Memory load of left-corner MG parsers

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Cyclop Retreat SS23

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- This presentation asks how tenure works based on left-corner parsers for Minimalist Grammars
- (...and provides no concrete answers.)

Outline

1. Introduction
   - Tenure
   - Parser directions
2. Tenure and the usual suspects
   - Right- vs. center embedding
   - Heavy NP shift
3. Questions and next steps

Introduction: tenure

- Tenure: how long a parse item is held in memory

(1) a. The **reporter** who [1]*the senator* [2]*attacked* **disliked** the editor.

b. The **reporter** who [1]*the senator* who [2]*John* [3]*met* [4]*attacked* **disliked** the editor.

(Gibson 2000)

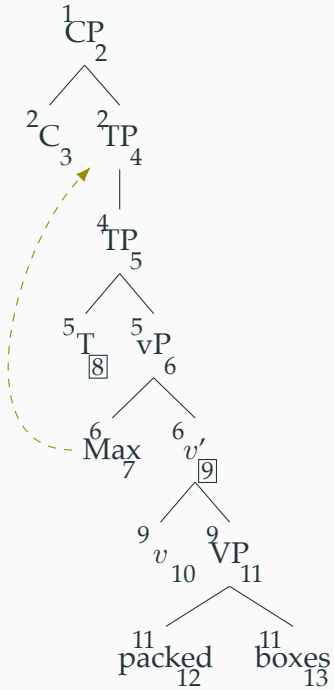
Introduction: tenure

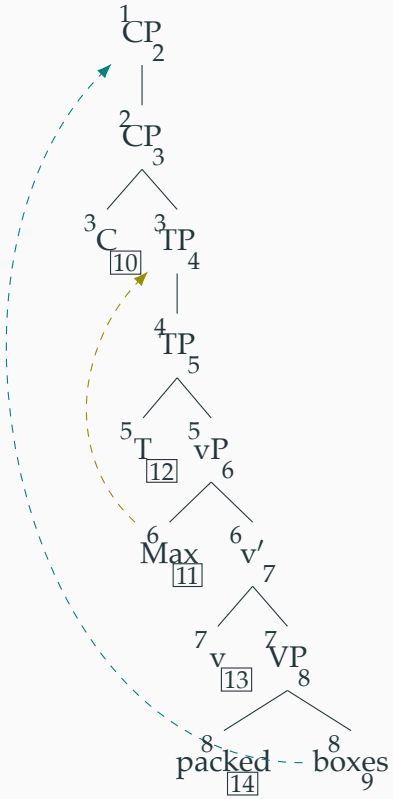
- Tenure: how long a parse item is held in memory

(2) a. Max packed boxes.

b. Boxes, Max packed.

(Liu 2022)





Introduction: tenure

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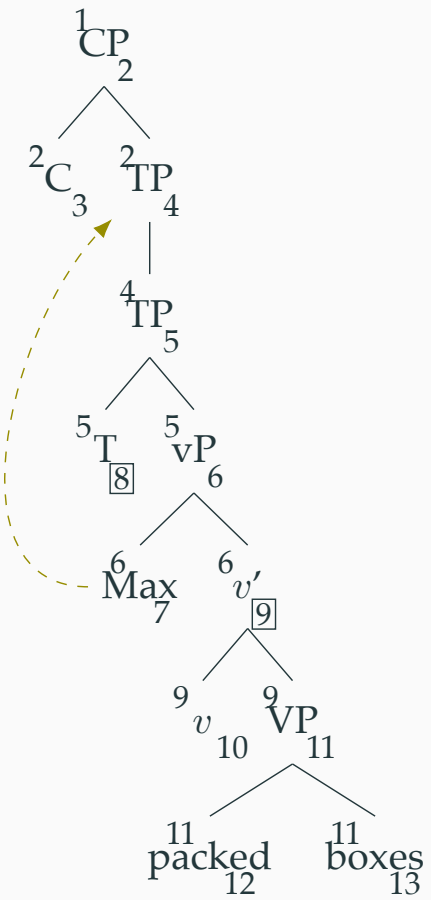
  - All based on a version of top-down parsers

Introduction: parser directions



Max packed boxes

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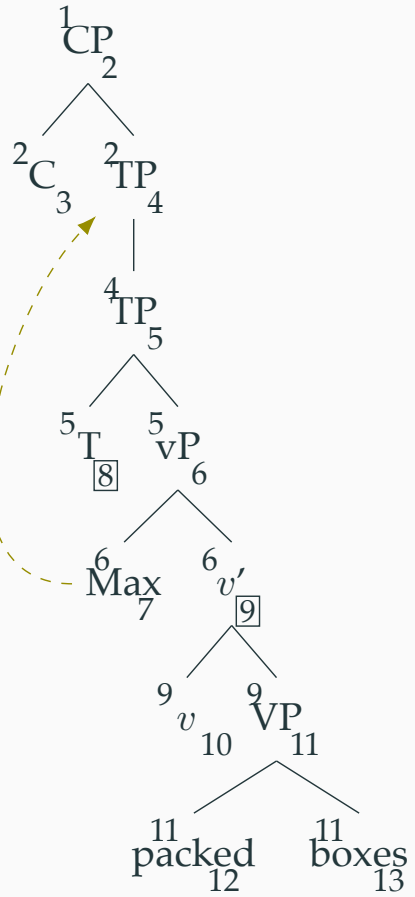

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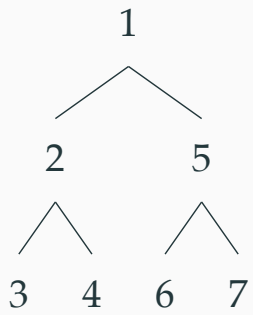

Top-down

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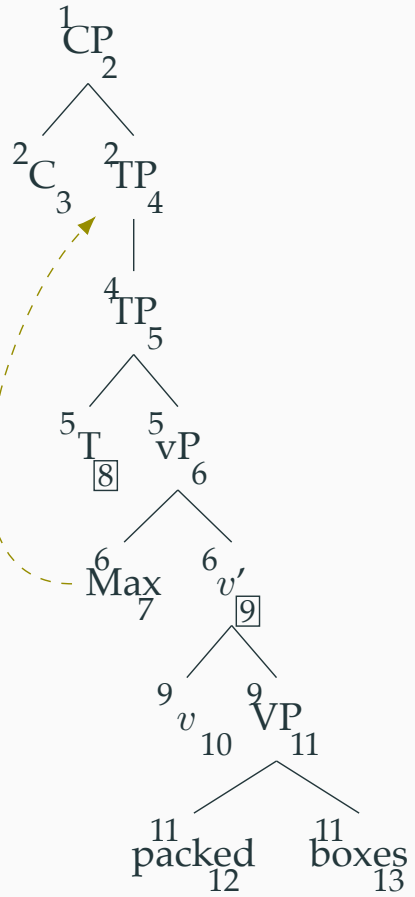

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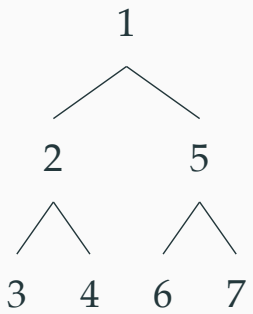
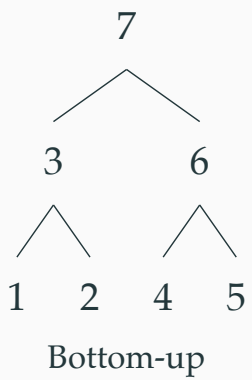


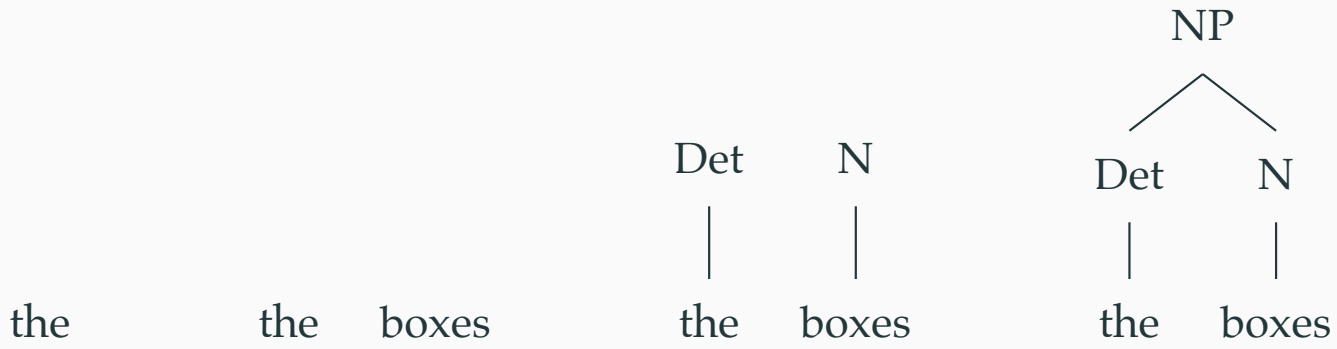
Top-down

- Pros
  - predictive
  - incremental
- Cons
  - terminal symbols do not guide prediction

Introduction: parser directions



- Pros
  - input driven
  - (can be) incremental
- Cons
  - not predicative



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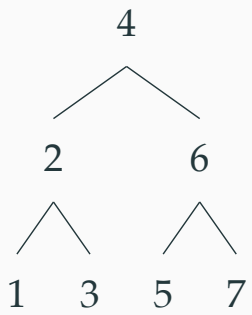
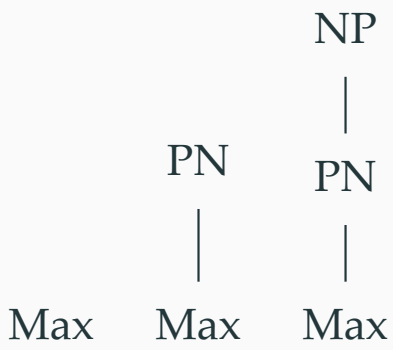


Left-corner

- Integrates
  - top-down prediction
  - bottom-up reduction

Left-corner parser: intuitions

1. `S -> NP VP`
2. `NP -> PN`
3. `NP -> Det N`
4. `VP -> Vt NP`
5. `PN -> Max`
6. `Vt -> packed`
7. `Det -> the`
8. `N -> boxes`



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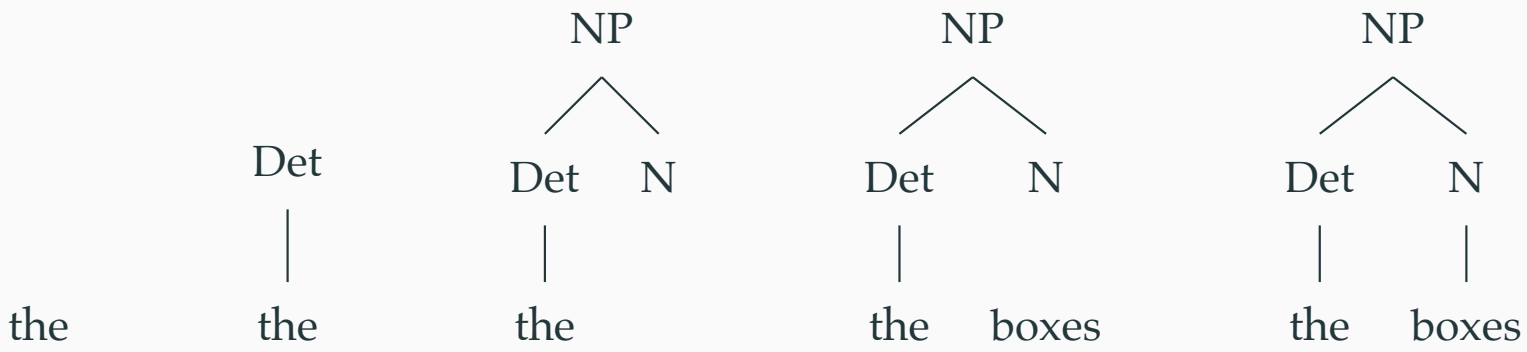

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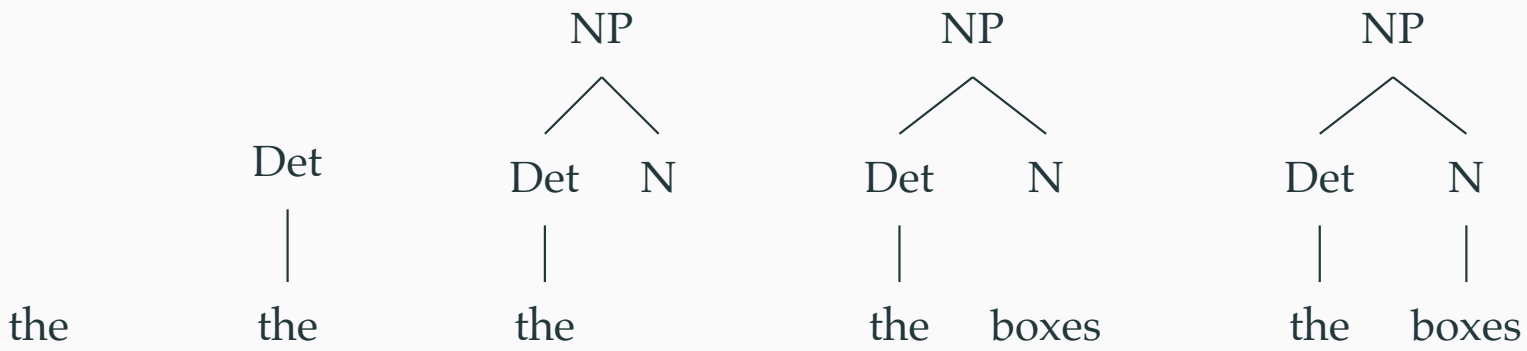

- Left-corner: the leftmost symbol on the righthand side of the rewrite arrow.

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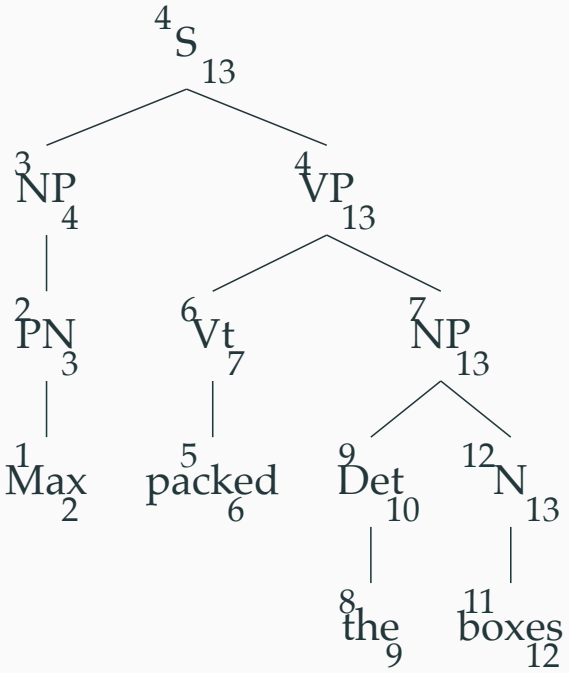

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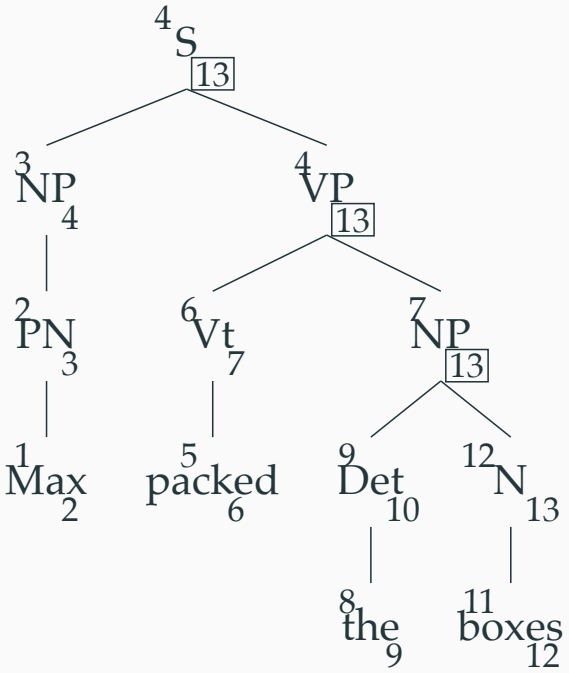

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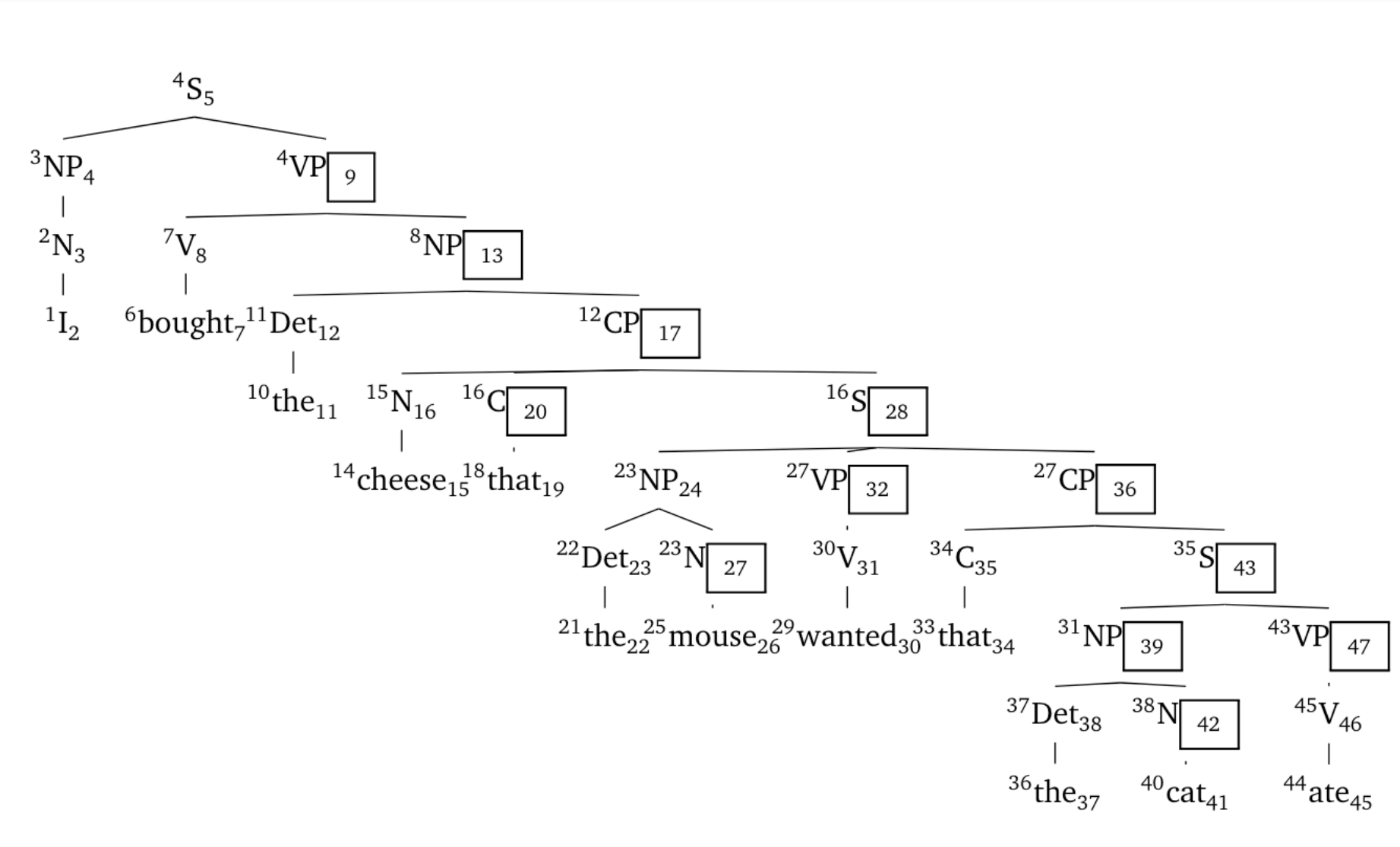
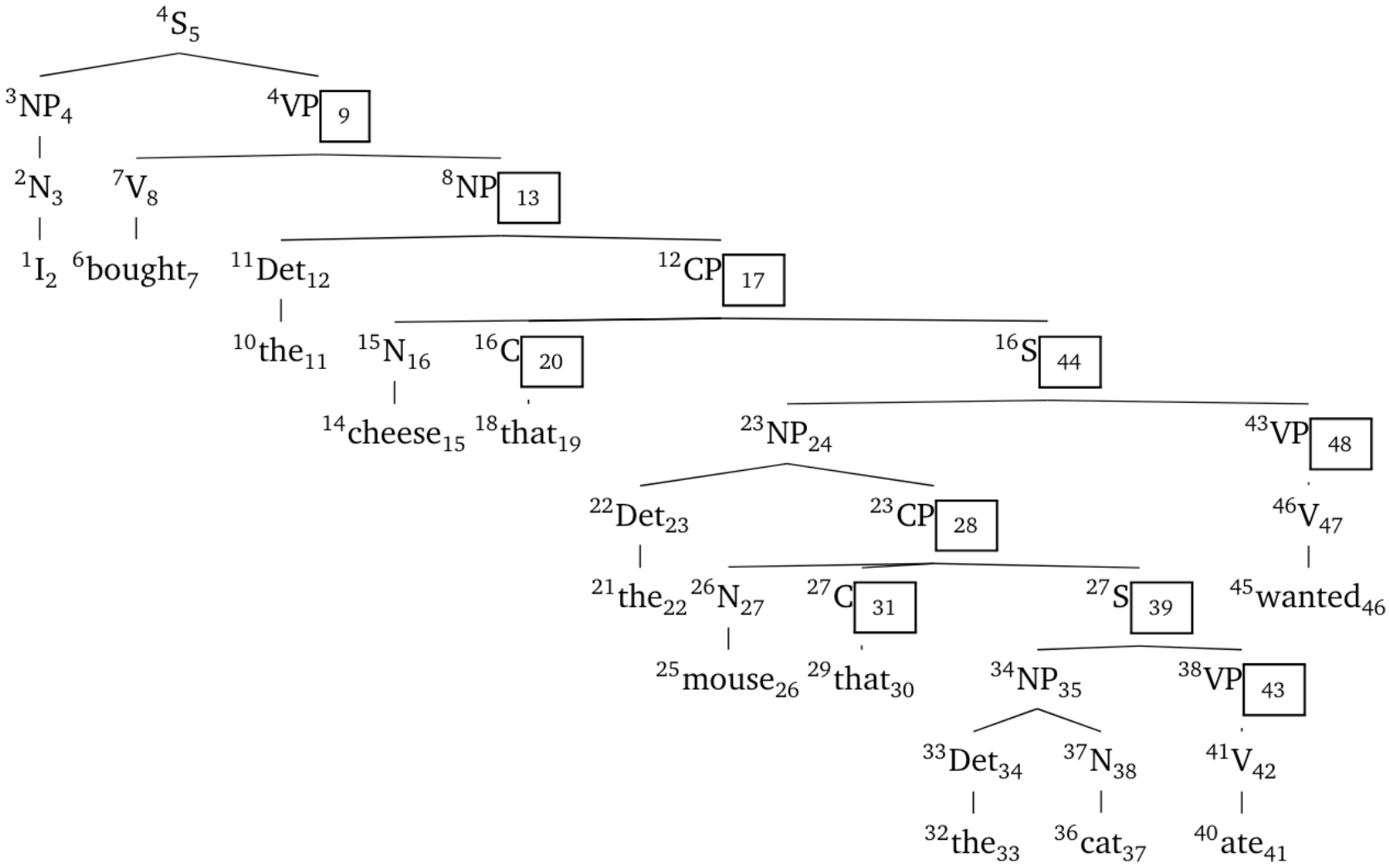
Right- vs. center-embedding



I bought the cheese that the mouse wanted that the cat ate.

Right- vs. center-embedding



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Right- vs. center-embedding

(3) I bought the cheese that the mouse wanted that the cat ate.
right-embedding
`MaxT = 12`

(4) I bought the cheese that the mouse that the cat ate wanted.
center-embedding
`MaxT = 28`

Right- vs. center-embedding

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success

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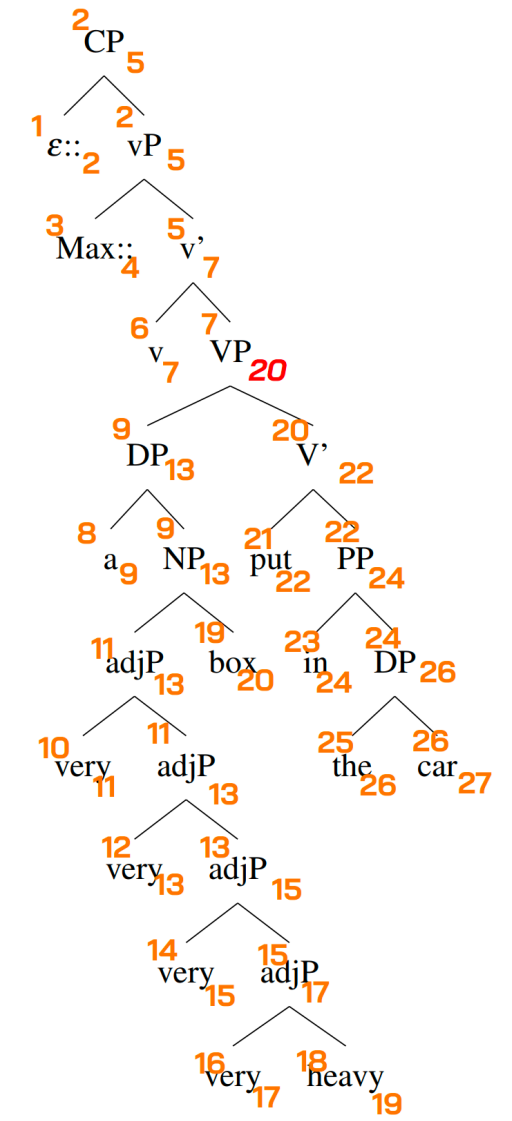
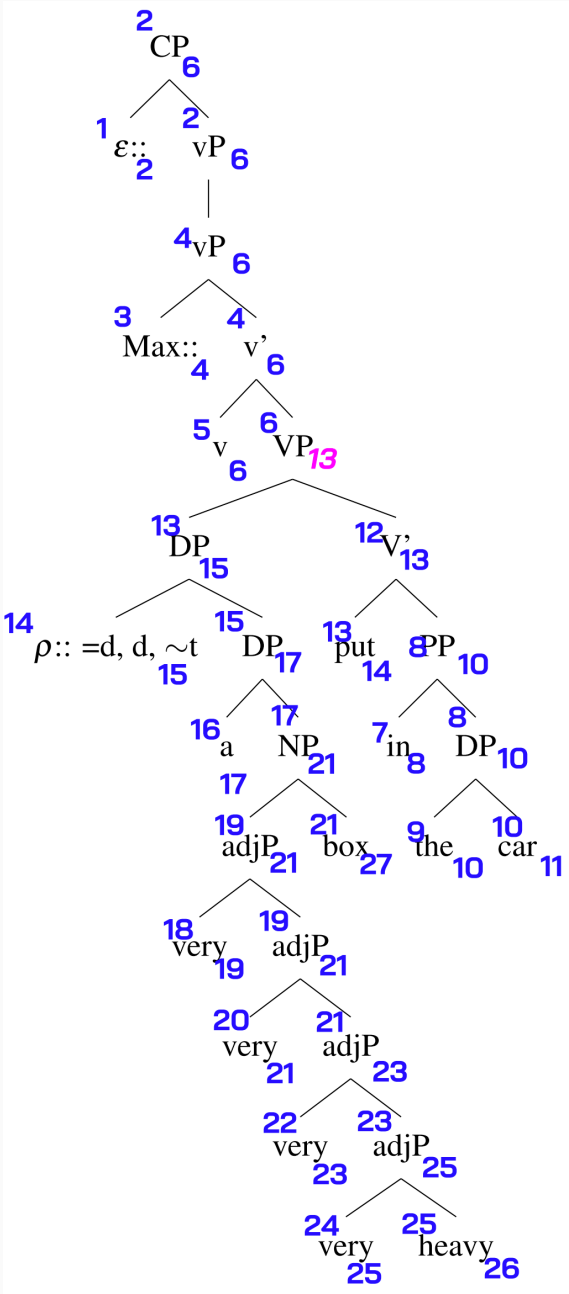
success-ish

Heavy NP shift



- ϵ Max v a very very very very heavy box put in the car.

Heavy NP shift



- ϵ Max v in the car put ρ a very very very very heavy box.

Heavy NP shift

(5) ϵ Max v a very very very very heavy box put in the car.
canonical order
`MaxT = 13`

(6) ϵ Max v in the car put ρ a very very very very heavy box.
HNPS order
`MaxT = 7`

Heavy NP shift

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success-ish

Questions and next steps

- Nodes vs. trees
  - memorizing a tree harder than memorizing a node?
  - metrics other than `MaxT`
    - `SumT`
    - `BoxT`
    - what about movement?
- Other benchmark constructions
  - relative clauses
  - topicalization (See 2)
- Tree annotation tools

Thank you!

References i

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Merely Local Syntactic Coherence Effects

(7) The coach smiled at the player **tossed** a frisbee.

(8) The coach smiled at the player **thrown** a frisbee.

Bottom-up and coordination