Definition of Syntax

- The study of the rules governing the way words are combined to form sentences in a language.
  - *garden the
  - *Children are
  - *Work in

- This class: what syntactic structure is and what the rules that determine syntactic structure are like.

Syntax

- Properties of syntactic knowledge:
  - Understand & produce an infinite number of sentences never heard before
    - "Some purple gnats are starting to tango on microwave"
  - Understand and produce long sentences
    - "Bill said that he thought that the esteemed leader of the house had it in mind to tell the unfortunate vice president that the calls that he made from the office in the White House that he thought was private..."
  - Determine the grammatical relations in a sentence
    - Mary hired Bill. Vs. Bill hired Mary
Syntax & meaning

- Non-sense sentences with clear syntax
  - Colorless green ideas sleep furiously.
  - A verb crumpled the milk.
  - I gave the question a scuba-diving egg.
  - *Furiously sleep ideas green colorless.
  - *Milk the crumpled
  - *the question I an egg scuba-diving gave.

- Sentences are composed of discrete units that are combined by rules. These rules explain how speakers can store infinite knowledge in a finite space—brain.

Generative Grammar

- Noam Chomsky 1950s
- *Generative* = a very explicit system of rules specifying what combinations of basic elements result in well-formed sentences.
- Defines the syntactic structure of a language.

- “all and only”= all grammatical sentences and only grammatical sentences
- Finite rules → infinite number of well-formed sentences
- Productivity of language
  - Phrase structure rules
  - Transformational rules
Phrase structure rules

- Some words seem to belong together:
  - {The crazy man} {is jumping off the bridge}
- Groups of words that belong together are called constituents
- The component that determines the properties of the constituent is the head, and the constituent can be referred to as a phrase: e.g. noun phrase

Phrase Structure Rules

- PSRs= State the structure of a phrase
- If we look at phrases, some patterns emerge:
  - Det N
  - the instructor = NP
  - Det N
  - a friend = NP
  - Det N
  - some homework = NP
  - Det N

Phrase Structure Rules (PSR)

- some more patterns:
  - V Det N
  - call the instructor= VP
  - V Det N
  - meet a friend = VP
  - V Det N
  - do some homework = VP
  - V Det N
  - skip two classes = VP
and yet more patterns:

- Prep Det N
- with the instructor = PP
- Prep Det N
- from a friend = PP
- Prep Det N
- with some homework = PP
- Prep Det N
- after two classes = PP

Rules for determining the structure of phrases

Generate a lot of sentences from a small number of rules.

The structure of a phrase will consist of one or more constituents in a certain order.

What does a NP consist of?

- "noun phrases have a Det and a N"
- NP → Det N

Lexical Rules

We need lexical rules to specify which words can be used when we rewrite constituents such as N.

- PN → {Mary, George}
- N → {girl, boy, dog}
- Art
- Pro
PSR

- V Det N V Det N V Det N
  run a marathon eat the food read the book
- V Prep Det N V Prep Det N
  go to the store talk with a teacher
- V Det N Prep Det N
  take your sister to the library
- “Verb phrases have a V, (sometimes) an NP, and (sometimes) a PP”
- VP -> V (NP) (PP)

The main phrase structure rules

1. S -> NP VP
2. NP -> {Det N, Pro, PN}
3. VP -> V (NP) (PP) (Adv)
4. PP -> P NP
5. AP -> A (PP)

Phrase Structure Rules & tree diagrams

- NP -> (Det) N
- PP -> P NP

The boy (NP)

The boy (NP)

the boy in the yard

Det N

The boy in the yard

Det N

P NP

The boy in the yard

Det N

P

The boy in the yard

Det N
Phrase Structure Rules

- \( VP \rightarrow V (NP) (PP) \)
- \( S \rightarrow NP \ VP \)

Example (1)
The old tree swayed in the wind

Example (2)
The children put the toy in the box
Example 3

How superficially different sentences are closely related?

How superficially similar sentences are different?

Deep and surface structure

*The deep structure* is an abstract level of structural organization in which all the elements determining structural interpretation are represented.

- Sentences that have alternative interpretations
- Sentences that have different surface forms but have the same underlying meaning.

*Surface structure*—how the sentence is actually represented

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Back to Generative Grammar

- How superficially different sentences are closely related?
- How superficially similar sentences are different?
Deep and surface structure

- How superficially different sentences are closely related?
  - Charlie broke the window.
  - The window was broken by Charlie.
  - Charlie who broke the window.
  - Was the window broken by Charlie?

  - Difference in their surface structure = difference in syntactic forms
  - BUT they have the same ‘deep’ or underlying structure

Structural ambiguity

- How superficially similar sentences are different? (multiple meanings)
  - E.g. Annie whacked the man with an umbrella
  - Same surface structure but different deep structure
  - The boy saw the man with a telescope
  - The question is: What is the scope of "with the telescope"? Does it modify only "the man" or does it modify "saw the man"?

Structural Ambiguity (1)

*The boy saw the man with the telescope*

Meaning: Using the telescope, the boy saw the man
Structural Ambiguity (2)

The boy saw the man with the telescope

Recursion

- Rules can be applied more than once in generating sentences
- E.g. repeat prepositional phrases more than once
  - The gun was on the table near the window in the bedroom in the pink house
- Put sentences inside sentences
  - This is the cat that ate the rat that ate the cheese that was sold by the man that lived in the city that was on the river...
- No end to recursion - produce longer complex sentences

Back to recursion

- [Mary helped George]. (A sentence)
- [Cathy knew] that [Mary helped George].
  (a sentence within a sentence)
- [John believed] that [Cathy knew] that [Mary helped George].
- The word that introduces the complement phrase
Complement Phrases

- Cathy knew *that* Mary helped George
- That = complementizer (C) introducing complement phrase (CP)
- The CP comes after the VP
- S → NP VP
- VP → V CP
- CP → C S

Transformational Rules

- Phrase structure rules → represent ‘deep’ structure- always generate structures with fixed word order.
- Mary saw George recently
  Recently Mary saw George
- Transformational rules = take a specific part and attach it in another place
- You will help Cathy
- Will you help Cathy?
Transformational Rules

Exercises

Rewrite the following sentences with Phrase Structure Rules. Hint: Locate your principal NP and VP before beginning.

a) Miriam swims.
b) The dog is barking.
c) Peter told the truth.
d) The wicked witch spilled the potion.
e) The runner with the best time won the prize.

Exercises

Draw a labeled tree diagram for the following English phrases. (Hint: what part of speech is the leader for the phrase?)

a. ancient pyramids
b. in the early evening
c. Drove a car
Exercises

- Draw phrase structure trees for the following sentences:
  - The puppy found the child
  - The ice melted
  - The hot sun melted the ice.
  - The house on the hill collapsed in the wind.
  - The boat sailed up the river.
  - A girl laughed at the monkey.
  - George saw a dog with Mary

Exercises

- Draw two phrase structure trees representing the two meanings of the sentence:
  - The magician touched the child with the wand.

Exercises

- In what way these sentences are ambiguous?
  - We met an English history teacher
  - Flying planes can be dangerous
  - The parents of the bride and groom were waiting outside
  - The students complained to everyone that they couldn’t understand.
Finally

Go over the exercises on page. 96
See you next class 😊