

INTD0112 Introduction to Linguistics

Lecture #13
April 5th, 2007

Announcements

- As usual, I will post your homework assignment #4 tomorrow, and it'll be due next Friday.

Summary of Tuesday's discussion

- Syntax is the study of sentence structure in human language.
- The key notion in the study of syntax is constituency, which we can determine using substitution or movement tests.

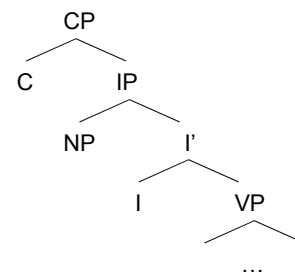
Summary of Tuesday's discussion

- Phrase structure rules (PSRs) allow us to analyze constituency relations in a particular structure, by re-writing a single constituent as one or more constituents, e.g.,
 - VP → V (NP) (PP)
 - NP → (Det) N (PP)
- Remember that brackets indicate optionality.

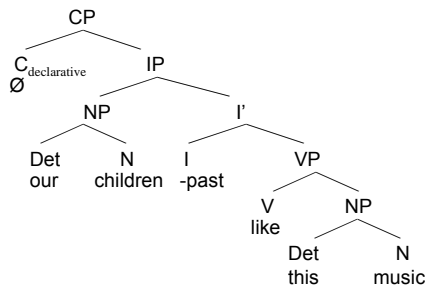
Summary of Tuesday's discussion

- Phrase structure of all grammatical categories follows the X'-schema:
 - XP → Specifier X'
 - X' → X Complement
- The structural skeleton of an English sentence, for example, is along the lines of the next slide:

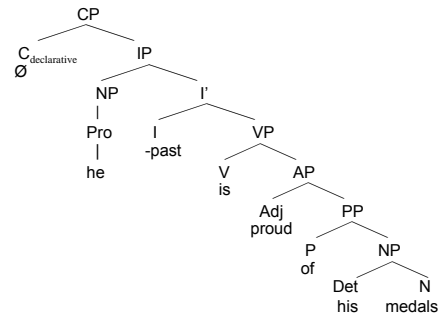
Structural tree of an English sentence



Our children like this music.



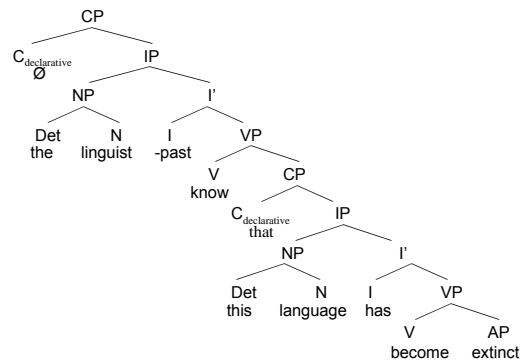
He is proud of his medals.



A more complex sentence

- So, how does the syntactic structure of the following sentence look like?

The linguist knows that this language has become extinct.



What do trees tell us?

- Tree diagrams of the kind illustrated above show three aspects of speakers' syntactic knowledge:
 - the **linear order** of the words in the sentence,
 - the **groupings** of words into particular syntactic constituents (e.g. NP, VP, etc.), and
 - 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:
 - the ability to formulate grammaticality judgments,
 - the ability to produce and understand an infinite number of sentences,
 - the ability to recognize cases of ambiguity, and,
 - 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

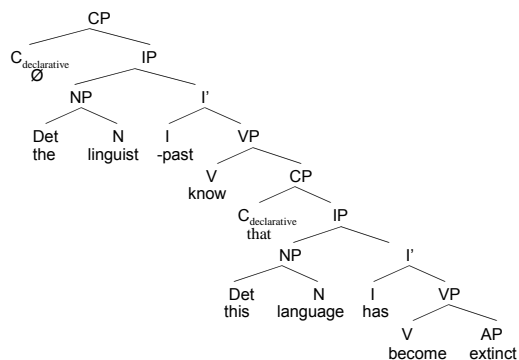
- Obviously, if we try to draw a tree for this ungrammatical sentence, we'll fail, simply because after using the first two PSRs for CP and IP, we're stuck: there's no NP rule in English that can expand like any of these two:
 - NP → N Det
 - NP → N Det N
- And there's no VP rule that expands with a 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

- We have already drawn a tree for the first of these sentences, repeated again on the next slide:



Recursiveness revisited

- How do you think does 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 last time, and see if we can find an answer.

Ambiguity revisited

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

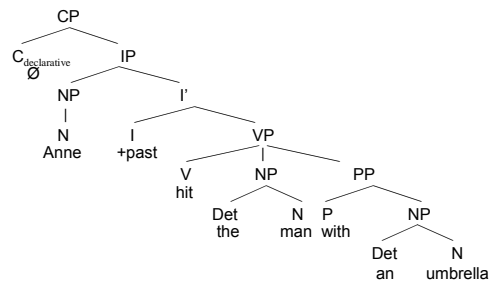
Ambiguity revisited

- The two crucial rules for this particular case of ambiguity are rules 4 and 6 for expanding VP and NP, respectively:

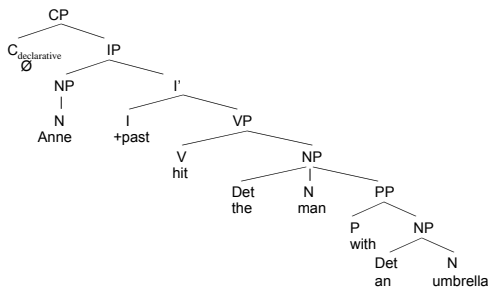
VP → V (NP) (PP)

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.”



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. $CP \rightarrow C IP$
2. $IP \rightarrow NP I'$
3. $I' \rightarrow I VP$
4. $VP \rightarrow V (NP) (PP)$
5. $VP \rightarrow V (CP)$
6. $NP \rightarrow (Det) N (PP)$
7. $AP \rightarrow (Deg) A (PP)$
8. $PP \rightarrow P NP$

Sentence relatedness revisited

- The answer then is probably not. There is no PSR that will allow the inflectional head "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 inflectional head at the beginning? After all, this is a mini-grammar, not an exhaustive grammar.
- Yes, we sure can. Here's one possible rule:
 $IP \rightarrow I NP VP$
- Ignoring the tertiary branching, can this rule help?

Sentence relatedness revisited

- The additional rule can help, but at a high cost: Now, we simply have no 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.

Transformational rules

- The solution proposed by Chomsky to this problem is to enrich our theory of grammar by including another component in the grammar in addition to the phrase structure component: a **transformational component** that consists of a set of **transformational rules**.

Transformational rules

- But 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.

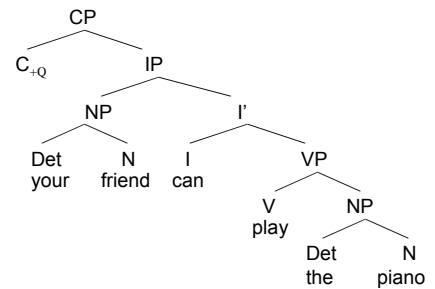
Deep and surface structure

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

Deriving English yes-no questions

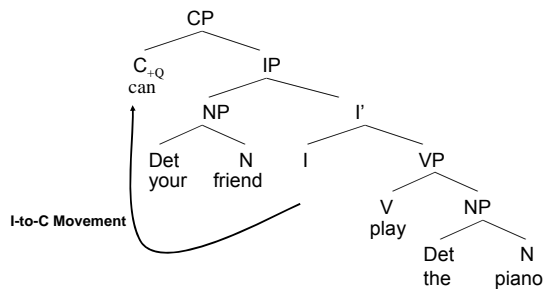
- So, let's now get back to the yes-no question "Can your friend play the piano?" and see how we can implement a transformational analysis.
- Now, instead of drawing a tree for the yes-no question directly, we actually draw a tree for the corresponding statement "Your friend can play the piano."

Your friend can play the piano.



D-Structure

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



S-structure

Evidence for I-to-C movement

- But how do we prove that there is actually I-to-C movement in English yes-no questions?
- A nice piece of evidence comes from embedded questions. Consider:
He was asking if your friend could play the piano.
**He was asking if could your friend play the piano.*

The grammar model

- The grammar model is thus something along the following lines:

Phrase structure grammar (or Merge + X'-theory)

↓
D-structure

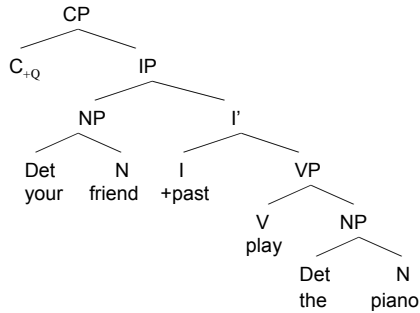
↓
Transformations (primarily Move)

↓
S-structure

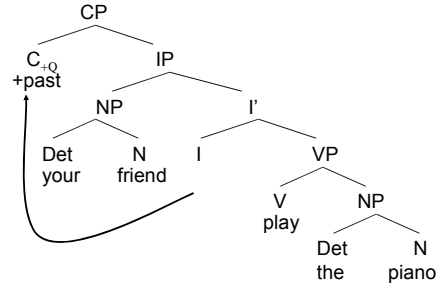
Deriving yes-no questions with "do"

- 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.

We apply PSRs to derive the D-structure:

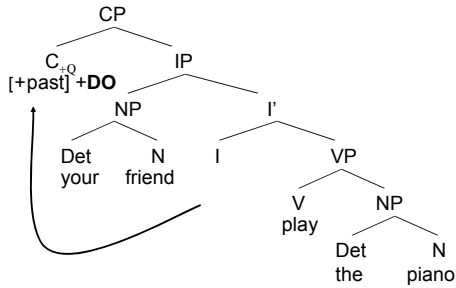


Now, since this is a question, we apply I-to-C movement to derive the S-structure:



➤ But does that give us the desired sentence?

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



➤ Now, does that give us the desired sentence?

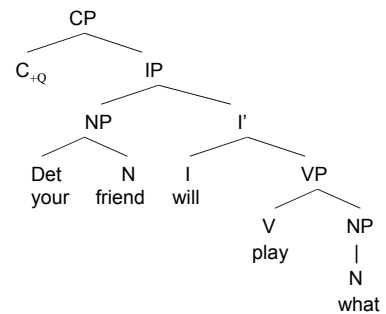
Transformations: Movement and Insertion

➤ 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.

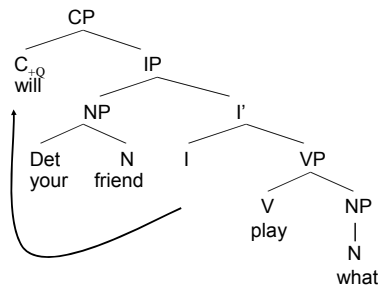
Deriving wh-questions

➤ Ok, let's try another kind of question, the so-called wh-questions, e.g.,
What will your friend play?

We apply PSRs to derive the D-structure:



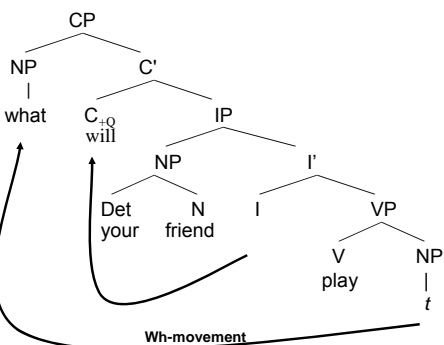
Now, since this is a question, we apply I-to-C movement to derive the S-structure:



➤ 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: XPs can move only to specifier positions, and X’s can only move head positions.



➤ Now, does that give us the desired sentence?

OK, but ...

- Important question: Can’t we just use PSRs to derive wh-questions and do without wh-movement?
- Sure, we can. All we need to do is create a rule for CP expansion such that there is a wh-phrase in the specifier of CP:
 - CP → Wh-NP C’
 - C’ → C IP
- Why don’t we do that? In other words, what would go wrong if we enriched our grammar with extra PSRs, instead of movement rules?

Next class agenda

- More syntax: Universal grammar and parametric variation