

# INTD0112 Introduction to Linguistics

Lecture #14  
Oct 26<sup>th</sup>, 2009

## Announcements

- I activated the link to the LAP guideline questions online. This will help you as write your LAP report.
- The other day there was this story on the main page of Yahoo!:
- <http://answers.yahoo.com/question/index?qid=20090929153251AAYjuZV>

## Today's puzzle

- *Bob hit the elf on the table with the hat.*
- How many meanings can you get out of this sentence?

## Summary of last class

- Syntax is the study of sentence structure.
- They key notion to understanding sentence structure in human language is "**constituency**."
- Constituency of a string of words can be determined by objective diagnostics: **substitution** test, **movement** test, and **clefting**.

## Phrase structure: Heads and complements

- Once we determine that a string of words is a constituent, the next step is to determine its syntactic type, or category.
- For this we make a distinction between a **head** and a **complement**.
- The head is the central word in a string, the one that requires other elements to be there.
- The complement is the part of the string that is there because of the head (if needed).
- The head and the complement together form what we call a **phrase**, and the syntactic category of the phrase is that of the head.

## Phrase structure: Heads and complements

- Remember from our discussion of morphology that there are four major **lexical categories** in human language (well, prepositions are iffy, but let's assume they are lexical for now):  
Noun (**N**),  
Verb (**V**),  
Adjective (**A**), and  
Preposition (**P**).
- As we should expect, each one of these categories can be the head of a phrase.

## Phrase structure: Heads and complements

- So,
  - “picture of the boys” is a *noun phrase (NP)*, since the head of the string is the N “picture”.
  - “ate the sandwich”, by contrast, is a *verb phrase (VP)*, since the head of the string is the V “ate”.
  - “in the office” is a *prepositional phrase (PP)*, since the head of the string is the P “in”.
  - “fond of chocolate” is an *adjectival phrase (AP)*, since the head of the string is the A “fond”.

## Phrase structure rules

- We express this head-complement relationship by means of rewriting rules, which we call **phrase structure rules**, as in the following examples:
  - NP → N PP
  - VP → V NP
  - PP → P NP
  - AP → A PP

## Subcategorization

- Notice that heads differ as to whether they need complements and how many they take. Technically, we say they have different **subcategorization** properties.
- For example, transitive verbs require complements, but intransitive verbs do not:
  - John slept.
  - \*John slept the dog.
  - John bought a new car.
  - \*John bought.
- Remember the *eat-devour* puzzle?

## Subcategorization

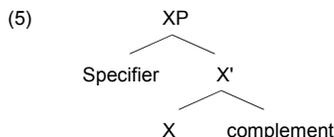
- Furthermore, transitive verbs differ in whether they subcategorize for an NP complement like “buy” above, or a PP complement as “talk”:
  - I talked [<sub>PP</sub> to his boss].
- Some transitive verbs even require two complements, such as “give” and “put”:
  - She gave [<sub>NP</sub> me] [<sub>NP</sub> money].
  - Alice put [<sub>NP</sub> the car] [<sub>PP</sub> in the garage].

## Phrase structure: Specifiers

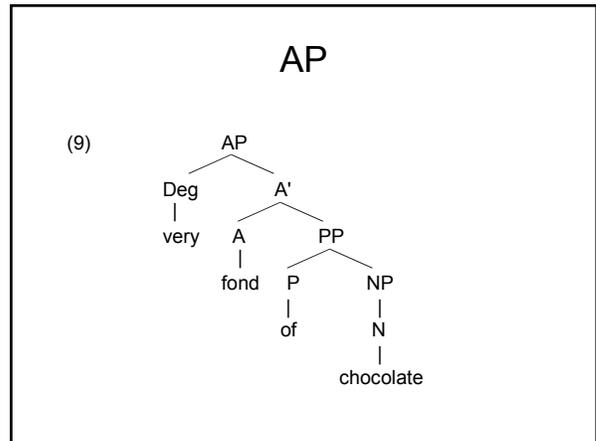
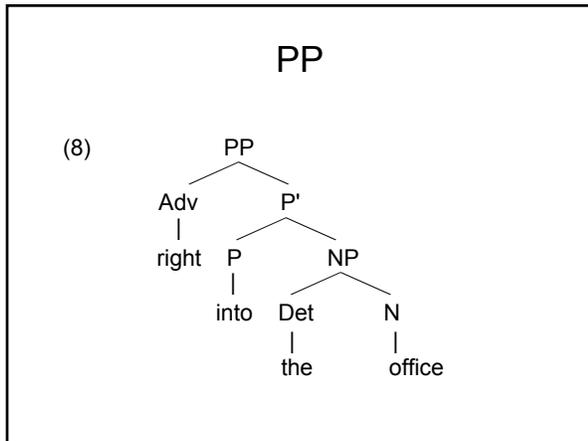
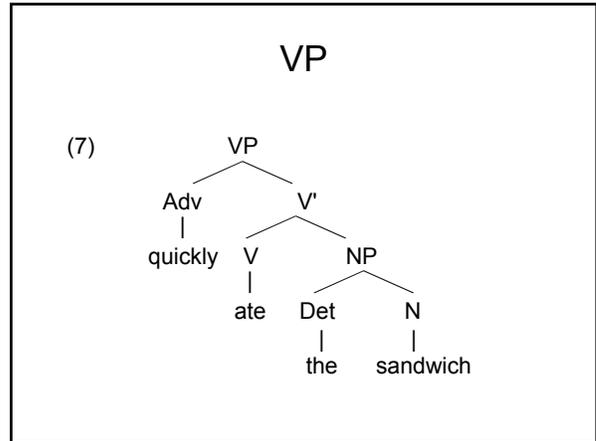
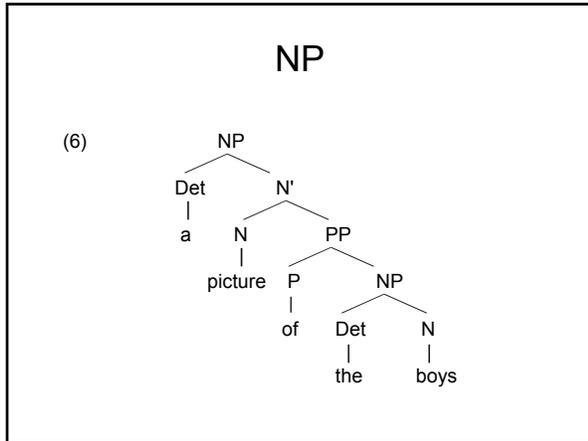
- Notice finally that while complements may be obligatory (depending on the subcategorization properties of the head), a head may also have nonobligatory “satellite” elements, called **specifiers**, e.g.,
  - an **adverb** (Adv) of a V: *sometimes rented a car*.
  - a **determiner** (Det) of an N: *the linguist*
  - a **degree** (Deg) word of an A or a P: *very nice/straight into the room*

## X'-schema for phrase structure

- To generalize, using X as a variable ranging over all heads, every phrase has the internal structure below:

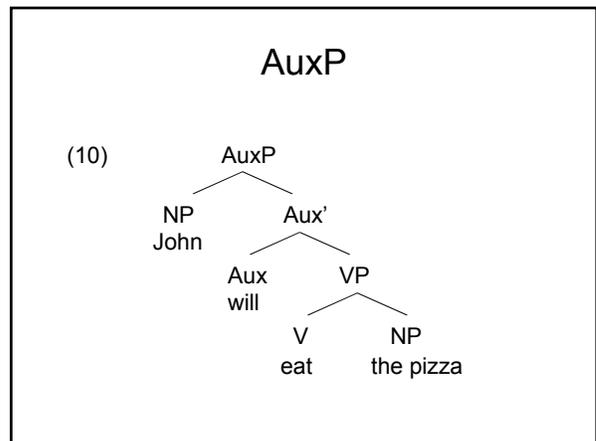


- **(Note:** The intermediate level between X and XP is pronounced X-bar.)
- We can then apply this X'-schema to all heads.



**So, what's the head of a sentence?**

- Consider now sentences such as  
John will eat the pizza.
- Since we know that "John" is a constituent, it must be that "will eat the pizza" is also a constituent. But what kind of constituent is it?
- Let's assume that the head here is the modal verb "will," whose complement is the VP "eat the pizza", and whose specifier is the subject "John", and that the whole string is an **Auxiliary Phrase (AuxP)**, as shown in the following tree diagram:

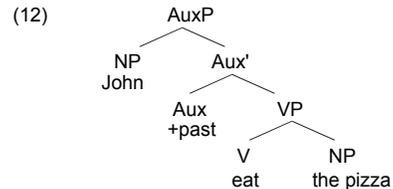


## AuxP

- But now consider this sentence:  
(11) John ate the pizza.
- Since the subject "John" is still present, we have to assume that there is some "Aux" element in the sentence, since subjects are specifiers of Aux. But it does not look like there is a modal verb there.
- Linguists assume that the tense morpheme is actually a form of Aux (or that Aux is a form of tense, but this is a labeling issue).

## AuxP

- The structure of "John ate the pizza" will look like that, then:



- Question: How does "eat" and "past" become the word "ate"?

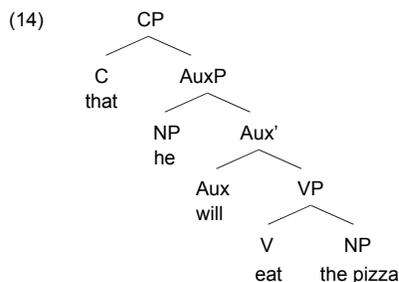
## One more category

- Consider the *complement* (also called *embedded clause*) of the verb "says" in  
(13) John says [that he will eat the pizza].
- Now, the embedded clause looks identical to the AuxP in tree #10, except that it has an extra element: the so-called **complementizer** *that*, which is said to carry the *illocutionary force* of the clause, i.e., it marks the clause as either declarative, interrogative, etc.

## CP

- Using the same X'-schema, this must be a head-complement relation (though no specifier is available here, but remember that specifiers are optional).
- Let's assume then that a complementizer (abbreviated **C**) also heads a phrase, and that its complement is AuxP, as shown on the next slide:

## CP (embedded)

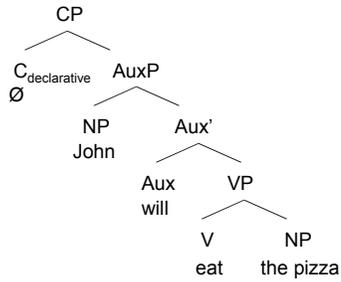


## CP

- But if C determines the illocutionary force of a clause, then it must also be present in matrix (i.e., non-embedded) clauses, though not pronounced.
- In other words, the structure of "John will eat the pizza" is actually as on the next slide, with a null C heading the sentence and indicating that this is a declarative sentence:

## CP (main)

(15)



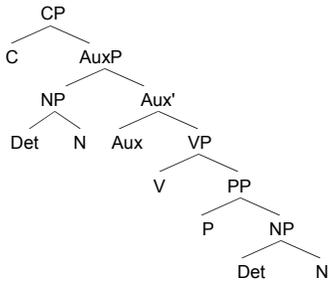
## A mini-grammar for English: Phrase structure rules

- So putting all of this together, here's a mini-grammar for English phrase structure, where brackets (or parentheses, depending on your dialect) indicate optionality: (**Note:** This is by no means an exhaustive list.)

(16)

CP → C AuxP  
 AuxP → NP Aux'  
 Aux' → Aux VP  
 VP → V (NP) (PP)  
 VP → V (CP)  
 VP → V AP  
 NP → (Det) N (PP)  
 PP → (Deg) P NP  
 AP → (Deg) A (PP)

## Structural tree of an English sentence



## A mini-grammar for English: Lexical rules

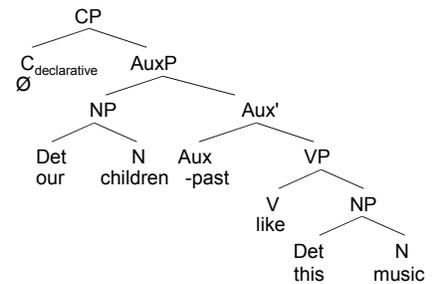
- A grammar must also include a set of rules that insert words from the lexicon under "terminal" nodes in the tree, e.g.,

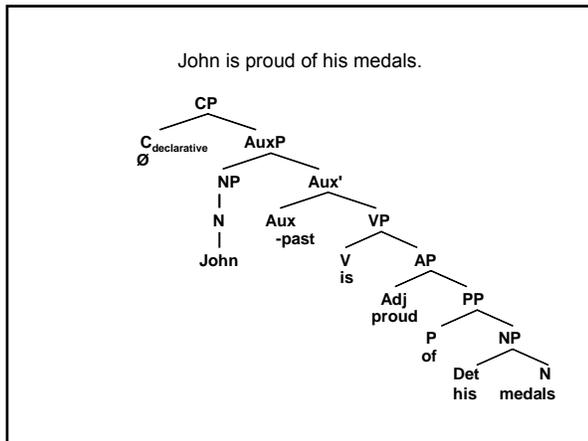
N → {man, dog, justice, ...}  
 V → {love, hit, leave, ...}  
 Aux → {will, must, Past, ...}  
 Det → {the, a, an, his, some, ...}  
 etc.

- As you should expect, these are called *lexical insertion* rules.

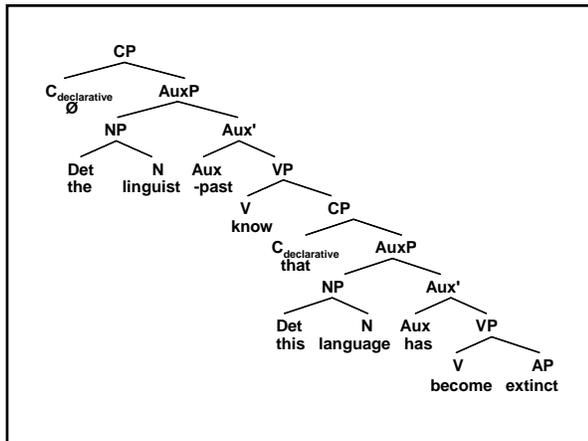
Time for some tree-drawing fun.  
Let's draw trees for some sentences.

Our children like this music.





*The linguist knows that this language has become extinct.*



### What do trees tell us?

- Tree diagrams show three aspects of speakers' syntactic knowledge:
  - a. the **linear order** of the words in the sentence,
  - b. the **groupings** of words into particular syntactic constituents (e.g. NP, VP, etc.), and
  - c. the **hierarchical structure** of these constituents (that is, the fact that constituents contain constituents inside them, which in turn contain other constituents, and so on and so forth).

### Aspects of syntactic knowledge revisited

- Remember that our mental grammar provides us with certain aspects of syntactic knowledge:
  - a. the ability to formulate grammaticality judgments,
  - b. the ability to produce and understand an infinite number of sentences,
  - c. the ability to recognize cases of ambiguity, and
  - d. the ability to relate sentences to each other.
- For our theory of grammar to be adequate, it has to account for all these aspects of grammatical knowledge. Let's see if it does.

### Grammaticality revisited

- We have already seen that our grammar can *generate* grammatical sentences. Now we also need to make sure that it does NOT generate ungrammatical sentences, such as the one below:
 

*\*Boy the ball kicked the.*
- How does a phrase structure grammar rule out such bad sentences?

## Grammaticality revisited

- Obviously, if we try to draw a tree for this ungrammatical sentence, we'll fail, simply because after using the first two PSRs for CP and AuxP, we're stuck: there's no NP rule in English that can expand like any of these two:  
NP → N Det  
NP → N Det N
- And there's no VP rule that expands with a V followed by just a Det:  
VP → V Det
- Our grammar thus succeeds to rule out nonsense structures such as the one above, as desired.

## Recursiveness revisited

- Can we account for the fact that a sentence, in principle, can be infinitely long?
  - The linguist knows that this language has become extinct.*
  - The biologist believes that the linguist knows that this language has become extinct.*
  - The neuroscientist claims that the biologist believes that the linguist knows that this language has become extinct.*
  - etc.*

## Recursiveness revisited

- How can a phrase structure grammar account for the recursive property of sentence structure in human language?
- Because rules can feed each other in a circular fashion. In this particular example, the rule expanding a CP contains a VP, and the rule expanding a VP contains a CP, which in turn contains a VP, which in turn contains a CP, and so and so forth *ad infinitum*.

## Ambiguity revisited

- The following sentence is two-way ambiguous:  
*Anne hit the man with an umbrella.*
- Can our phrase structure grammar account for that fact?
- Well, let's look at the mini-grammar we constructed so far for English, and see if we can find an answer.

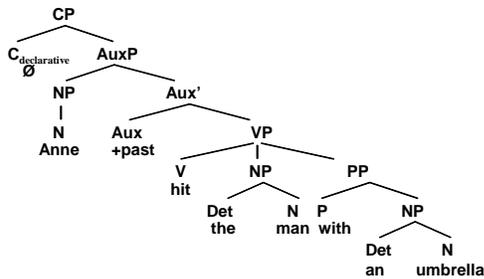
## Ambiguity revisited

1. CP → C AuxP
2. AuxP → NP Aux'
3. Aux' → Aux VP
4. VP → V (NP) (PP)
5. VP → V (CP)
6. NP → (Det) N (PP)
7. PP → (Deg) P NP
8. AP → (Deg) A (PP)

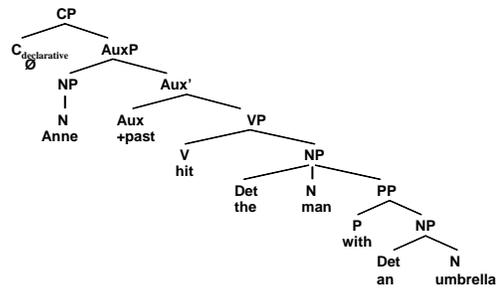
## Ambiguity revisited

- The two crucial rules for this particular case of ambiguity are rules 4 and 6 for expanding VP and NP, respectively:  
VP → V (NP) (PP)  
NP → (Det) N (PP)
- Notice that a PP may "attach" to either a V or an N, and it is this ambiguity of PP-attachment that creates the ambiguity of the sentence. Let's see that in tree format.

Anne hit the man with an umbrella.  
 "Meaning: Anne held an umbrella and hit the man with it."



Anne hit the man with an umbrella.  
 "Meaning: Anne hit the man who was holding an umbrella."



### A take-home puzzle

- *Bob hit the elf on the table with the hat.*
- How many meanings can you get out of this sentence? Can you explain why?

### Sentence relatedness revisited

- Finally, we need to find out if a phrase structure grammar can account for the fact that some sentences are somehow "felt" to be related, e.g.,
  - a. Your friend can play the piano.
  - b. Can your friend play the piano?
- We know that a phrase structure grammar can generate the (a) sentence, but the question now is: Can it also generate the sentence in (b)?
- Any ideas?

### Sentence relatedness revisited

Here's the mini PSG again:

1. CP → C AuxP
2. AuxP → NP Aux'
3. Aux' → Aux VP
4. VP → V (NP) (PP)
5. VP → V (CP)
6. NP → (Det) N (PP)
7. PP → (Deg) P NP
8. AP → (Deg) A (PP)

### Sentence relatedness revisited

- The answer then is probably not. There is no PSR that will allow the Aux "can" to appear at the beginning of the sentence.
- But why should this be a problem? Can't we simply add a rule that allows us to have an Aux head at the beginning? After all, this is a mini-grammar, not an exhaustive grammar.
- Yes, we sure can. Here's one possible rule:  
 AuxP → Aux NP VP
- Can this rule help?

## Sentence relatedness revisited

- The additional rule can help, but at a high cost: Now, we simply have no direct explanation for why a statement and a corresponding question are felt to be related.
- In essence, while a phrase structure grammar can account for grammaticality, ambiguity, and recursiveness, it fails to account for sentence relatedness, which is a problem.
- To solve this problem, we need to enrich our theory of grammar. We do that on Wednesday.

## Next class agenda

- More syntax: Universal grammar and cross-linguistic variation. Finish reading Chapter 5 of O'Grady *et al's* book.
- Also read the section on syntactic typology in McGregor's Chapter 11, pp. 264-66.