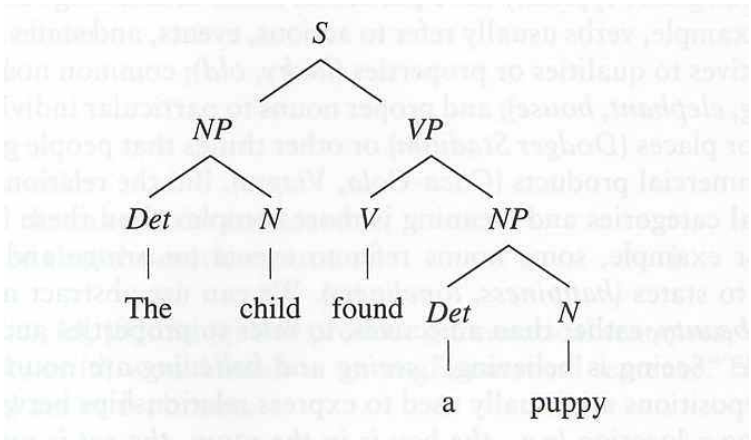
If you do not live by priorities, you live by pressure.

Int.Eng.Lin Syntax (2) (89-108) Rhee

1. Phrase Structure Trees and Rules

- All categories are named in a tree.
- Entire sentences belong to S.



Tree diagram w/ syntactic category information
= phrase structure tree (= PS tree)
= constituent structure tree

>> shows that a sentence is a linear string of words and a hierarchical structure with phrases nested in phrases.
>> is an explicit graphic representations of a speaker's knowledge of the structure of the sentence of his/her language.

※ PS trees represent 3 aspects of speaker's syntactic knowledge:
(i) the linear order of the words in the sentence
(ii) the identification of the syntactic categories of words and groups of words
(iii) the hierarchical structure of the syntactic categories

[node]: point in a PS tree
[dominate]: Every higher node dominates all the categories beneath it.
[immediately dominate]: A node immediately dominates the categories one level below it.
[sister]: categories that are immediately dominated by the same node
[PS rules]: formal device to represent information in a PS tree

[PS rules]

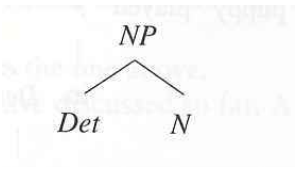
1. S → NP VP
2. NP → Det N
3. VP → V NP

Rule 2 conveys:

(i) A noun phrase can contain a determiner followed by a noun in that order.

(ii) A determiner followed by a noun is a noun phrase.

NP → Det N



S → NP VP

VP → V NP

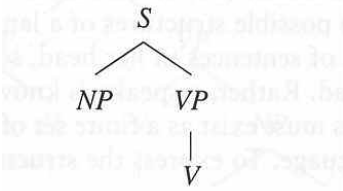
- VPs may not contain an NP object.

The woman laughed.

The man danced.

The horse galloped.

VP → V



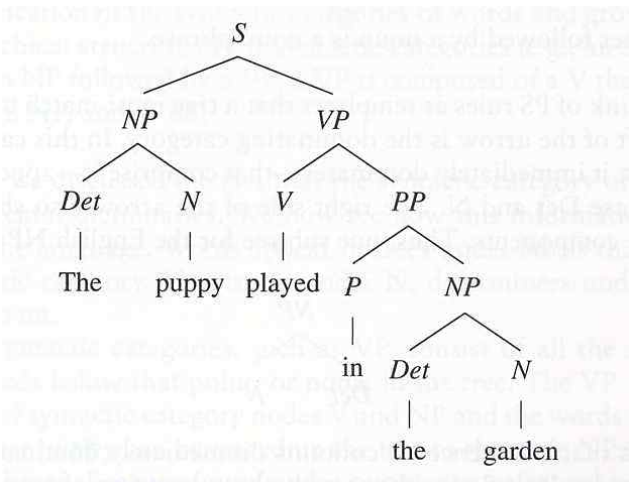
- VPs may contain prepositional phrases following the verb.

The puppy played in the garden.

The boat sailed up the river.

A girl laughed at the monkey.

The sheepdog rolled in the mud.



VP → V PP

PP → P NP

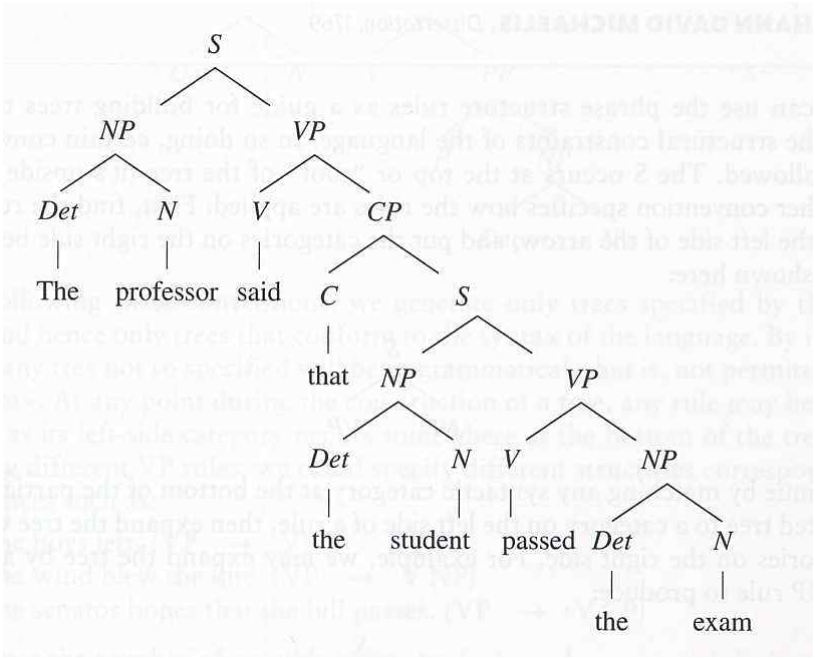
- VPs may contain (= embed) a sentence.

The professor said that the student passed the exam.

that = complementizer (C)

VP → V CP

CP → C S



[complementizer]

that, whether, if...

I don't know whether I should talk about this.

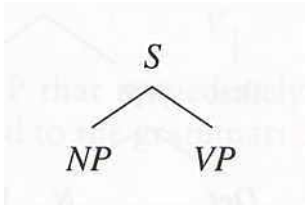
The teacher asked if the students understood the syntax lesson.

[PS rules so far (more to come)]

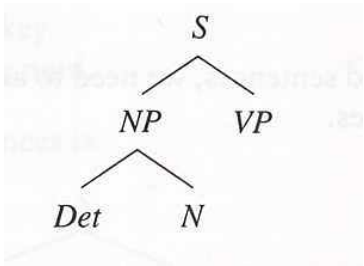
1. S → NP VP
2. NP → Det N
3. VP → V NP
4. VP → V
5. VP → V PP
6. PP → P NP
7. VP → V CP
8. CP → C S

2. Some Conventions for Building Phrase Structure Trees

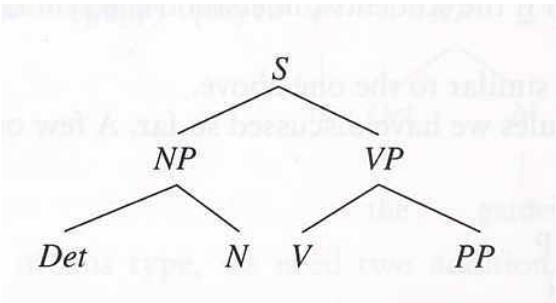
1. Begin with S using PS rules.



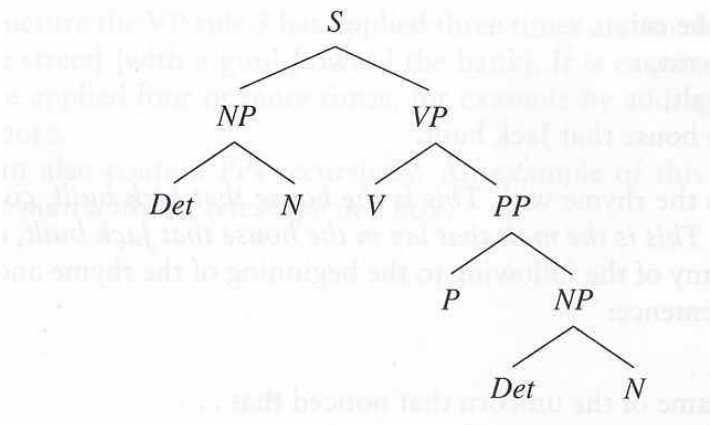
2. Continue with the left side uncompleted category.



3. Continue with the remaining uncompleted category.



4. Continue...



- We may use different PS rules making reference to the sentence being represented.

The boys left. (VP → V)

The wind blew the kite. (VP → V NP)

The senator hopes that the bill passes. (VP → V CP)

3. The Infinity of Language: Recursive Rules

So, naturalists observe, a flea
Hath smaller fleas that on him prey;
And these have smaller still to bite 'em,
And so proceed ad infinitum. (Jonathan Swift)

Human speakers can produce and understand infinite number of sentences.

(1)a. *The kindhearted boy had many girlfriends.*
b. *The kindhearted, intelligent boy had many girlfriends.*
c. *The kindhearted, intelligent, handsome boy had many girlfriends.*

(2)a. *John found a book in the library.*
b. *John found a book in the library in the stacks.*
c. *John found a book in the library in the stacks on the fourth floor.*

(3)a. *The cat chased the mouse.*
b. *The cat chased the mouse that ate the cheese.*
c. *The cat chased the mouse that ate the cheese that came from the cow.*
d. *The cat chased the mouse that ate the cheese that came from the cow that grazed in the field.*

• e.g. *The House that Jack Built*

This is the farmer sowing the corn,
that kept the cock that crowed in the morn,
that waked the priest all shaven and shorn,
that married the man all tattered and torn,
that kissed the maiden all forlorn,
that milked the cow with the crumpled horn,
that tossed the dog,
that worried the cat,
that killed the rat,
that ate the malt,
that lay in the house that Jack built.

• e.g. Addition of:

I think that...
...that...
...which...
I wonder if...
Do you know whether...

• e.g. *The girl walked [down the street] [over the hill] [through the woods]...*

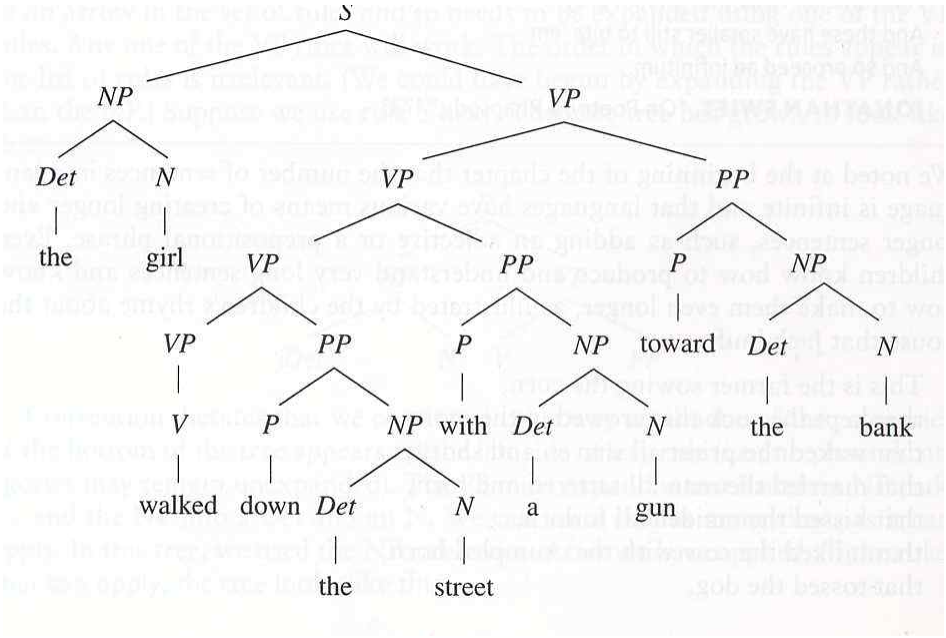
>> Problem: Rule 5. [VP → V PP] allows for only one PP.

>> How can we solve this?

[Infinity in the Rule: Recursivity]

• PS-Rule: VP → VP PP ☜ recursive rule

"The girl walked [down the street] [with a gun] [toward the bank]."

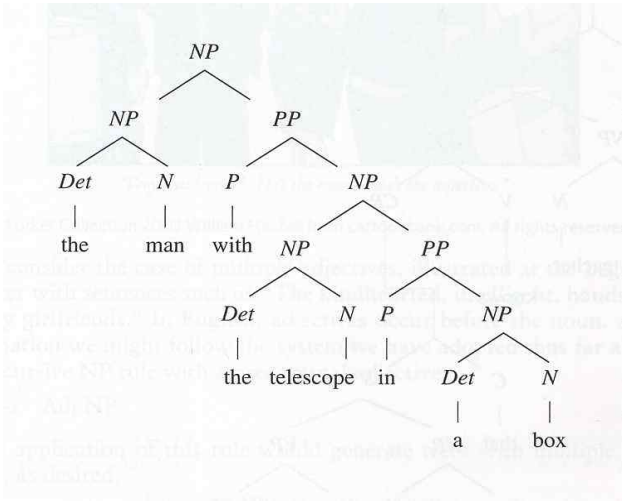


Another problem: NPs may contain multiple PPs.

>> Solution: Another recursive rule!

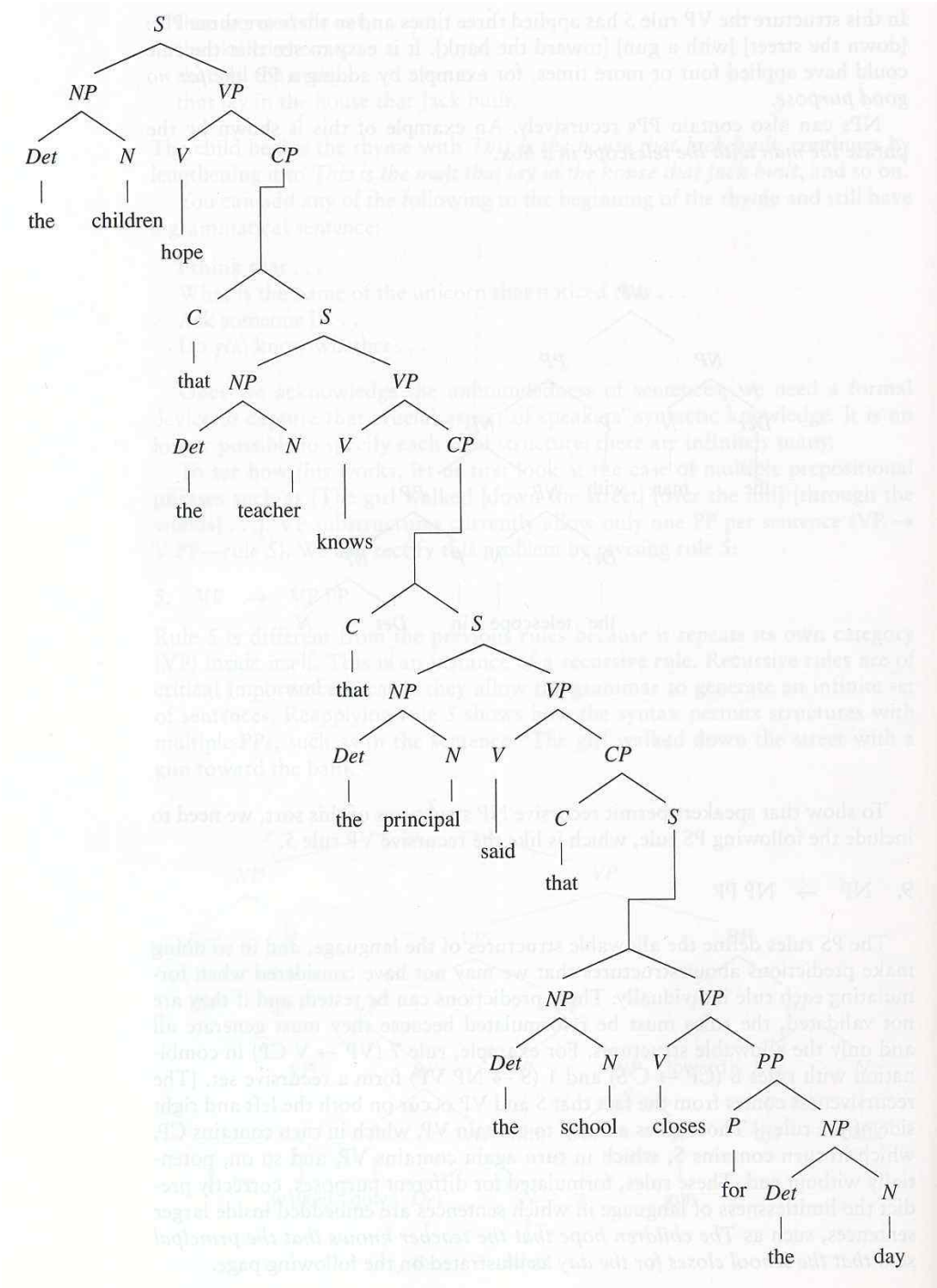
• NP → NP PP

"the man with the telescope in a box"



• VP → V CP
  CP → C S
  S → NP VP

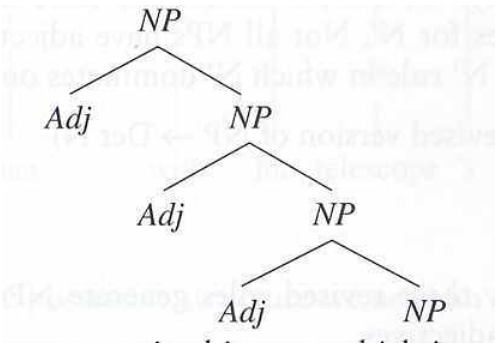
"The children hope that the teacher knows that the principal said that the school closes for the day."



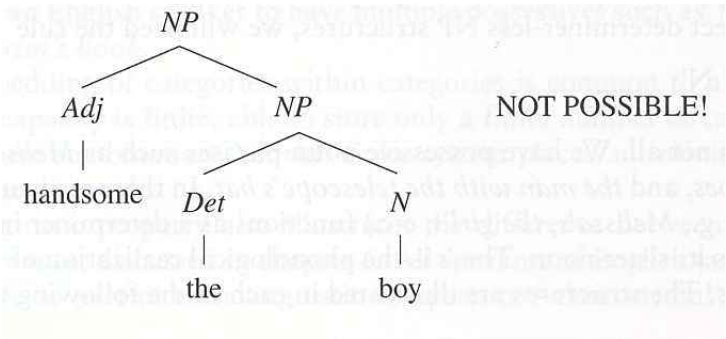
Another Problem: NPs can have multiple adjectives.

>> Solution: Recursive NP rule:

• NP → Adj NP



A big problem: an impossible tree



Why?

Adjectives and determiners are both modifiers of a noun, <u>but they have a different status!</u>

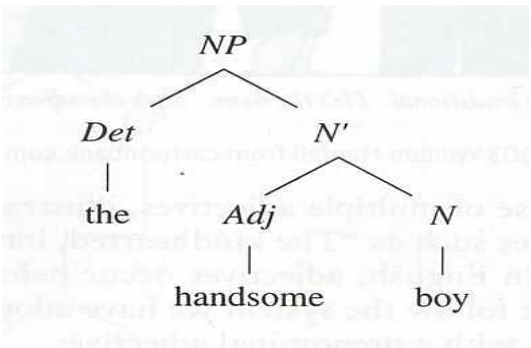
How?

Make different levels!

• Levels of Phrases

N-bar (=N')

"the handsome boy"

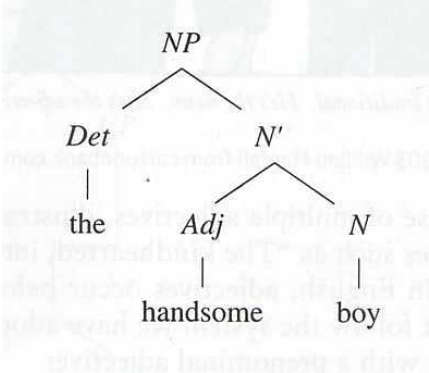


• Revised PS-Rules

NP → Det N'

N' → Adj N'

N' → N



• NP with no Det

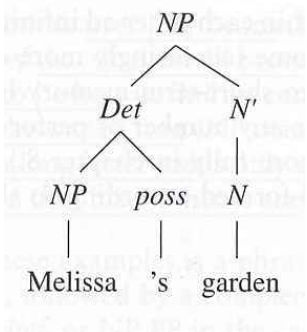
NP → N'

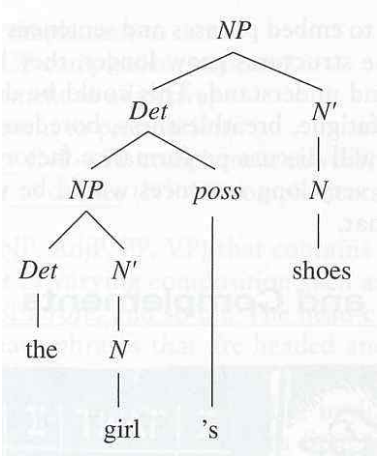
• NP with possessives

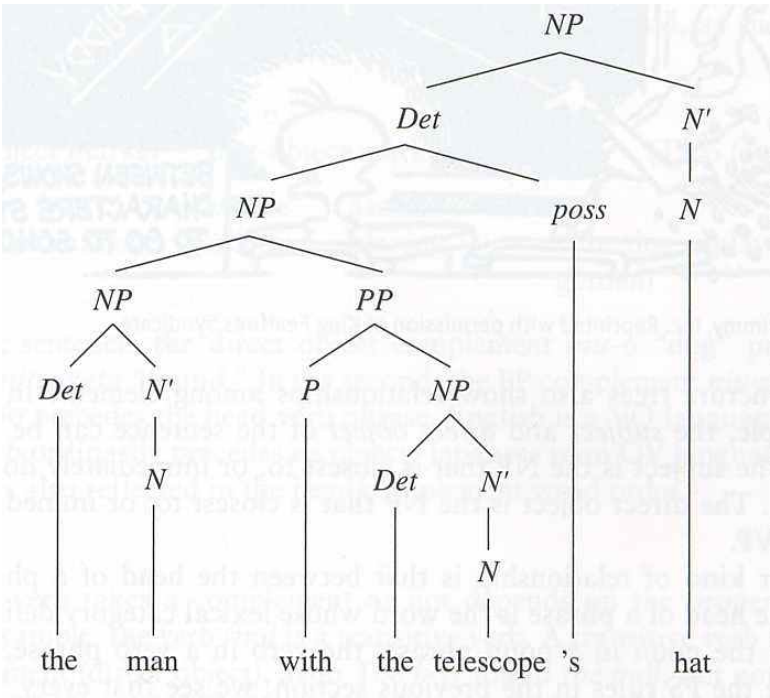
NP → NP's N'

Det → NP poss

e.g. "Melissa's garden", "the girl's shoes", "the man with the telescope's hat"







Det → NP poss

NP → Det N' >> Recursive (cf. the student's friend's cousin's book)

4. Heads and Complements

Sentential elements can be structurally defined, with reference to PS trees.
"subject": the NP closest to, or immediately dominated by, the root S.
"direct object": the NP closest to, or immediately dominated by, VP

"head" of a phrase: the word whose lexical category defines the type of the phrase
egs. N of NP; V of VP; P of PP...
"complement" of a phrase: sister of head; completes the meaning of the phrase

eg. VP: find a puppy
head: find (V)
complement: a puppy (NP)

eg. I thought that the child found the puppy.
head: thought (V)
complement: that the child found the puppy (CP)

eg. The death of Lincoln shocked the nation.
head: death (N)
complement: of Lincoln (PP)

egs.	an argument over jelly beans	(PP complement to noun)
	his belief that justice will prevail	(CP complement to noun)
	happy to be here	(infinitive complement to adjective)
	about the war in Iraq	(NP complement to preposition)
	wrote a long letter to his only sister	(NP-PP complement to verb)
	tell John that his mother is coming to dinner	(NP-CP complement to verb)

4.1 Selection

- Whether a verb takes a complement or not depends on the properties of the verb.
  eg. A transitive verb requires an NP complement.
  The boy found the ball.
  *The boy found.
  *The boy found in the house.

  eg. Some verbs are optionally transitive.
  John ate.
  John ate a sandwich.

- Verbs select different kinds of complements.
  eg. Some verbs take NP and PP complement.
  Sam put the milk in the refrigerator.
  *Sam put the milk.
  Robert gave the film to his client.

*Robert gave to his client.

eg. Intransitive verbs cannot take an NP complement.
Michael slept.
*Michael slept a fish.

eg. Some verbs select a sentence complement.
I think that Sam won the race.

eg. Some verbs select an NP and a sentence complement.
I told Sam that Michael was on his bicycle.

eg. Some verbs select either AdjP or a sentence complement.
Paul felt strong as an ox.
He feels that he can win.

- Sentences as complements often follow a complementizer that.
eg. I think that he is cute.
I think he is cute.

- Some nouns select a PP or a CP complement.
eg. the belief in freedom of speech
the belief that freedom of speech is a basic right

- Some nouns select a PP, but not a CP, complement.
eg. their sympathy for the victims
*their sympathy that the victims are so poor

- Some adjectives select a PP complement.
egs. tired of stale sandwiches
proud of her children

※ With noun selection, the complement is often optional.
egs. He respected their belief.
We appreciated their sympathy.
Elimelech was tired.
All the mothers were proud. (understood from context)

※ With verb selection, the complement is often not optional.
*He put the milk.
*She gave the money.

[C-selection; Subcategorization]

"C-selection" "subcategorization": the information about the complement types selected by lexical items.

[S-selection]

"S-selection": the information about the meaning of the subjects and complements of a verb

egs. "murder": the subject and the object are human
"drink": the subject is animate and the object is liquid
"like": the subject is animate

egs. !The rock murdered the man.
!The beer drank the student.
!The tree liked the boy.
!Colorless green ideas sleep furiously.

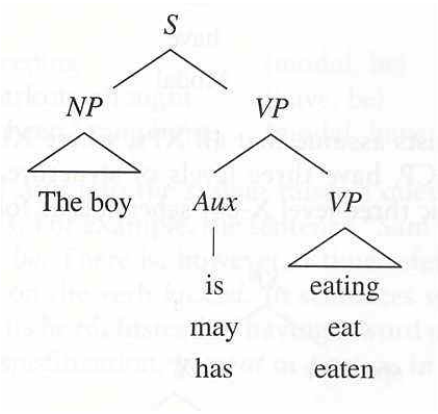
※ The well-formedness of a phrase depends on:
(i) whether it conforms to the structural constraints of the language expressed in the PS rules
(ii) whether it obeys the selectional requirements of the head, both C-selection and S-selection

4.2 What Heads the Sentence

Does a sentence have a head?

Sam will kick the soccer ball.
Sam has kicked the soccer ball.
Sam is kicking the soccer ball.
Sam may kick the soccer ball.

Aux: *will, has, is, may, might, could, would, can...*



Aux:

Auxiliary verbs specify a time frame for the event/state described by the verb.
Modals specify possibility, certainty, ... of the event/state described by the verb.

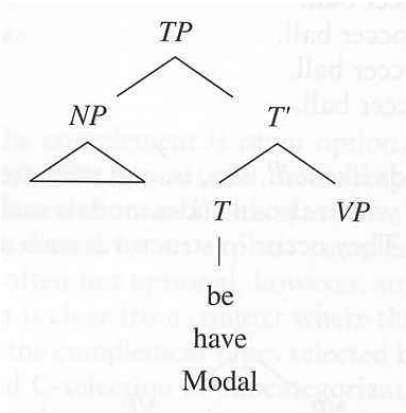
※ A sentence is about a situation or state of affairs that occurs at some point in time.

[Complement of Aux]

egs. Aux *be* selects the progressive form of the verb (*be dancing*)
Aux *have* selects the past participle form of the verb (*has eaten*)
Aux modal selects the infinitival form of the verb (*must sleep*)

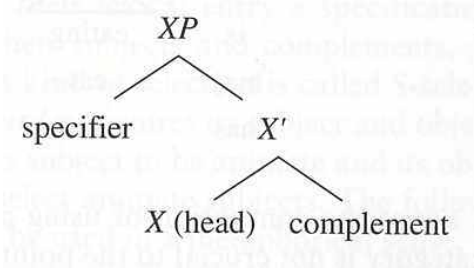
[Some Variations]

※ Some scholars use T and TP (instead of Aux and S).



[All three levels for XP]

※ Many linguists assume a three level structure.



Level 1: XP
Level 2: specifier + X'
Level 3: head + complement

[spec]: a modifier; often optional

eg. spec of NP: determiner (*a, the...*)
spec of VP: adverb (*never, often...*)
spec of AdjP: degree adverb (*very, quite...*)

※ X-bar structure is thought to be universal.

[Back to the Current Approach]

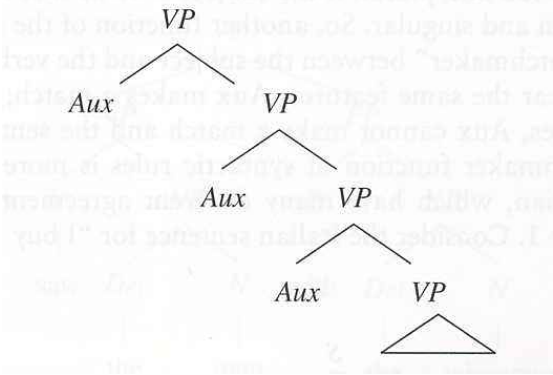
VP → Aux VP (recursive)

- English allows multiple-Aux sentences.

  egs: The child may be sleeping.

  The dog has been barking all night.

  The bird must have been flying home.



[Problem]

What about a sentence without a modal?

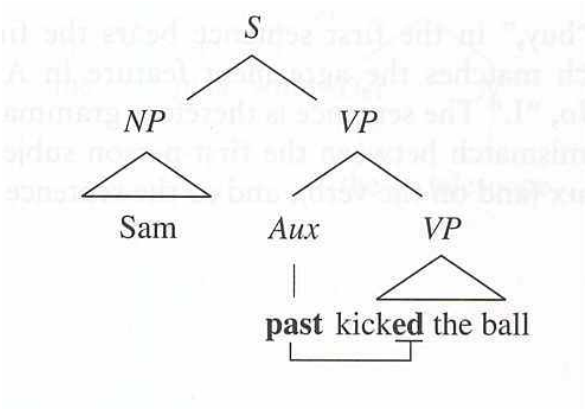
eg. Sam kicked the soccer ball.

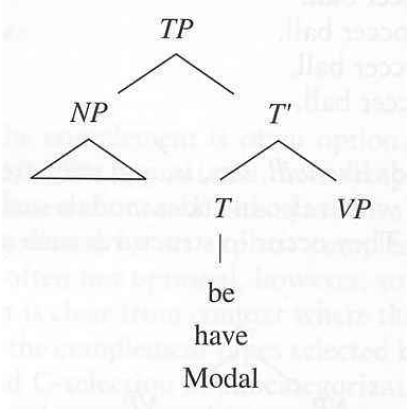
>> Solution!

Past tense has the time-reference function.

The sentences without auxiliaries: the **tense** of the sentence is its head.

The verb inflection must match the tense in Aux.





Aux also specifies the agreement features of the subject.

Subject	Aux info
we	1st, Plural
he	3rd, Singular

Aux also does a "match-making" job for the subject and the verb.