Where am I?

- HUL242: **Fundamentals of Language Sciences**
- **Syntax(Lecture-3)**
- Monday, March 24th

Review

- **Phrases** (NP, VP, PP), **not categories** (N, V, P) are used to make a sentence.

- **Phrase: a group of words that functions as a unit in syntax.**

1. Women walk.
2. The woman walks.
3. The woman with the telescope walks.
4. The smart woman from India with the telescope walks.

- In (1)-(4), the underline word(s) function(s) as a unit. They do the same function: **argument (subject) of the verb** 'walk'.

Today

- We will study major phrasal categories in English and develop phrase structure (PS) rules for them.

- We will learn to use them to do syntactic analysis (e.g., to draw phrase trees).

Zooming in on the NP

- What can occur in a noun phrase (NP) and in what place?
  1. Women
  2. The woman
  3. The woman with the telescope
  4. The woman from India with the telescope
  5. The smart woman from India with the telescope
  6. The smart friendly woman from India with the telescope
  - ..
- What do you observe?
  1. Noun (N)
  2. Determiner (D) and N
  3. D, N and prepositional phrase (PP)
  4. D, N, PP, and PP
  5. D, Adjective (Adj), N, PP, and PP
  6. D, Adj, Adj, N, PP, and PP

Starting the observation as a rule

- What do you observe?
  1. N
  2. D and N
  3. D, N and PP
  4. D, N, PP, and PP
  5. D, Adj, N, PP, and PP
  6. D, Adj, Adj, N, PP, and PP

- An NP can consist of a noun, then optionally a determiner, any number of adjectives, and optionally any number of PPs.

- Order among them is
  - D > Adj > N > PP

- The following rule captures our observation.
  - **NP → (D) (Adj+) N (PP+)** **(to be revised)**

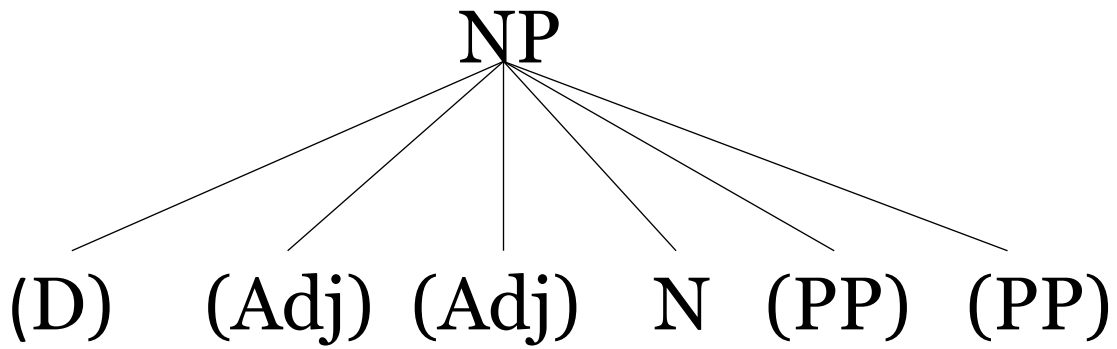
Starting the observation as a rule

- The following rule captures our observation
  - **NP → (D) (Adj+) N (PP+)**
- This representation is called a **phrase structure rule**
  - Read '→' as 'can consist of'
  - Treat everything in parentheses as optional
  - Read '+' as 'more than one'
- A noun phrase (NP) can consist of an optional determiner, optionally more than one adjective, obligatory noun and optionally more than one prepositional phrase (PP).

Primary tree: NP

- The NP corresponds to the following trees

$$NP \rightarrow (D)\ (AdjP+)\ N\ (PP+)$$



Zooming in on prepositional phrases

- What can occur in a PP and in what order?
- Some PPs we just saw
  - from India
  - with the telescope
  - on the mat
  - in crosswalk

- What is your observation/generalization? What can appear in PPs?
  - a PP can consist of a P, then an NP

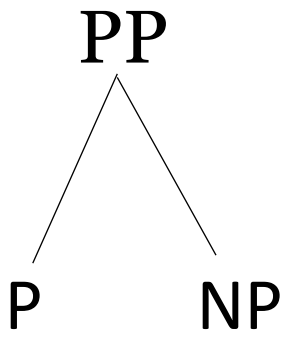
- Stating the observation as a rule
  - PP → P NP

(to be revised)

Primary tree: PP

- A PP can consist of a P, then an NP

  PP → P NP



Zooming in on Adjective phrases

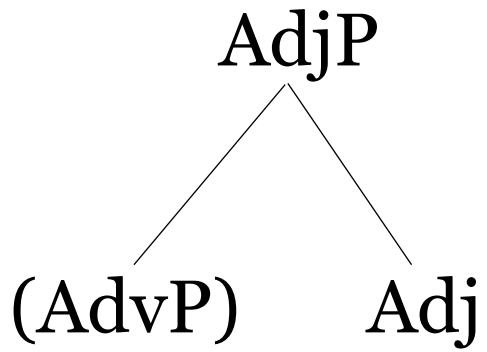
- The NP rule mentions Adjectives. They are form phrases. What's inside an AdjP?
  - Minimally, an Adj: *Yellow*, *friendly*, *intelligent*
    - AdjP → Adj
  - But can be complex: *very yellow*, *incredibly stupid*, . . .
    - AdjP → (AdvP) Adj

Note: 'very' in 'very yellow' is not an adjective but an adverb since it is modifying an adjective. So 'incredibly' in 'incredibly stupid'

Primary tree: AdjP

- An adjective phrase can have an adjective and optionally an adverb.

AdjP → (AdvP) Adj



Zooming in on Adverb Phrase

- **Adverbs** work the same way. They can either be
  - Simple: *quickly* or
  - Complex: *very quickly*

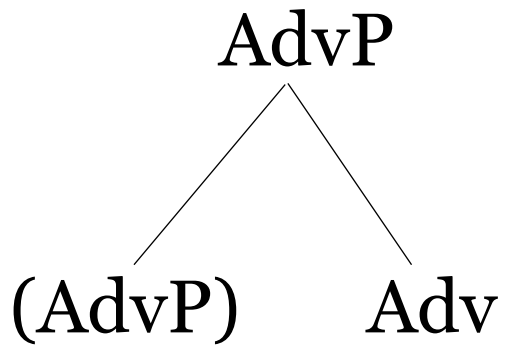
- This gives us the following rule for AdvP:

$$\text{AdvP} \rightarrow (\text{AdvP})\ \text{Adv}$$

Primary tree: AdvP

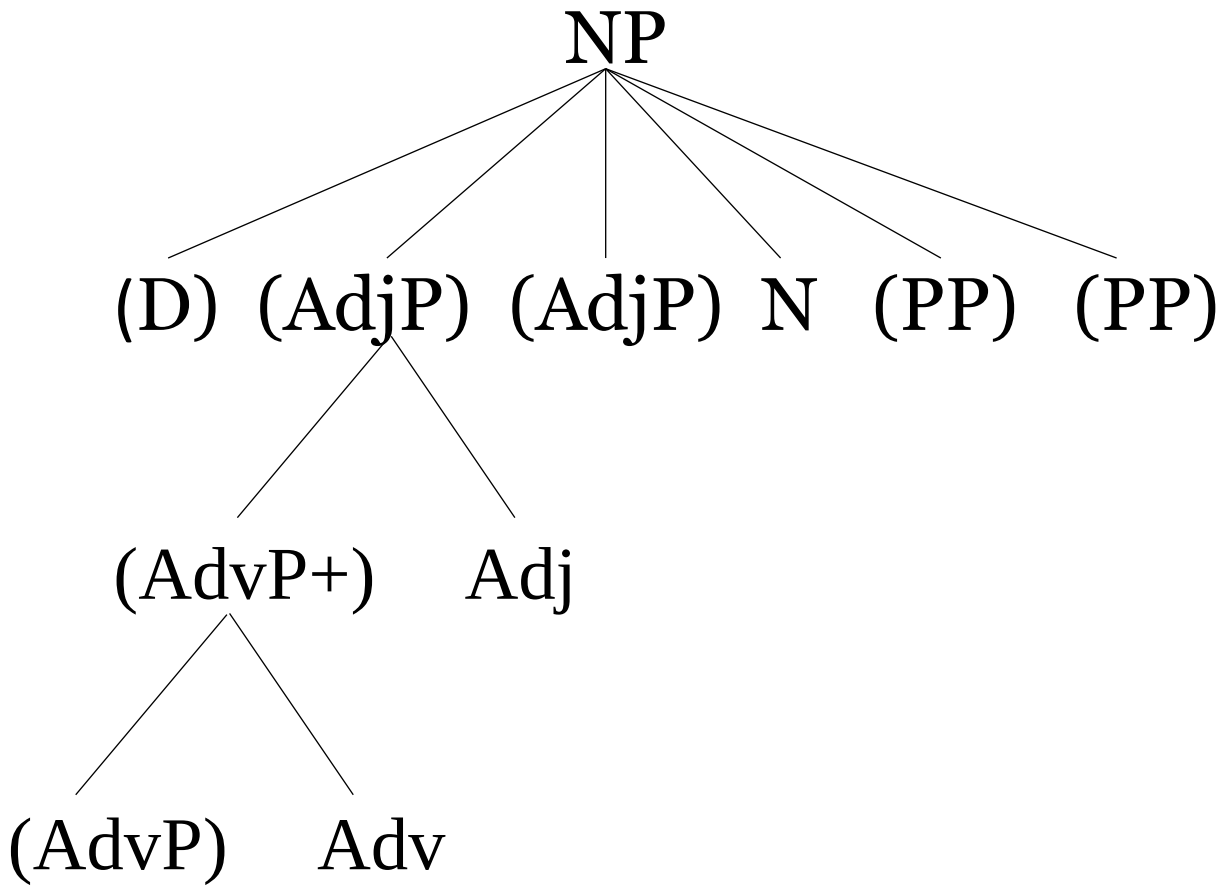
- An adverb phrase can have an adverb and optionally an adverb Phrase.

AdvP → (AdvP) Adv



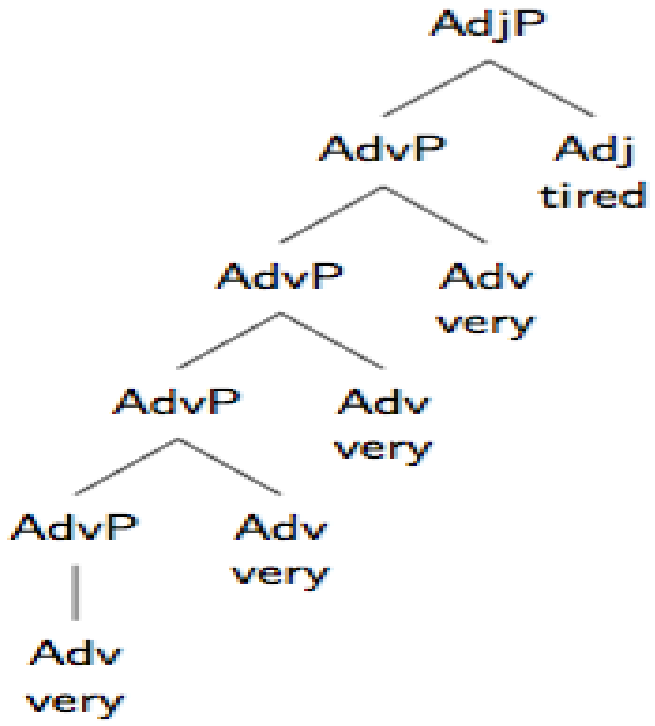
An NP with full-fledged AdjP

- Putting all things together



Recursion: Very very very very….

- Our simple rules for AdjP's and AdvP's generate big structures!



Recursion: A formal aspect

- A grammar is **recursive** if you can have an *X* inside of an *X* (here X is a variable that stands for a phrase)

- In 'very very very tired', we have AdvP that contains AdvPs.

AdvP → (AdvP) Adv

Recursion

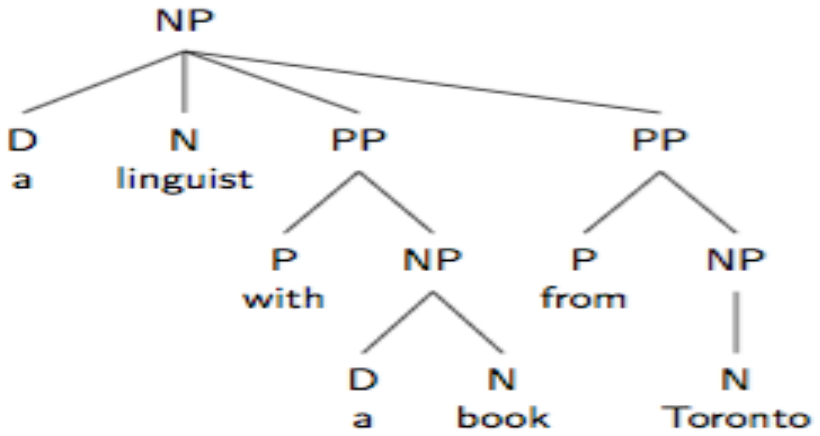
- Repeating our two phrase structure rules:
  - NP → (D) (AdjP+) N (PP+)
  - PP→ P NP
- What do you notice?
  - An NP can contain a PP, which will contain an NP, which can contain a PP, which ……
  - *The man in a house in the woods by the shed at the lake …*
- This is how we get **recursion** (a unique property of human language)!

Ambiguity: A formal aspect

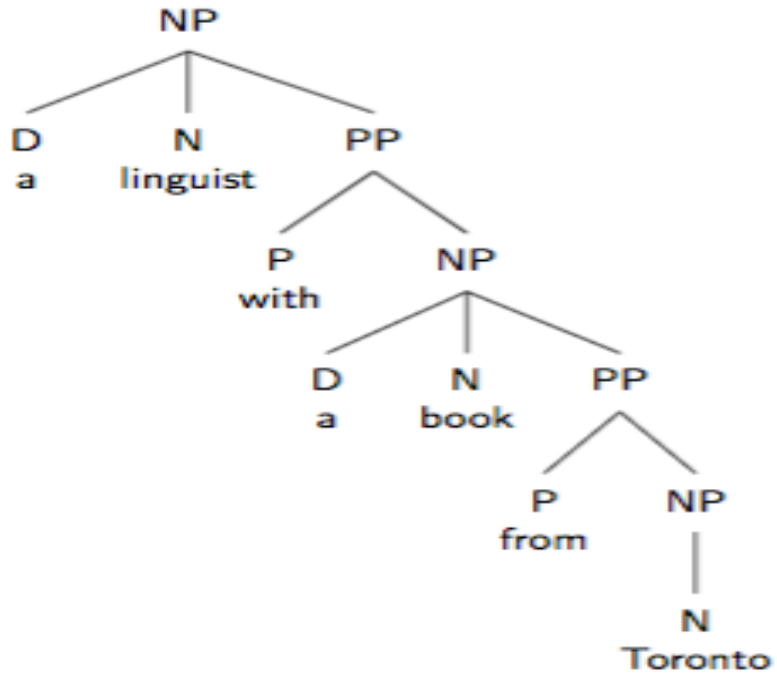
- A grammar is (syntactically) **ambiguous** if it generates multiple (syntactic) trees for a single string. Here's an ambiguous NP:

1. "A linguist with a book from Toronto"

(a) The linguist is from Toronto



(b) The book is from Toronto



Ambiguity

- Two PPs in the same NP may lead to ambiguity
  1. *The woman with the telescope from India*

     (a) The telescope is from India

     (b) The woman is from India
- Two ways to build (1) and our NP and PP rules can capture this
  - We could treat '*from India*' as part of the NP '*the telescope from India*', *meaning* (a)

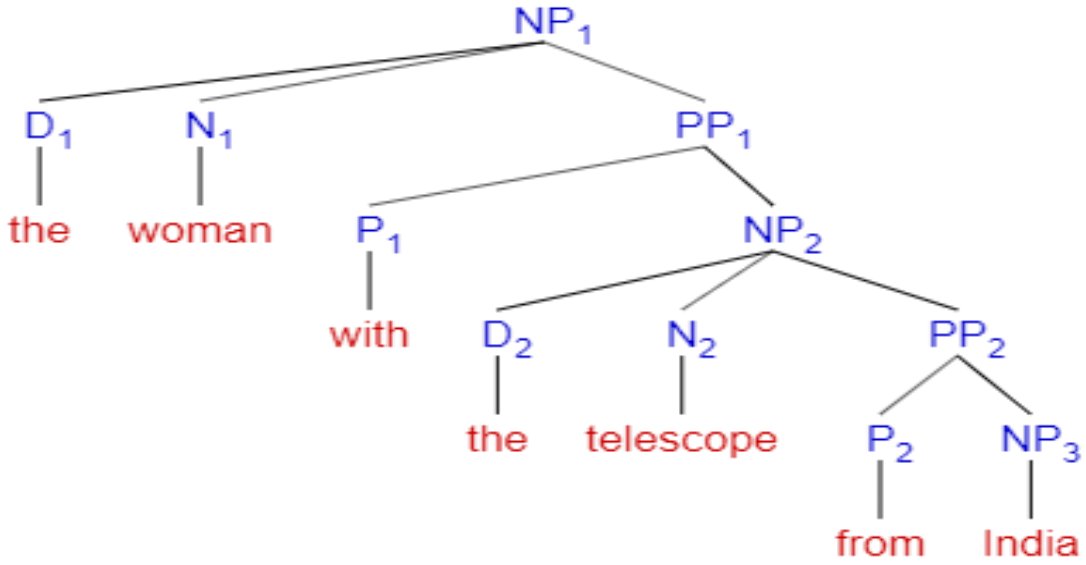
    NP → D N PP

    PP → P NP
  - We could treat '*from India*' as separate from '*the telescope*', and only part of the larger NP, meaning (b).

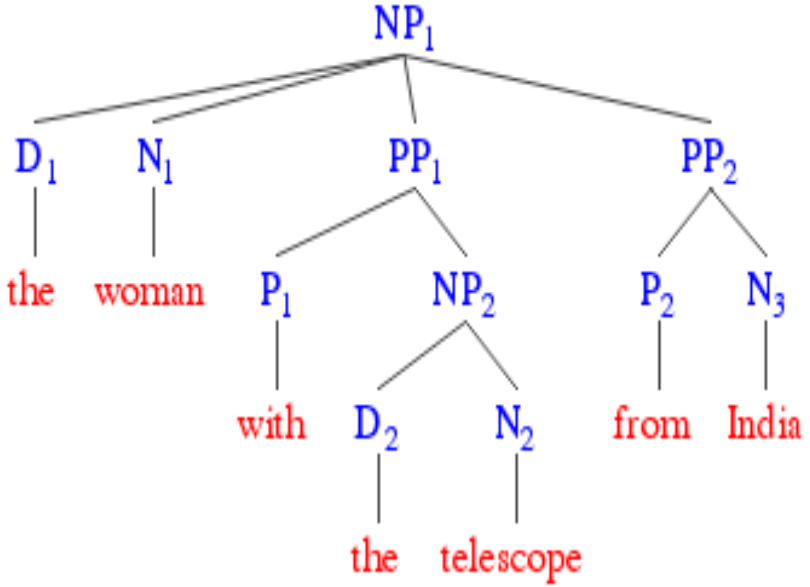
    NP → D N PP PP

    PP → P NP

Ambiguity



Tree-1



Tree-2

'from India' as part of '*the telescope from India'*

'from India' as a part of the larger NP

A note on Adjectives and Adverbs

1. A big yellow book
2. A very yellow book

- What is the difference between (1) and (2)
  - In (1), 'big' and 'yellow' both modify the noun 'book'. So, both are adjectives.
  - In (2), 'yellow' modifies the noun 'book'. So, 'yellow' is an adjective.
  - 'very', on the other hand, modifies the adjective 'yellow'. So, 'very' is an adverb.

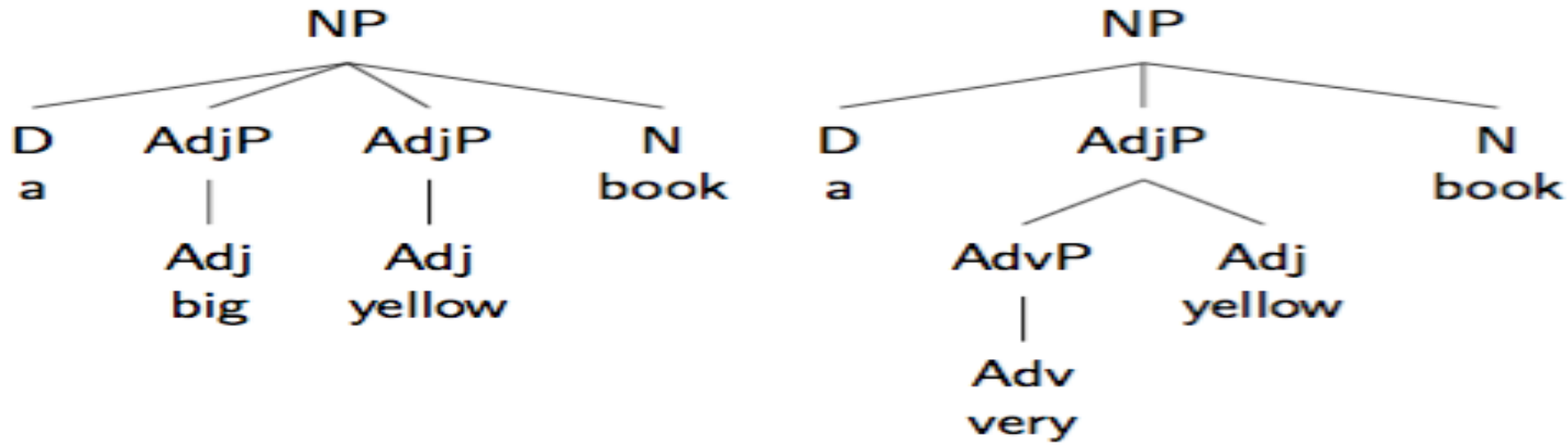
Note: Adjectives only modify nouns. Adverbs modify adjectives or verbs but never nouns.

- **Principle of Modification:** if *X* modifies *Y*, *X* and *Y* are **sisters** in a tree.

More on Adjectives and Adverbs

1. A big yellow book
2. a very yellow book

- Two different structures



- A tree like the left can't be generated for '*a very yellow book*'.
- A tree like the right can't be generated for '*a big yellow book*'.

Exploring the verb phrases (VPs)

- Verb phrases can just be a verb (Intransitive verb)
  - John [left].
  - Thus, VP → V
- Or a verb and an NP (transitive verb)
  - John [read the book].
  - Thus, VP → V NP
- Or a verb and two NPs. (ditransitive verb)
  - John [gave the boy a book].
  - Thus, VP → V NP NP
- A single rule that can capture all three sentences?
  - VP → V (NP) (NP)

A clausal argument inside VPs

- Some verbs take NP or a clause as an object
  1. I asked [NP the question].
  2. I asked [CP if you knew the answer].

$$VP \rightarrow V \{NP/CP\}$$

- The second argument of a verb can also be *clausal*
  3. John told [NP Mary] [NP a story].
  4. John told [NP Mary] [CP that he is a linguist].

$$VP \rightarrow V (\{NP/CP\}) (\{NP/CP\})$$

- This modifies our previous VP rule as:

$$VP \rightarrow V (\{NP/CP\}) (\{NP/CP\})$$

A clausal argument inside VPs

$$VP \rightarrow V\ (\{NP/CP\})\ (\{NP/CP\})$$

- A VP can consist of a V, optionally followed by NPs or something we call **CP**s (complementizer phrase).
  - We'll come back to CPs after we're finished with VP.

A PP argument inside VPs

- The second argument of a verb can also be a *PP*, as (2)

1. John gave [NP Mary] [NP a book].
   VP → V NP NP

2. John gave [NP a book] [PP to Mary].
   VP → V NP PP

- This modifies our previous VP rule as:

VP → V ({NP/CP}) ({NP/CP/**PP**})

Modifiers inside VPs

- VPs can also be *preceded by* any number of AdvPs:
  - Bill [often very very quickly ran].

    VP → (AdvP+) V

- And *followed* by any number of PPs and AdvPs:
  - I [bought the ice-cream at IIT happily for Rs.100 yesterday]

    VP → V NP PP AdvP PP AdvP

The full-fledged VP

VP → (AdvP+) V ({NP/CP}) ({NP/PP/CP}) (AdvP+) (PP+) (AdvP+)

Here's a sentence making use of (almost) all these pieces:

John frequently very happily told Mary that he majored in Linguistics loudly in the library yesterday.

Back to CPs

- ‘CP’ stands for ‘complementizer phrase’. It’s a sentence preceded by a *complementizer* (words like *that*, *whether*, *if*).
  - John told Mary **that** he’s a linguist .
  - What will you do **if** you miss the plane?
  - I will see **whether** she is at home.

- The C turns out to be optional in many cases:
  - John told Mary **(that)** he’s a linguist

- Thus, we have CP rule as follow

  CP → (C) S

Sentences: S or TP

- We looked at many English sentences. All consist of NP and VP
  1. [NP Cats] [VP meow]]
  2. [NP The man] [VP walked]]
  3. [NP John] [VP frequently very happily told Mary that he majored in Linguistics loudly in the library yesterday]]

- Thus, a sentence (S) consists of a noun phrase and a verb phrase. We often call S's another name TP which stands for 'tense phrase'.

  $S \rightarrow NP\ VP$

  $TP \rightarrow NP\ VP$

- You can use whichever label you like, but TP is more modern.

Sentences: S or TP

- A sentence can have a CP as the subject.

  1. *That Mary was coming surprised John*

     TP → {NP/CP} VP

- Sometimes **Tense** (such as modal- can/might/could etc. or auxiliary verbs-is/am/are/has/have/was/were/will/shall) can precede the main verb:

  1. Mary might come.
  2. Mary is eating a banana.
  3. Bill will read the book.
  4. Sue had read the book.

- Summarizing these points, our final TP rule:

  TP → {NP/CP} (T) VP

Summing up: Phrase structure rules developed today for English

1. CP → (C) TP
2. TP → {NP/CP} (T) VP
3. NP → (D) (AdjP+) N (PP+)
4. PP → P NP
5. AdjP → (AdvP) Adj
6. AdvP → (AdvP) Adv
7. VP → (AdvP+) V ({NP/CP}) ({NP/CP/PP}) (AdvP+) (PP+) (AdvP+)

(To be revised in the next class)

Next class

- More on phrase structure (PS) rules
- How to build trees for sentences
- Reading: **Carnie, Ch. 3 section:2-3**