LNGT0101
Introduction to Linguistics

Lecture #14
Oct 31st, 2012

Announcements

- Syllabus table updated with changes.
- Guest lecture talk is now on Nov 14.
- So, do check the updated syllabus regularly.

http://blogs.middlebury.edu/linguistics101/syllabus-table-new/

- We still have one last group screening for *The Linguists*. We'll do that before Thanksgiving. I'll send an e-mail with possible dates to choose from.

Announcements

- A couple of small typos on the midterm.
- On Exercise #2:
  - [know] on the exam and [**kʰno**] in the textbook are really the same thing, and should not affect your answer to this particular item in any way.
  - Also, [maj] on the midterm is equivalent to [**maɪ**].
- On Exercise #10-B:

  The sentence is: ***John should do their work***.

Announcements

- Reminder: I'll be here for an hour after today's class to answer any questions you may have on the midterm.
- I'm away from campus with less than ideal access to e-mail from Thursday to Sunday.

Announcements

- HW3 scores have been sent to your mailboxes over the weekend. Average score is 74 and median is 77.
- Some linguistic problems may be challenging, but that's why they're worth doing. You get to work on your problem-solving skills, hypothesis-making skills, formalization and precision skills, as well as argumentation skills, of course in addition to learning interesting facts about human language.
- I know I'm running the risk of sounding excessively repetitive here, BUT spelling should have **ZERO** bearing on your answers of phonology problems. Remember: An illiterate speaker of English still knows as much phonology about English as you do.

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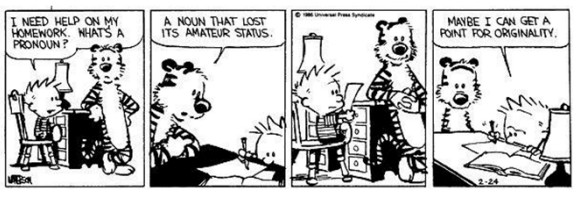
Cartoon of the day



Syntax

A couple of puzzles still unresolved

- ***Recursiveness***:
  a. *The linguist knows that this language has become extinct.*
  b. *The biologist believes that the linguist knows that this language has become extinct.*
  c. *The neuroscientist claims that the biologist believes that the linguist knows that this language has become extinct.*
  d. *etc.*
- ***Ambiguity***:
  Anne hit the man with an umbrella.
  Bob hit the elf on the table with the hat

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Syntax

- Syntax is the study of sentence structure in human language.
- A sentence is not a mere sequence of words; rather, every sentence has a ***syntactic structure***.
- The key notion to understanding syntactic structure is that of ***constituency***.
- Let's see what this means.

Constituency

- Consider the following sentence:
  The linguist has drawn a tree.
- If I ask you to, intuitively, divide the sentence into two units, where would you draw the line?
- Probably this:
  (1) The linguist | has drawn a tree.

Constituency

- Intuitively, we "know" that certain words "hang together" in the sentence to the exclusion of others. We call such strings of words "**constituents**."
- And we can actually determine constituency by means of "objective" diagnostic tests, since intuitions can sometimes be rather unreliable here.
- There are four constituency tests: **substitution**, **movement**, **clefting**, and the **stand-alone** test. Let's consider each in turn.

Substitution test for constituency

- If a string of words can be replaced by one word and the result is a grammatical sentence while preserving the original meaning, then it must be that this string of words comprises a "constituent".

Substitution test for constituency

(2) a. [The linguist] has drawn a tree.
✓*He* has drawn a tree.
b. The linguist has drawn [a tree].
✓The linguist has drawn *it*.
c. The [linguist has drawn a tree].
*The ???
d. [The linguist has] drawn a tree.
*??? drawn a tree.
e. [The linguist has drawn a] tree.
*??? tree.
f. The linguist [has drawn a tree].
The linguist *has*. (In response to "Who has drawn a tree?")

Substitution test for constituency

(3) a. [The tall boy] ate the burrito.
✓*He* ate the burrito.
b. The tall boy ate [the burrito].
✓The tall boy ate *it*.
c. [The tall boy ate] the burrito.
*??? the burrito.
d. The tall boy [ate the burrito].
✓The tall boy *did (so)*. (In response to "Who ate the burrito?")
e. The tall boy ate the burrito [in the classroom].
The tall boy ate the burrito *there.*
f. The tall boy ate [the burrito in the classroom].
*The tall boy ate *it.* *(The sentence may look ok, but we changed the meaning)*

Movement test for constituency

- If a string of words can be moved together in a sentence keeping the same meaning intact, then this string of words comprises a "constituent". Consider the examples in (4a-f).

(4) a. We will hold the meeting [in Sam's office].
In Sam's office we will hold the meeting.
b. We will hold [the meeting in Sam's office].
**The meeting in Sam's office* we will hold.

Movement test for constituency

c. I know he will [eat the whole pizza], and
eat the whole pizza he will.
d. *I know he [will eat the] whole pizza, and
will eat the he whole pizza.
e. I read [this book by Chomsky] before.
This book by Chomsky I read before.
f. I read this book [by Chomsky before].
**By Chomsky before* I read this book.

Clefting

- Clefting (*It is X that …*) may also be used as a constituency diagnostic:

This linguist drew these trees on the board.

- Apply clefting to some strings:

It is ***this linguist*** that drew these trees on the board.
It is ***these trees*** that this linguist drew on the board.
It is ***on the board*** that this linguist drew these trees.
*It is ***trees on*** that this linguist drew these the board.
*It is ***linguist drew*** that this these trees on the board.

Stand-alone test (using answers to questions)

- If a string of words can stand alone as an answer to a question, then it is a constituent, e.g.,

Q: What did John eat?
A: The whole pizza./*The whole.

Q: What did John do?
A: Eat the whole pizza./*Eat the.

Syntax is not linear; it's hierarchical

- A sentence is thus not a mere list of words arranged in sequence. Rather, it is a set of constituents, which, as we'll see later, are arranged in a hierarchical fashion.
- The next question to ask is: What are the types of constituents in human language?
- We discuss this next.

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Phrase structure: Heads and complements

- Once we determine that a string of words is a constituent, the next step is to determine its syntactic 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.
- The head and the complement together form what we call a ***phrase***, and the type of the syntactic category of the whole 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 select complements and how many they take. Technically, we say they have different ***subcategorization*** properties.
- For example, transitive verbs select complements, but intransitive verbs do not:
  - John slept.
  - *John slept the dog.
  - John bought a new car.
  - *John bought.
- Remember the *eat-devour* contrast?

Subcategorization

- Furthermore, transitive verbs differ in whether they subcategorize for an NP complement like "buy" above, or a PP complement as "talk":

  I talked [$_{PP}$ to his boss].
- Some transitive verbs even require two complements, such as "give" and "put":

  She gave [$_{NP}$ me] [$_{NP}$ money].

  Alice put [$_{NP}$ the car] [$_{PP}$ in the garage].

Subcategorization

- Other verbs such as 'say' select a whole clause as a complement:

John said [$_{CP}$ that he'd stop by this evening].

- Words like 'that' that introduce clauses are called ***complementizers***, and the whole bracketed string is referred to as a **Complementizer Phrase** (CP).

Table 5.5 Some examples of verb complements

Complement option	*Sample heads*	*Example*
Ø	vanish, arrive, die	The rabbit vanished __.
NP	devour, cut, prove	The professor proved [$_{NP}$ *the theorem*].
AP	be, become	The man became [$_{AP}$ *very angry*].
PP$_{to}$	dash, talk, refer	The dog dashed [$_{PP}$ *to the door*].
NP NP	spare, hand, give	We handed [$_{NP}$ *the man*] [$_{NP}$ *a map*].
NP PP$_{to}$	hand, give, send	She gave [$_{NP}$ *a diploma*] [$_{PP}$ *to the student*].
NP PP$_{for}$	buy, cook, reserve	We bought [$_{NP}$ *a hat*] [$_{PP}$ *for Andy*].
NP PP$_{loc}$	put, place, stand	She put [$_{NP}$ *the muffler*] [$_{PP}$ *on the car*].
PP$_{to}$ PP$_{about}$	talk, speak	I talked [$_{PP}$ *to a doctor*] [$_{PP}$ *about Sue*].
NP PP$_{for}$ PP$_{with}$	open, fix	We opened [$_{NP}$ *the door*] [$_{PP}$ *for John*] [$_{PP}$ *with a crowbar*].

Table 5.9 Some verbs permitting CP complements

Complement options	*Sample heads*	*Example*
CP	believe, know, think, remember	They believe [$_{CP}$ *that Mary left*].
NP CP	persuade, tell, convince, promise	They told [$_{NP}$ *Eric*] [$_{CP}$ *that Mary had left*].
PP$_{to}$ CP	concede, admit	They admitted [$_{PP}$ *to Eric*] [$_{CP}$ *that Mary had left*].

Table 5.6 Some examples of noun complements

Complement option	*Sample heads*	*Example*
Ø	car, boy, electricity	the car __
PP$_{of}$	memory, failure, death	the memory [$_{PP}$ *of a friend*]
PP$_{of}$ PP$_{to}$	presentation, gift, donation	the presentation [$_{PP}$ *of a medal*] [$_{PP}$ *to the winner*]
PP$_{with}$ PP$_{about}$	argument, discussion, conversation	an argument [$_{PP}$ *with Stella*] [$_{PP}$ *about politics*]

Table 5.7 Some examples of adjective complements

Complement option	*Sample heads*	*Example*
Ø	tall, green, smart	very tall __
PP$_{about}$	curious, glad, angry	curious [$_{PP}$ *about China*]
PP$_{to}$	apparent, obvious	obvious [$_{PP}$ *to the student*]
PP$_{of}$	fond, full, tired	fond [$_{PP}$ *of chocolate*]

Table 5.8 Some examples of preposition complements

Complement option	*Sample heads*	*Example*
Ø	near, away, down	(he got) down __
NP	in, on, by, near	in [$_{NP}$ *the house*]
PP	down, up, out	down [$_{PP}$ *into the cellar*]

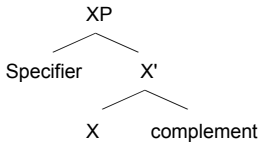
Phrase structure: Specifiers

- 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*** *rents 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:

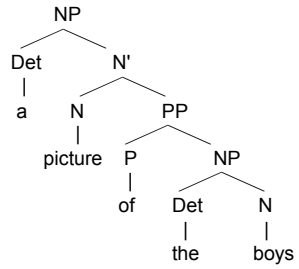
(5)



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

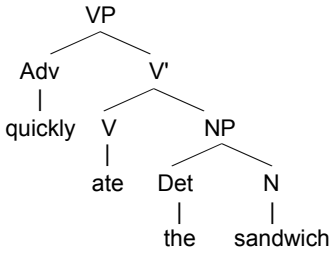
An example of a NP

(6)



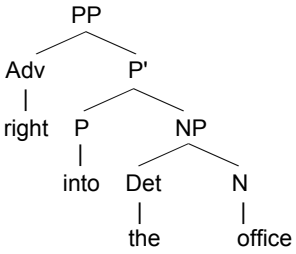
An example of a VP

(7)



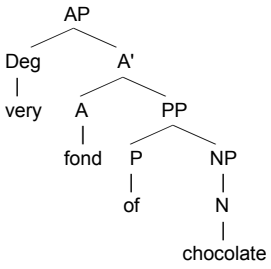
An example of a PP

(8)



An example of a AP

(9)

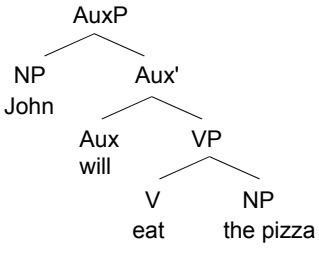


So, what's the head of a sentence?

- 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.
- We, therefore, 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**) (or, a **Tense Phrase** (**TP**), as mentioned in your textbook).
- This is shown in the tree diagram on the next slide:

AuxP

(10)



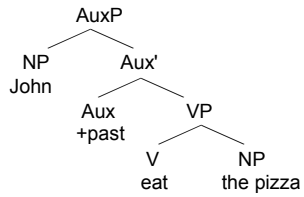
AuxP

- 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.
- Syntacticians 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 and not really significant in any way).

AuxP

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

(12)



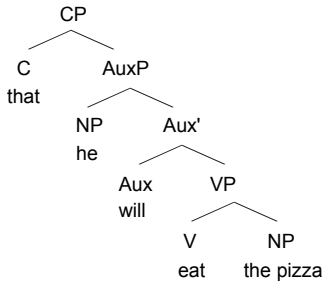
- Question: How does "eat" and "past" become the word "ate"? We'll get back to that on Monday.

CP

- Consider the *complement* (also called *embedded clause*) of the verb "says" in
  (13) John says [$_{CP}$ that he will eat the pizza].
- Remember that such verbs take a CP as a complement.
- Notice that the embedded clause looks identical to the AuxP in tree #10, except that it has the **complementizer *that***, which is said to carry the *illocutionary force* of the clause, i.e., it marks the clause as either declarative, interrogative, etc.
- Let's assume then that a complementizer (abbreviated **C**), which is the head of CP, takes AuxP as its complement, as shown on the next slide:

CP (embedded clause)

(14)

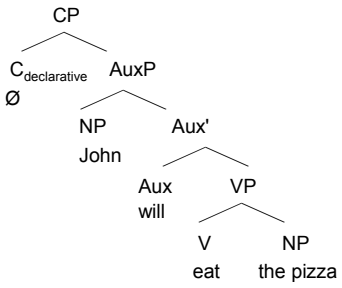


CP

- But if C determines the illocutionary force of a clause, then it must also be present in main (i.e., non-embedded) clauses, though not pronounced (in languages like English).
- 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 clause)

(15)



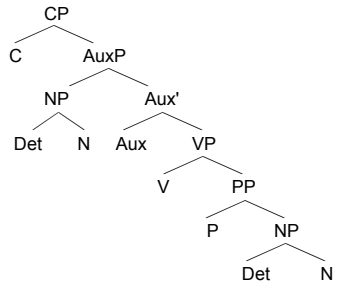
A mini-grammar for English: Phrase structure rules

- So putting all of this together, here's a mini-grammar for English phrase structure, where parentheses 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)

One possible structural tree of a simple 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.

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Sentences to draw trees for

1. Our children like this music.
2. John is proud of his medals.
3. The linguist knows that this language has become extinct.

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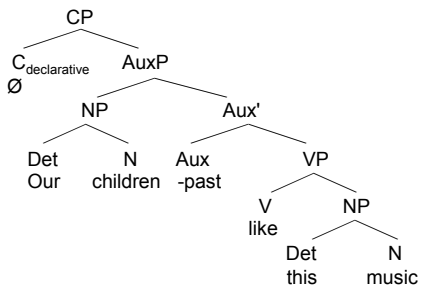
Our children like this music.



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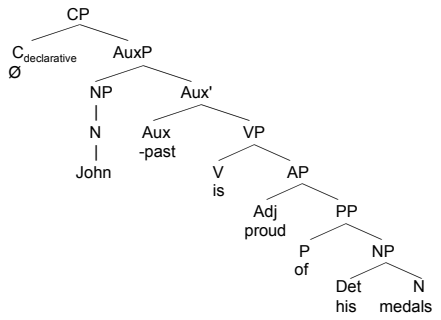
John is proud of his medals.



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The linguist knows that this language has become extinct.

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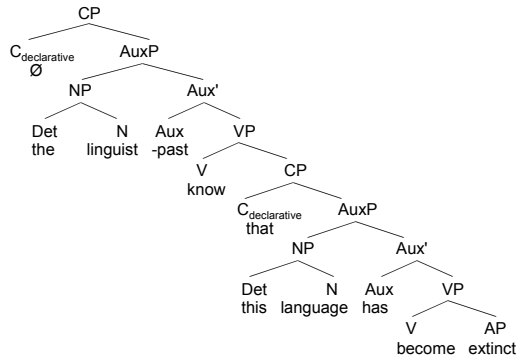

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What do trees tell us?

- 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).

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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.

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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*.

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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

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Recursiveness revisited

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

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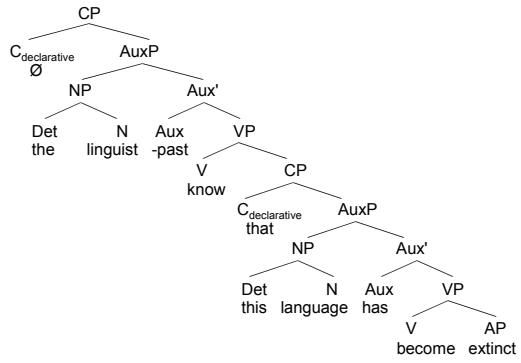

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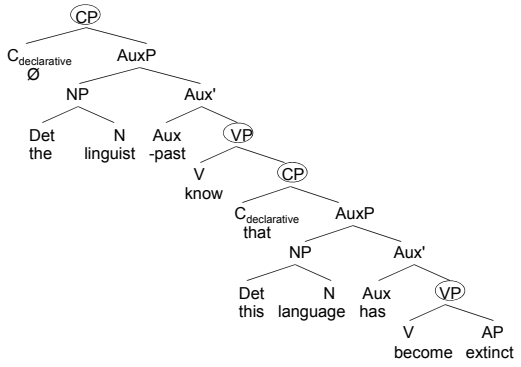

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Ambiguity revisited

- 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.

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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)

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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.

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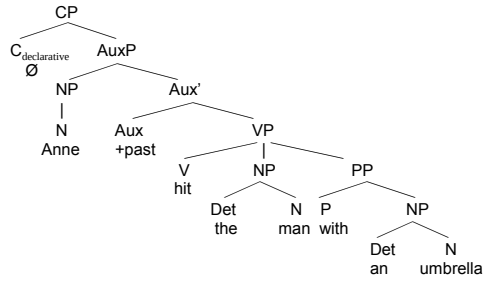
Anne hit the man with an umbrella.
"Meaning: Anne held an umbrella and hit the man with it."



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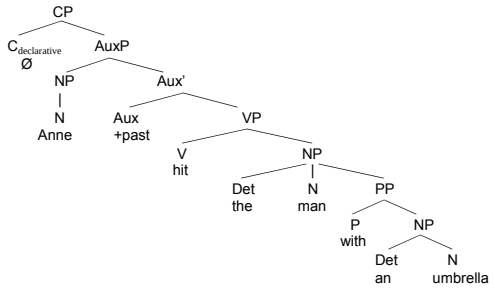
Anne hit the man with an umbrella.
"Meaning: Anne hit the man holding an umbrella."



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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?
- Let's make that an extra credit assignment worth 4 points. Specify all possible meanings and draw a syntactic tree for each one. Make sure you indicate which meaning goes with which tree. Due Monday Nov 5th.

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Next class agenda

- Why do languages differ in their sentence structures?
- Chapter 4, pp. 149-167.