

Language basics

IIE 366: Developmental
Psychology
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Lecture 20

Symbols and grammar

- Symbols
 - words are arbitrary
 - the sound "dog" has nothing to do with dogs
 - compare driving on parkway to parking on driveway, blueberries and cranberries, hamburger...
- Grammar
 - the order of words matters
 - Dog bites man. vs. Man bites dog.

Grammar

- You not only understand language, you *sense* when a sentence is ungrammatical
 - Please try your Nice Chinese Food with Chopsticks: the traditional and typical of Chinese glorious history and cultural.
 - Is raining.
 - The child seems sleeping.
 - Sally poured the glass with water.
 - It's a flying finches, they are.
 - Rarely is the question asked: Is our children learning?

Sometimes you still understand what was meant!

Phrases

- Every sentence is built out of phrases

The happy boy eats candy.

The first three words form a unit called a noun phrase (NP)

The happy boy

What identifies a noun phrase?

This is *not* the same analysis you did in grammar school!

Phrases

- All noun phrases obey certain rules
 - *rewrite rules*

NP → (det)A*N
 - NP -- noun phrase
 - det -- determiner: "the", "a", "an"
 - A -- adjective
 - N -- noun
 - () -- optional
 - * -- as many as you want

the happy boy

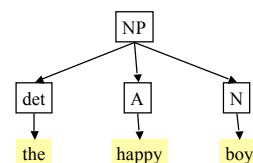
the boy

John

the tall slender woman

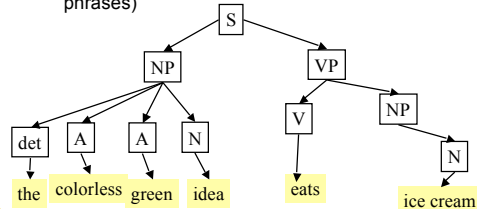
Phrase tree

- It helps to describe rules as phrase trees
- Specifies both *what* can be used in the phrase and *where* it must be used



Sockets

- In a phrase tree, a phrase is like a component that snaps into the right place
 - any appropriate phrase works! (even nonsense phrases)



Words

- Even if all languages have similar rules for combining phrases, they use different *words*
- Words are **symbols** that are arbitrary in many respects
 - “dog” is nothing like a dog
 - is it rote memorization?
 - » partly, but it is also more than that

Morphology

- The rules of word formation
- In many respects English has a very limited morphology
 - nouns have two forms
 - verbs have four forms

duck
ducks

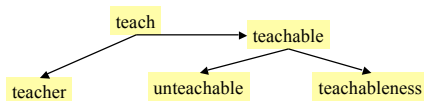
quack
quacks
quacked
quacking

Morphology

- Other languages have many more variations
 - Italian and Spanish have 50 forms of *each* verb
 - classical Greek has 350 forms of *each* verb
 - Turkish has 2 million forms of *each* verb
 - some languages build entire sentences around one complex verb
- There are rules for these forms

Morphology

- On the other hand, English morphology allows one to easily create new words from old words
 - add suffixes and prefixes



Suffixes

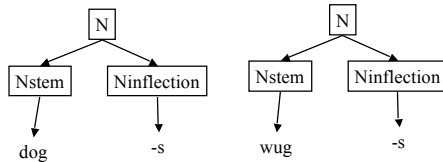
- English has lots of these derivational suffixes

-able	-ify	-ance	-ism	-ous	Examples of <i>morphemes</i>
-age	-ion	-ary	-ist	-y	
-al	-ish	-er	-ity		
-ate	-ize	-ful	-ive		
-ed	-an	-hood	-ness		
-en	-ant	-ic	-ory		

You probably do not consciously know what some of these mean, but your language system does.

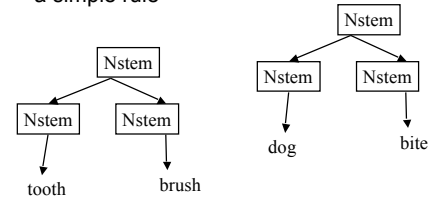
Rules

- So what are the rules?
- One looks to be easy
 - ♦ to pluralize a noun, add -s



Rules

- The creation of compound nouns also follows a simple rule



Exceptions

- You can probably think of lots of exceptions to these types of rules
 - ♦ many words seem to follow arbitrary rules
 - ♦ electricity --> *not* the state of being electric
 - ♦ intoxicate --> nothing to do with toxic substances
 - ♦ pluralization

» mouse, mice	teach, taught
» leaf, leaves	buy, bought
» man, men	fly, flew

Exceptions

- These exceptions generally come from other languages (with appropriate rules)
 - ♦ English adopts the words but not the rules
- These exceptions tend to be very common words
 - ♦ drink-drank sink-sank
 - ♦ throw-threw ring-rang
 - ♦ sit-sat blow-blew
- All derive from a proto-Indo-European language that formed past tense by replacing one vowel with another

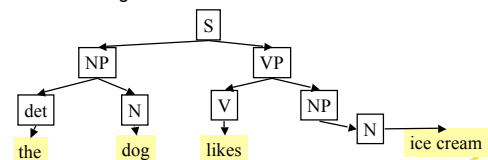
Understanding

- You can learn quite a bit about a sentence's meaning by knowing the phrase tree *structure* of the sentence
 - ♦ indicates some aspects of *meaning*

The green idea eats the girl's candy.
- We know the sentence is about an idea rather than the girl
 - ♦ we also know the idea is doing the eating

Parsing

- Parsing is something like building a phrase tree in reverse
- Let's parse through a simple sentence word by word
 - ♦ The dog likes ice cream.



Ambiguity

- Time flies like an arrow.
- (1) Time proceeds as quickly as an arrow proceeds.
- (2) Measure the speed of flies in the same way that you measure the speed of an arrow.
- (3) Measure the speed of flies in the same way that an arrow measures the speed of flies.
- (4) Measure the speed of flies that resemble an arrow.
- (5) Flies of a particular kind, time-flies, are fond of an arrow.

Ambiguity

- Or consider the following (grammatically valid) sentence
 - ♦ Buffalo buffalo buffalo buffalo buffalo buffalo buffalo.
- Here's a hint to make it understandable in principle

Significance

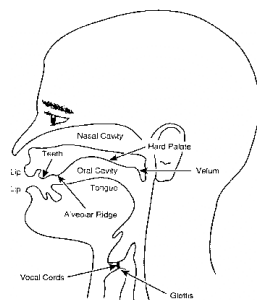
- These types of results suggest that words and grammar are *not* enough to insure communication
- In a certain sense a speaker and listener must already be *agreeing* about a topic before anything can be communicated
- Thus, we can understand the following discourse
 - ♦ Woman: I'm leaving you.
 - ♦ Man: Who is he?

Schemas / scripts

- Cognitive devices
 - ♦ describe stereotypical properties of a situation
 - ♦ e.g., restaurant scene involves table, waiter, drinks, tips,...
- Fill-in the missing information that is critical for understanding language (and events in general)
 - ♦ explains why it is difficult to communicate across cultures, even with a common language
- Schemas provide the context to remove the almost constant ambiguities of language

Speech

- Lungs push air out to make a sound
 - ♦ other organs shape sound



Example

- Note where your tongue is as you say
 - ♦ bet butt
 - ♦ beet bat
- The position of the tongue shapes the vocal tract and makes different sounds!
 - ♦ this is true for all vowels

Example

- Note what your lips do as you say
 - ♦ boot book
- The lips add additional frequencies to make different sounds
- Thus, you can *hear* someone smile across a telephone!
- Vowels are all distinguished by the shape of the vocal tract

Consonants

- Consonants are more complicated
 - ♦ different type of control of air flow
- (1) *Voicing*: vibration of vocal cords
 - ♦ /b/, /d/, /m/, /w/, /v/ (voiced)
 - ♦ /p/, /t/, /f/ (not voiced, or unvoiced)
- (2) *Place of articulation*:
 - ♦ /d/, /t/ (upper gum)
 - ♦ /m/, /b/, /p/ (lips)
 - ♦ /f/, /v/ (lip and teeth)

Consonants

- (3) *Manner of articulation*
 - ♦ /d/, /t/ (stop)
 - ♦ /m/ (nasal)
 - ♦ /f/, /v/ (fricative)
- Each consonant is uniquely identified by its voice (or not) and its place and manner of articulation

Phonemes

- English uses 40 combinations of voicing, place, and manner of articulation
 - ♦ Polynesian uses 11
 - ♦ Khoisian (Bushman) uses 141
- No language uses some possible sounds
 - ♦ raspberries, scraping teeth, squawking...
 - ♦ Note, these sounds *are* used for communication, but not as part of language!
- Japanese does not distinguish /r/ from /l/

Next time

- Language development