The structure of sentences

1) You will give it to her
2) You will give the book to your roommate
3) You will give the book about syntax to your roommate's sister

- Someone doing the giving
- Something changing hands
- Someone receiving the thing

Sentential players

- It's like there's a "spot" for each of these players:
  1) __ will give __ to __
- And it doesn't matter whether the "player" is described with one word, two words, or several words.

Constituents

- Each "unit" of this sort is what we'll call a constituent. We enclose them in brackets to indicate that the words form (and behave as) a unit.
  1) [You] will give [the book] to [your roommate].
- A significant property of language is that these units can be arbitrarily complicated:
  2) [You] will give [it] to [Ed's roommate's sister's friend]

Arbitrarily complicated

- [Ed's roommate's sister's friend]
- This has sub-units within it:
  1) [[Marge]'s friend]
  2) [[Ed's roommate's sister]'s friend]
- And within that:
  1) [[[Marge]'s sister]'s friend]
  2) [[[Ed's roommate]'s sister]'s friend]
- In general, it looks like wherever a name can go, so can [name's noun].

[name's noun]

- Wherever a name can go, so can [name's noun].
  1) I gave the book to Homer.
  2) I gave the book to Bart's father.
  3) I gave the book to Lisa's brother's father.
- This replacement rule is recursive. The thing we are replacing is also contained in the thing we replaced it with.
Groups of groups of groups

- Sentences are made of grouped words. These groups can be contained in other groups, arbitrarily deep. A group of this kind: a constituent.
- Constituents can contain constituents that can contain constituents, etc.—The structure of a sentence is hierarchical.
- Constituents behave as a unit...

Constituents

- Functioning as a unit...
  - The students did their syntax assignment.
  - The students did the crossword puzzle.
  - John did the crossword puzzle.
  - The crossword puzzle is what John did.
  - Crossword puzzle is what John did the.
  - John likes the crossword puzzle.
  - John likes the jigsaw puzzle.
  - John likes the theater.

Finding constituents

- How do we find constituents in a sentence? For many of them, we can guess, but a guess isn’t evidence.
- The structure of a sentence has consequences.
- To find the constituents (to determine the structure) we test for the consequences.

Constituency tests

- Replacement test
- Fragment test
- Ellipsis
- Clefting
- Movement test

Replacement test

- A constituent is a group of words which function as a unit. If you can replace part of the sentence with another constituent (the smallest constituent being a single word), this tells us that the replaced section of the sentence is a constituent.
- This isn’t foolproof, but it usually works if you try to keep the meaning as close as possible.

1) The students left.
2) They left.
- The students is a constituent.
  1) The students will eat the sandwiches.
  2) They will eat the sandwiches.
  3) The students will eat them.
  4) The students will dine.

- [The students] will [eat [the sandwiches]].
Sentence fragment test

- Generally, only constituents can be used in the fragmentary response to a question.
- Who will eat the sandwiches?
  - The students. *Students will eat the.
  - What will the students do?
  - Eat the sandwiches. *Eat the.
  - What will the students eat?
  - The sandwiches.
- [The students] will [eat [the sandwiches]].

Ellipsis test

- If you can elide a string, it qualifies as a constituent.
- Ellipsis is really deletion of a string from a sentence. Sometimes this is “repaired” by using the verb do, something which we will seek to explain at a later point.
- The professors will eat the sandwiches, and then..
- The students will.
- The students will eat the cookies, and then...
- *The professors will sandwiches.

Movement (topicalization) test

- Sometimes you can “move” a string of words to the front of a sentence (then generally interpreted as the topic of the sentence). When you can, you’ve found a constituent.
- The sandwiches, the students will eat _.
- Eat the sandwiches, the students will _.
- The students, they will eat the sandwiches.
- *Students will, the eat the sandwiches.
- *Students, the will eat the sandwiches
- Failing a constituency test isn’t evidence against constituency!

Clefting test

- Like the movement test, if you can fit your string into the frame it be X that S (where you move the string X from inside S), X is a constituent.
- It’s the sandwiches that the students will eat _.
- It’s the students that _ will eat the sandwiches.
- It’s eat the sandwiches that the students will (do) _.
- *It’s students eat that the _ will the sandwiches.
- *It’s eat the that the students will _ sandwiches.

Finding constituents

- Tests: Replacement, (ellipsis,) movement, clefting, fragment.
- Some to try:
  - Two African swallows can carry a coconut.
  - A cat was walking down the street.
  - A creature was stirring up trouble.
  - Flying planes can be dangerous.

And all through the house...
**Bonus: the breakdown.**

**Trees, hierarchy, and constituency**

- [The students] [ate [the sandwiches]]

```
  the
  
  students
  
  ate
  
  the
  
  sandwiches
```

- square bracket notation
- tree structure

**The triangle**

- Sometimes, when the internal constituency is unknown or unimportant to the current discussion, a triangle is used instead.

```
  the
  
  students
  
  ate
  
  the
  
  sandwiches
```

**Trees**

- Root node
- Nodes (with node labels)
- Branches
- Terminal nodes
- Nonterminal nodes
Tree relations

- A node $X$ *dominates* nodes below it on the tree; these are the nodes which would be pulled along if you grabbed the node $X$ and pulled it off of the page.
- Acts as a unit. Is a constituent.

Verbs and substitution

- One of the ways we know a verb is a verb (category) is by observing that it can substitute for other verbs.
  1) Pat likes to sing. Pat likes to drive.
  2) Pat bought a book. *Pat bought (a) sing.
  3) Pat likes to eat sandwiches.
  4) *Pat unpleasant to eat sandwiches.
- So is $\text{eat sandwiches}$ a verb?
- Well, kind of, yes.
- It's a constituent, a phrase, that has the properties a verb does. A verb phrase.

The making of a phrase

- In that spirit, we know that a phrase differs from a word in that it *contains* words (or other phrases).
- We've seen that when words are combined into a phrase, the phrase inherits the properties of one of the things we combined. (The phrase has a head).
- Suppose a phrase can arise from merging two words together, with one taking priority. In a way, attaching one word to another.

The making of a phrase

- We're trying to characterize our knowledge of syntactic structure.
- Our grammatical knowledge is a system (we can judge new sentences).
- All things being equal, a theory in which the system is simpler (needed fewer assumptions) is to be preferred over a theory that entails more complex one.
Merge

- So, let’s go for the simplest theory of structure we can (and only move away from it if the simplest theory won’t work)
- A phrase is a syntactic object formed by combining (merging) two syntactic objects, with the properties inherited from one of them (the head of the phrase).
- A word is a syntactic object.

Merge, in the abstract

- A good way to think about this is that we have a number of syntactic objects lying around on a workbench of sorts.
- We use the operation Merge to assemble them together into one syntactic object.

Merge, in the abstract

- We combine D and E using Merge to form a combined syntactic object.
- We need to call our new object something, so we call it C.
- C is now a syntactic object (containing D & E).
- D and E are now “off the table”—we can’t Merge D with anything because it’s inside C. (“Merge only combines objects at their root nodes”).

Merge, in the abstract

- Since C is now a syntactic object, we can combine C with the other syntactic object, B, to form a new syntactic object we’ll call A.
- Now, all we’re left with is the single syntactic object A.

Merge, in the abstract

- When two objects are Merged, one of them is the head, the most important one.
- The head determines the properties of the constituent—that is, the features of the head project to become the features of the whole combined object.

Trees and constituency

- Pat will eat lunch.
- Pat will dine.
So how do we know which is the head?

- When we Merge two things, one is the head, and determines the properties of the resulting syntactic object.

- The next thing we'll turn to is the question of how the syntactic system knows which is the head.