
|  | nǐ < kànjiànle | nǐ < 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 [ ${ }_{\mathrm{VP}}$ shéi nǐ kànjiàn-le shéi]]
(Adapted from Huang 1982: 253)

| nı̌ < kànjiànle | nı̌ < 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 [ ${ }_{V P}$ shéi nǐ kànjiàn-le shéi]]
(Adapted from Huang 1982: 253)

| shéi < nǐ | shéi < kànjiànle | shéi < shéi |
| :--- | :--- | :--- |
| nǐ < nǐ | nǐ < kànjiànle | nǐ < 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）

| smósillil | shés－Kannjiànle | shèi＜shéi |
| :---: | :---: | :---: |
| 解号号 | nǐ＜kànjiànle | nǐ＜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 nǐ '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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