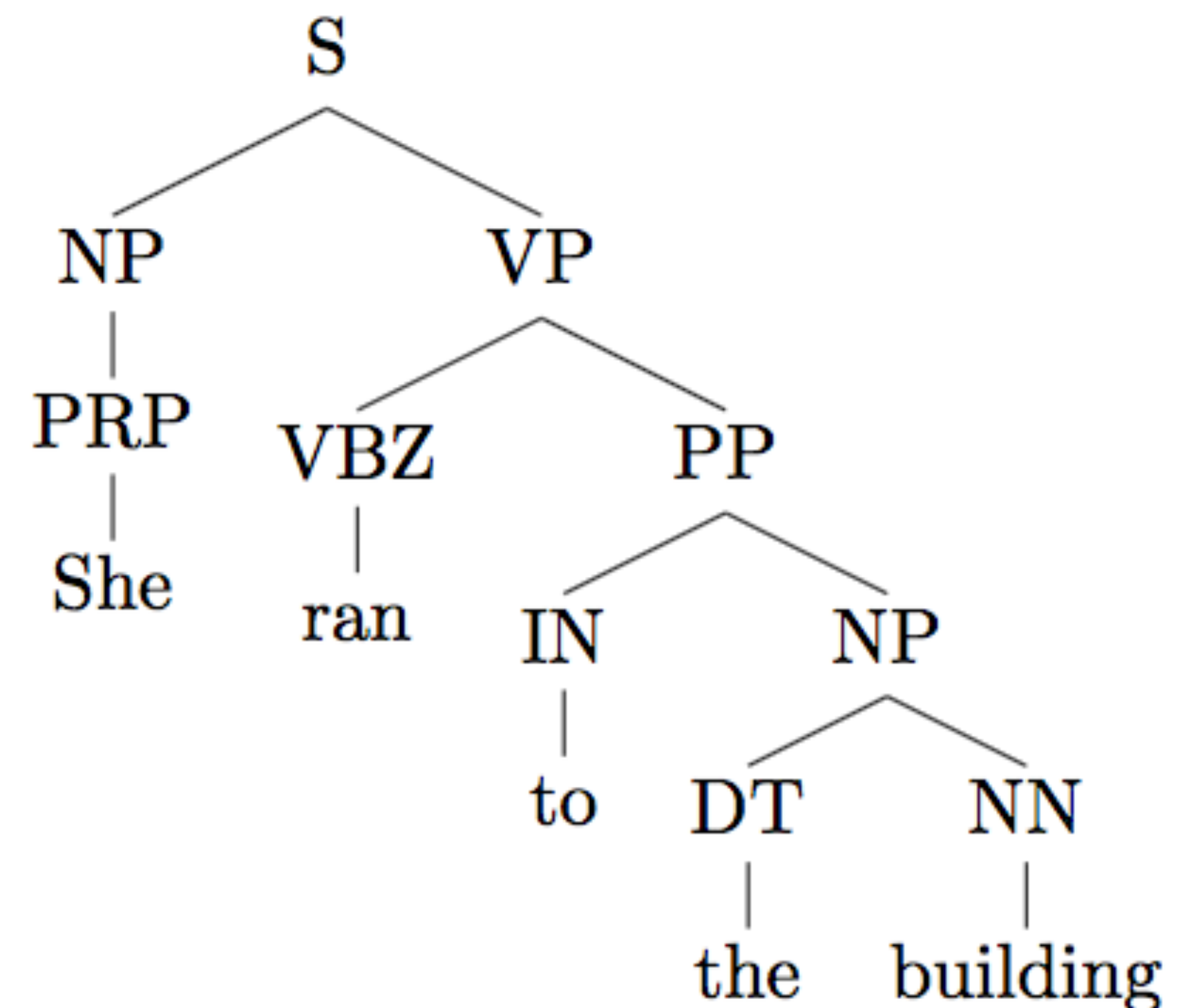# Syntax
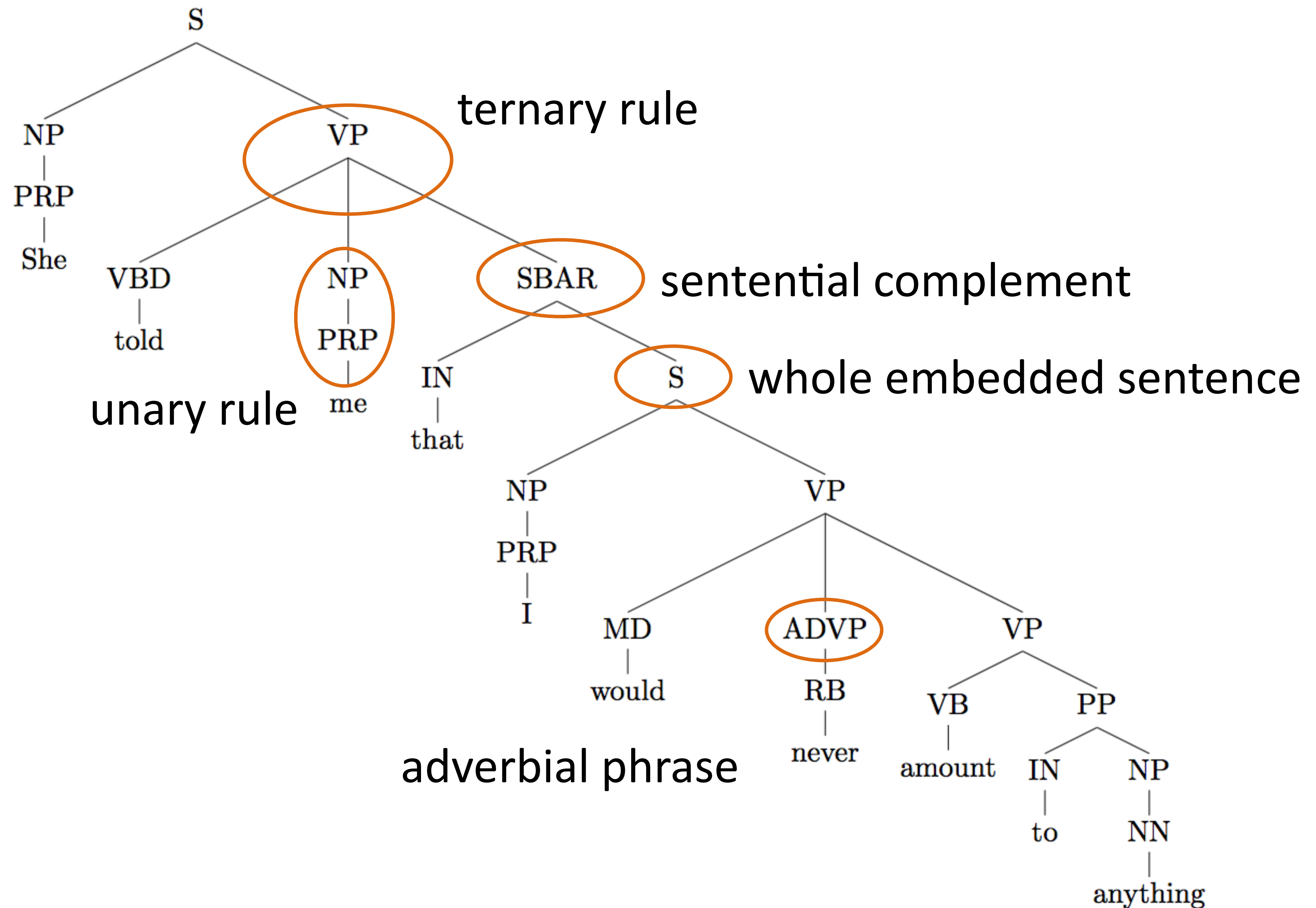
- Study of word order and how words form sentences

- Why do we care about syntax?

  - Multiple interpretations of words (noun or verb? *Fed raises*... example)

  - Recognize verb-argument structures (who is doing what to whom?)

  - Higher level of abstraction beyond words: some languages are SVO, some are VSO, some are SOV, parsing can canonicalize

Constituency Parsing

▸ Tree-structured syntactic analyses of sentences

▸ *Constituents*: (S)entence, (N)oun (P)hrases, (V)erb (P)hrases, (P)repositional (P)hrases, and more

▸ Bottom layer is POS tags

▸ Examples will be in English. Constituency makes sense for a lot of languages but not all
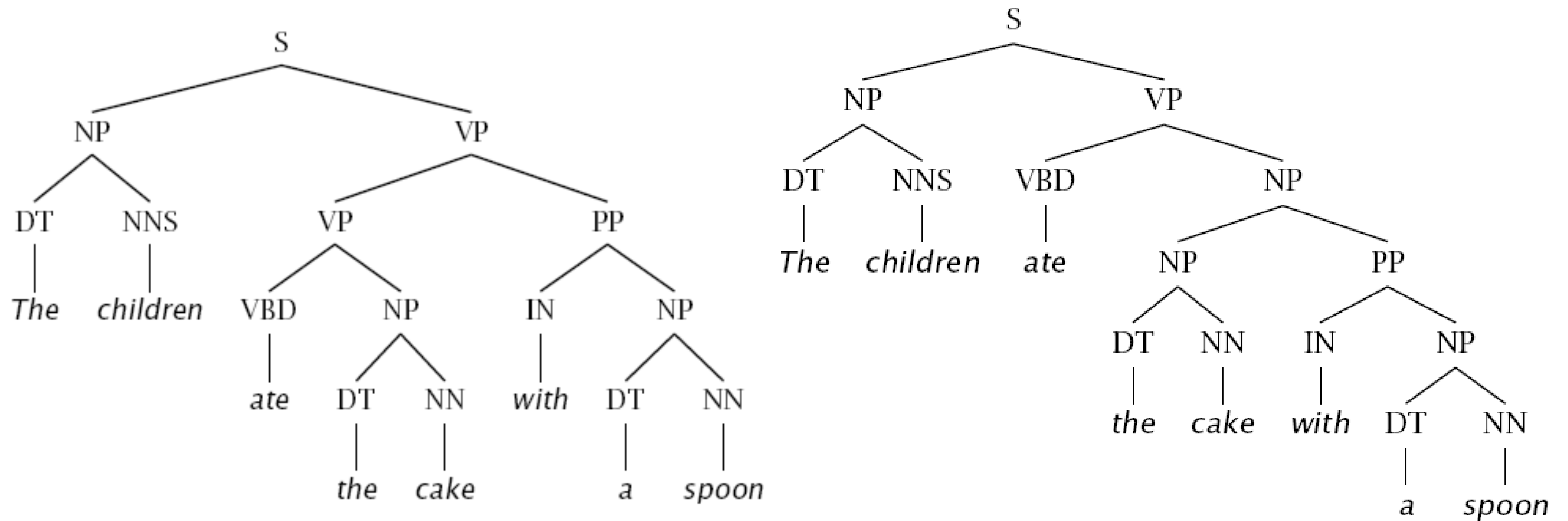
Constituency Parsing

Constituency Parsing

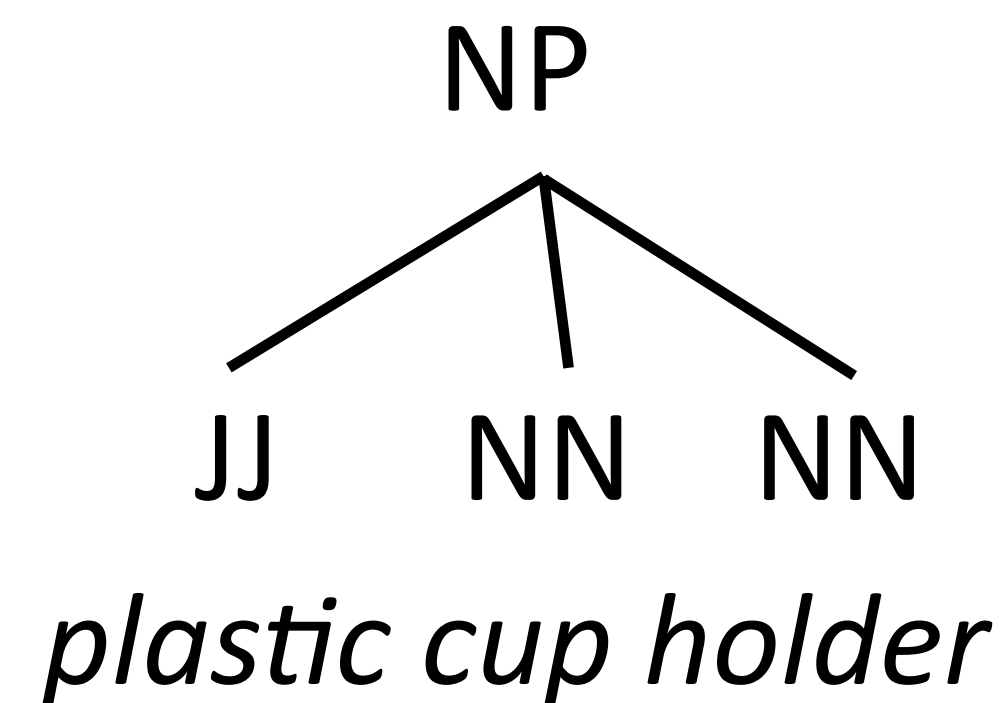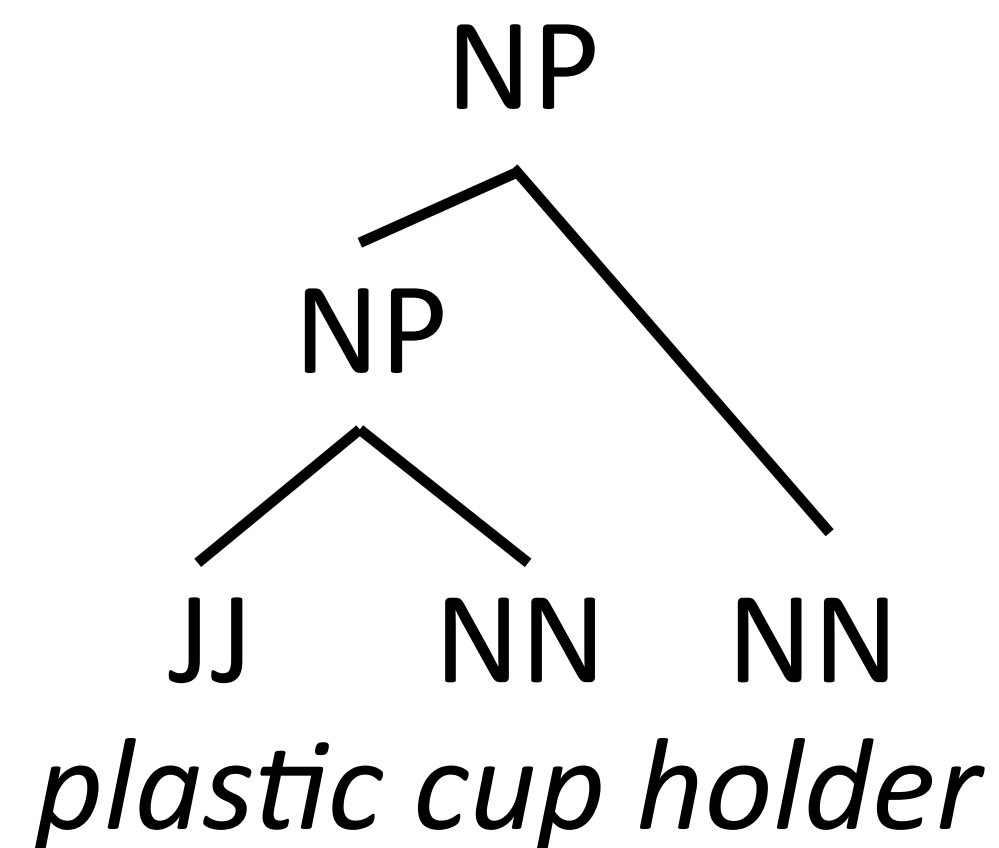a   refund   that   the court   estimated   *-1

Challenges

PP attachment

same parse as "the cake with some icing"

Challenges

▸ Modifier scope:

```
           NP                                    NP
          /  \                                  /|\
        NP     \                               / | \
       /  \     \                             /  |  \
     JJ    NN    NN                         JJ   NN   NN
   plastic cup holder                     plastic cup holder
```

▸ Complement structure:

The students complained to the professor that they didn't understand

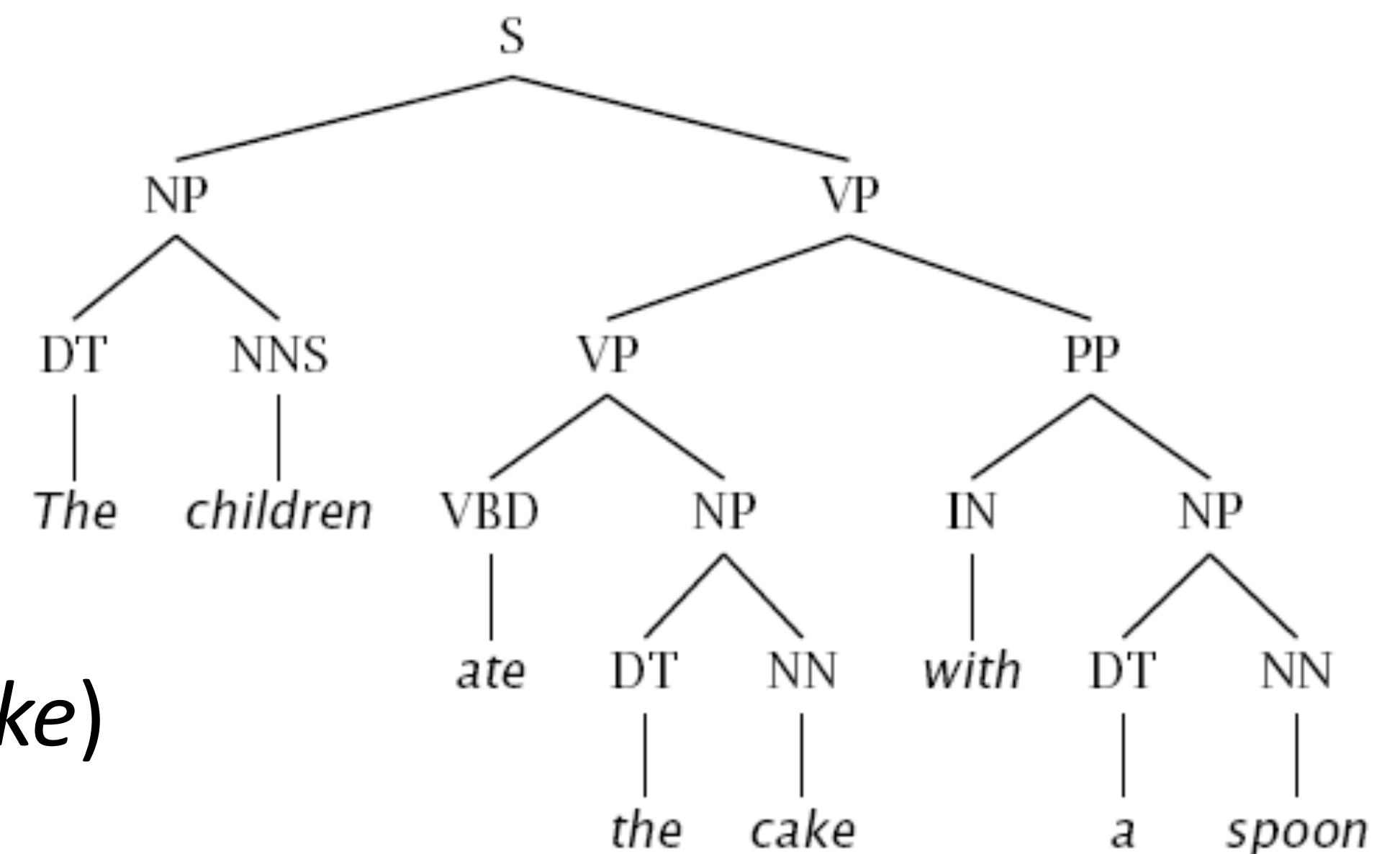▸ Coordination scope:

The man picked up his hammer and saw

compare: *The man picked up his hammer and swung*

Eisenstein textbook

Constituency

▸ How do we know what the constituents are?

▸ Constituency tests:

  ▸ Substitution by proform (pronoun, *do so*)

  ▸ Clefting (*It was with a spoon that...*)

  ▸ Answer ellipsis (What did they eat? *the cake*)
                                        (How? *with a spoon*)

▸ Sometimes constituency is not clear, e.g., coordination: *she went to and bought food at the store*