LNGT0101
Introduction to Linguistics

Lecture #13
Oct 26th, 2011

Announcements

- HW3 scores are posted. Average score is rather lower than on the previous two homework assignments.
- 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.
- Guessing is never a good strategy, not in linguistics, not in any other field, not in life. We have to follow a methodical procedure to know the answers to difficult questions.

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Announcements

- Midterm exam is posted. It is due Thursday Nov 3rd by 12noon, either by e-mail or in my mailbox at Farrell House.
- Read the instructions before you start working on the exam. Instructions for the exam are different from those for homework assignments.
- I will hold a review session for the midterm on Monday Oct 31st right after class. I'm also available during regular office hours and by appointment for any questions.

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LAP announcement

- The atlas of language structures is now available online as well. LINK

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Summary of Syntax so far

- 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: the **substitution**, **movement**, **clefting,** and **stand-alone** tests.

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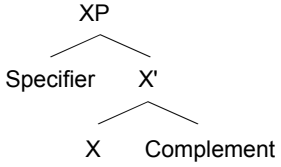
Summary of Syntax so far

- Constituents are phrases. A phrase is a string of words composed of a syntactic head, its complement (if needed), and its specifier (if any).
- All phrases follow the X'-schema:



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Summary of Syntax so far

- The syntactic categories we talked about so far are: NP, VP, PP, AP, AuxP, and CP.
- Our grammar thus far has two types of rules:

  (i) Phrase structure rules (PSRs) of the form
  A → B C, and

  (ii) Lexical insertion rules, which insert words into syntactic structures generated by PSRs.

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

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A mini-grammar for English: Phrase structure rules

- 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)

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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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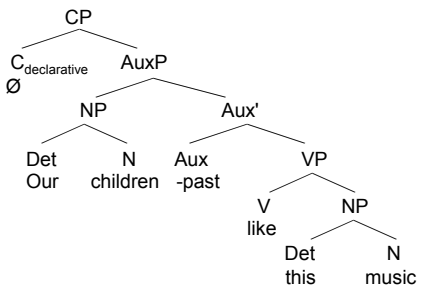
Our children like this music.



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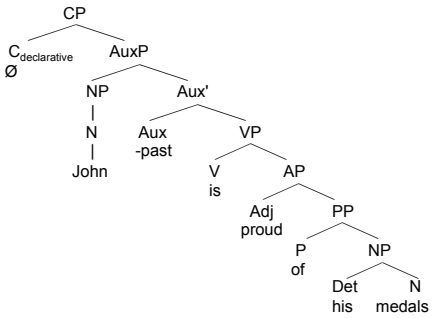
John is proud of his medals.



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The linguist knows that this language has become extinct.

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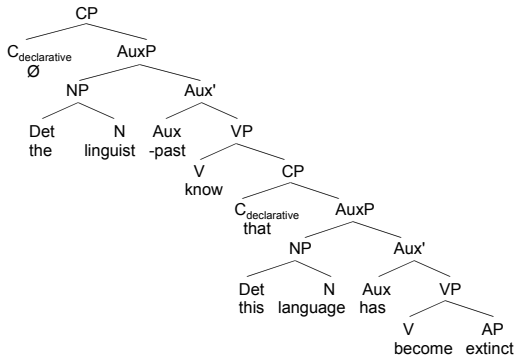

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What do trees tell us?

- 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*.
- How does a phrase structure grammar rule out such bad sentences?

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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
- Our grammar thus succeeds to rule out nonsense structures such as the one above, as desired.

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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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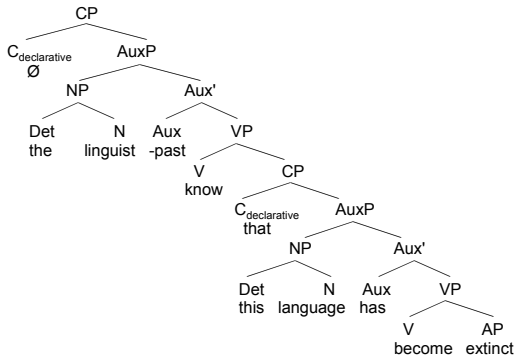

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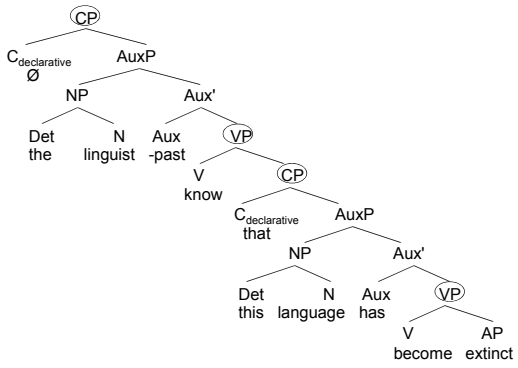

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Recursiveness revisited

- 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*.

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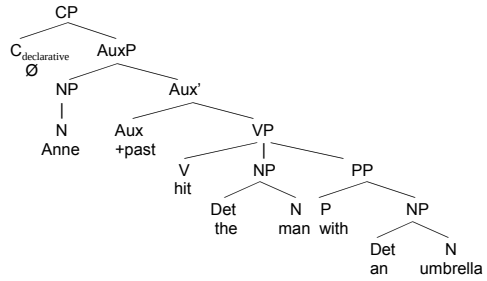
Anne hit the man with an umbrella.
"Meaning: Anne held an umbrella and hit the man with it."



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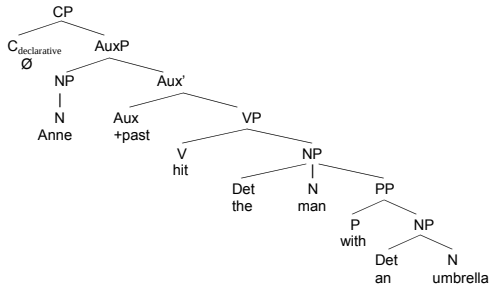
Anne hit the man with an umbrella.
"Meaning: Anne hit the man holding an umbrella."



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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.

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Sentence relatedness revisited

- Finally, we need to find out if a phrase structure grammar can account for the fact that some sentences are intuitively "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?

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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. VP → V (AP)
7. NP → (Det) N (PP)
8. PP → (Deg) P NP
9. AP → (Deg) A (PP)

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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?

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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 in a straightforward manner, which is a problem.
- To solve this problem, we need to enrich our grammar.

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Transformational rules

- A solution, first proposed by Chomsky in the 1950s, is to include another component in the grammar in addition to the phrase structure component: a ***transformational component*** that consists of a set of ***transformational rules***.

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Transformational rules

- What is a transformational rule?
- A transformational rule is a syntactic operation that takes one structure as input and operates on it producing a modified syntactic structure as output.

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Deep and surface structure

- For this purpose, a fundamental distinction in the grammar has to be made between two separate levels of structure:
  (a) a pre-transformational structure, which is called ***deep structure*** (or D-structure) and is derived by phrase structure rules, and
  (b) a post-transformational structure, which is called ***surface structure*** (or S-structure) and is derived through the application of transformational rules.

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Deriving English yes-no questions

- So, let's now get back to the yes-no question "*Can your friend play the piano?*" and see how we can implement a transformational analysis.
- Now, instead of drawing a tree for the yes-no question directly, we actually draw a tree for the corresponding statement "*Your friend can play the piano*."
- The only difference is that such structure will be marked as interrogative. We can do that by adding a [+Q] feature on C in the tree.

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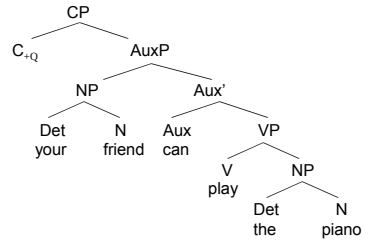
Your friend can play the piano.



D-structure

(Note: [+Q] indicates this sentence is interrogative. After all, we do not want to say that both sentences are identical. They obviously are not.)

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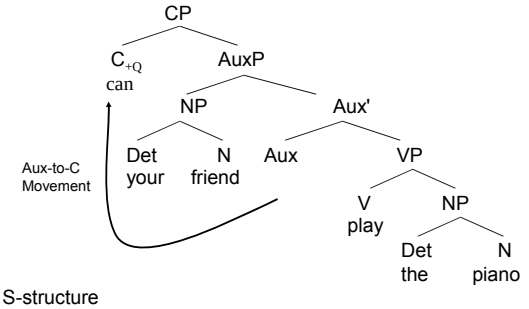
Now, a transformation moves Aux to C, thereby deriving:
Can your friend play the piano?



S-structure

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Evidence for Aux-to-C movement

- But how do we prove that there is actually Aux-to-C movement in English yes-no questions? What evidence is there that 'invisible triangles' actually exist?
- Well, consider:

  He asked if your friend could play the piano.

  **He asked if could your friend play the piano.*

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Deriving yes-no questions with "do"

- But how about yes-no questions like:

  Did your friend play the piano?
- Again, let's start by drawing a tree for the D-structure of the sentence. Remember the D-structure is the corresponding statement, which in that case is …
- Right: *Your friend played the piano*.

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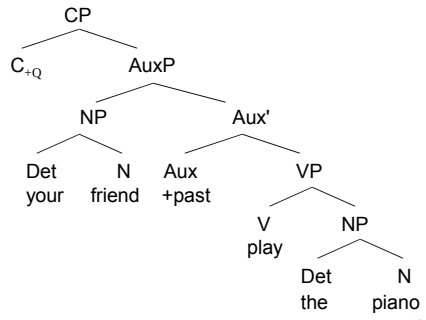
We apply PSRs to derive the D-structure:



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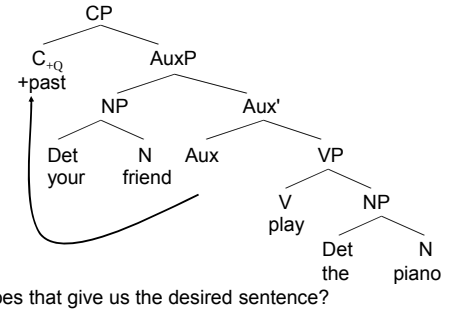
Now, since this is a question, we apply Aux-to-C movement to derive the S-structure:



- But does that give us the desired sentence?

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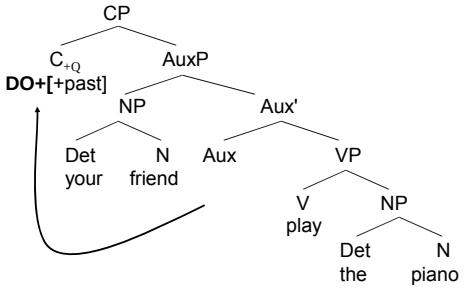
Do-support: To derive the actual surface structure, we insert the *dummy* verb "do" to support the inflectional affix [+past]



- Now, does that give us the desired sentence?

Transformations: Movement and Insertion

- So, in addition to movement, transformations can also "insert" materials in the structure of a sentence.
- Insertion rules, though, are not as many in the grammar as movement rules.

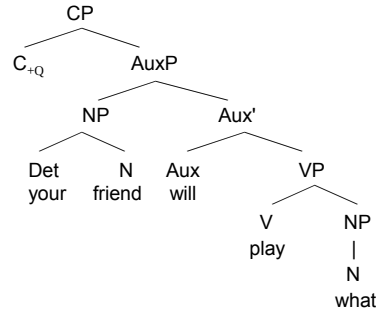
Deriving wh-questions

- Ok, let's try another kind of question, the so-called ***wh-questions***, e.g.,

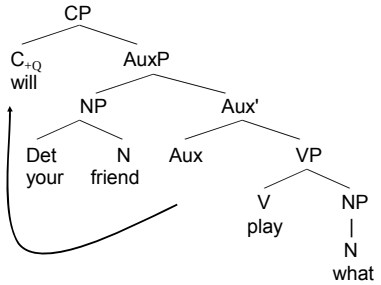
  What will your friend play?
- Since "what" is interpreted as the object of "play," we assume that this is where it starts at D-structure:

  your friend will play what

We apply PSRs to derive the D-structure:



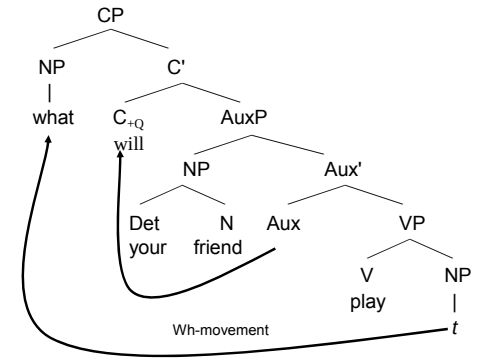
Now, since this is a question, we apply Aux-to-C movement to derive the S-structure:



- But does that give us the desired sentence?

Where do wh-phrases end up?

- To get the desired surface structure, we need to move the wh-phrase "what" to the front of the sentence.
- The question now is: Where does the wh-phrase move to?
- There is a restriction, however. It's called ***structure perseveration***: *Phrases can move only to specifier positions, and heads can only move to head positions*.



*("t" stands for **trace** of the moved phrase, another invisible triangle.)*

Syntax: The grammar model

Phrase structure grammar (X'-theory)

↓

D-structure

↓

Transformations (primarily Movement)

↓

S-structure

- But if this language model is universal, why do languages differ then? We talk about this on Monday.

Agenda for next class

- Variation in word order: English vs. Japanese.
- More on word order: The position of verb in Welsh, French, and German.
- Some universal principles of grammar: Movement out of "islands."
- Finish reading Chapter 4, particularly the section on "UG principles and parameters."