Announcements


• Homework 2 is due in class now if you’re submitting a hard copy, or by 8pm via e-mail.
• How much time did the homework take?
• Angeline Rodriguez: Linguistics 101 tutor.

Presentation on Monday

• Forensic linguistics
• http://www.cbsnews.com/news/forensic-linguistics-makes-web-less-anonymous/

New words!

Bird seed!

Monkey bread!
Pets!

Syntax

- Syntax is the study of sentence structure in human language.
- What do we know when we know the syntax of our language?

We know:

- What is grammatical and what is ungrammatical.
- Grammaticality is not dependent on meaningfulness.
- The same string of words can give rise to multiple meanings.
- Structures can look different but mean roughly the same thing.
- Structures can look the same but have completely different meanings.
- Structures can go ad infinitum, in theory.

Syntax

- For our theory of grammar to be adequate, it has to account for these different aspects of native speakers' subconscious syntactic knowledge.
- We start talking about this today.

Syntax

- Why do we think that sentences have a structure? In other words, why can't we treat a sentence as a sequence of words?

Consider:

- The boy and the girl's uncle left.
- How many people left?
- [The boy and the girl]'s uncle left, didn't he?
- The boy and [the girl]'s uncle left, didn't they?
Consider:

- Black cab drivers went on strike.
- Black [cab drivers] went on strike.
- [Black cab] drivers went on strike.

Syntax

- A sentence is not a mere sequence of words; rather, every sentence has a **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 be unreliable.
- 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.
   ✓ The linguist has drawn [a tree].
   ✓ 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 drawn a tree. (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.
   ✔ *I know he [will eat] the whole pizza, and
      will eat the he whole pizza.
   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."
   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

• 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 a set of constituents arranged in a hierarchical fashion.
• The next question to ask is: What are the types of constituents that exist in syntactic structures?
• Before we list the types, we need to introduce the terms ‘head’ and ‘complement,’ which combine to form ‘phrases.’
Phrase structure: Heads and complements

- The head of a phrase is the central word ---the one that requires other elements to be there.

- The complement is the part of the phrase that is there because of the head.

- The label of the whole phrase is that of the head. So, if the head is a noun, then the phrase is a noun phrase, for example.

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

- “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.”

Phrase structure: Heads and complements

- “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

Selection (aka subcategorization)

• Notice that heads differ as to whether they select complements and how many they take. Technically, we say they have different selection 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.
Selection (aka subcategorization)

- Furthermore, transitive verbs differ in whether they select an NP complement like “buy” above, or a PP complement as “talk”:
  
  I talked [PP to his boss].

- Some transitive verbs obligatorily select two complements, such as “give” and “put”:
  
  She gave [NP me] [NP money].
  Alice put [NP the car] [PP in the garage].

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’ which introduce clauses are called complementizers, and the whole bracketed string is referred to as a Complementizer Phrase (CP).

Phrase structure: Specifiers

- While complements may be obligatory (depending on the selectional 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; our car
  - 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)  

  \[
  \begin{array}{c}
  \text{Specifiers} \\
  \text{X'} \\
  \text{X} \\
  \text{Complement}
  \end{array}
  \]

  \(X\)

  \(X'\)

  Specifier

  \(X\)

  Complement

  (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.
- 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:
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).

The structure of “John ate the pizza” will look like that:

(12) AuxP

NP John

Aux +past VP

V ate Det N

the pizza

Consider the complement (also called embedded clause) of the verb “says” in (13) Mary says [that John will eat the pizza].

Remember that such verbs take a CP complement.

The embedded clause looks identical to the AuxP in tree #10, except that it has the complementizer that.

Complementizers mark a clause as declarative, interrogative, or imperative.

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.

But if C determines the type 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.
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.)
  - 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)

A mini-grammar for English: Lexical rules

- In addition to PSRs, 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, ...}
  - C → {that, whether, Ø, ...}
  - etc.
- As you should expect, these are called lexical insertion rules.

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.
Our children like this music.

John is proud of his medals.

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).

Next class agenda
- Draw trees for the sentences in Exercise 8 in the textbook, p. 131.
- Ambiguity and recursiveness revisited.
- Finish reading Chapter 3, pp. 109-129.