

TOPIC 2: BASICS OF LINGUISTICS

NATURAL LANGUAGE PROCESSING (NLP)
CS-724

Topics

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Topics	Subtopics
2: Basics of Linguistics	Description of language, Levels of description: <ul style="list-style-type: none"><li data-bbox="465 601 1180 654">• Phonetics and Phonology,<li data-bbox="465 676 861 729">• Morphology,<li data-bbox="465 752 730 805">• Syntax,<li data-bbox="465 828 799 881">• Semantics,<li data-bbox="465 903 788 956">• Discourse.

What Is Language?

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- A system for the **communication**, in **symbols**, **sound**, of any kind of information.
- Through language, people:
 - ▣ **share their experiences**, concerns, and beliefs and
 - ▣ **communicate these to the next generation**.

The Nature of Language

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- There are approximately 6,000 languages in the world
- More than 80 languages in Ethiopia.
- All languages are organized in the **same basic way**.
- Spoken languages use **sounds and rules** for putting the sounds together.
- Written language use **symbols and rules** of putting symbols together
- Sign languages use **gestures** rather than sounds or symbols.

Studying a Language

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1. Isolate the **phonemes**, or the smallest classes of sound that make a difference in meaning.
2. Determine all **groups or combinations of sounds** that seem to have meaning.
3. See how **morphemes** are put together to form words, phrases or sentences.
4. Determine all **groups or combinations of morphemes** that seem to create meaningful word.
- 5.

Levels of language description

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- **Phonetics and Phonology** — The study of linguistic sounds
- **Morphology** — The study of the meaningful components of words
- **Syntax** — The study of the structural relationships between words
- **Semantics** — The study of meaning
- **Pragmatics** — The study of how language is used to accomplish goals
- **Discourse** — The study of linguistic units larger than a single utterance

Levels of language description

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- **Language and communication**
 - Spoken and Written language.
 - Generation and Analysis of language.
- **Understanding language may mean:**
 - accepting new information,
 - reacting to commands in a natural language,
 - answering questions.
- **Problems and difficult areas**
 - Vagueness and imprecision of language:
 - redundancy (many ways of saying the same)... see, look,
 - ambiguity (many senses of the same data)..... read vs read
 - Non-local interactions, peculiarities of words.
 - Non-linguistic means of expression (gestures, ...).

Linguistic anomalies... the challenge

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- Pragmatic anomaly
Next year, all taxes will disappear.
- Semantic anomaly
The computer ate an apple.
- Syntactic anomaly
The computer ate an apple.
An the ate apple computer.
- Morphological anomaly
The computer eated an apple.
- Lexical anomaly

Colourless	green	ideas	sleep	furiously	<u>Incorrect</u>
↑	↑	↑	↑	↑	
adjective	adjective	noun	verb	adverb	
↓	↓	↓	↓	↓	
beautiful	red	dress	shining	amazingly	<u>correct</u>

Levels of language description

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- Tasks of being capable of analyzing an incoming audio signal and recovering the exact sequence of words and generating its response require knowledge about **phonetics and phonology**, which can help model how words are pronounced in colloquial speech.
- Producing and recognizing the variations of individual words (e.g., recognizing that *doors* is plural) requires knowledge about **morphology**, which captures information about the shape and behavior of words in context.

Levels of language description

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- **Syntax:** the knowledge needed to order and group words together

I'm I do, sorry that afraid Dave I'm can't.

(Dave, I'm sorry I'm afraid I can't do that.)

ቤቴ ሄጄ እመጣለሁ vs እመጣለሁ ቤቴ ሄጄ

Levels of language description

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- **Pragmatics:** the appropriate use of the kind of *polite* and *indirect* language
 - *No or*
 - *No, I won't open the door.*
 - *I'm sorry, I'm afraid, I can't.*
 - *I won't.*
- **Discourse conventions:** knowledge of correctly structuring these such conversations (intonation, gesturer, style, speech act, etc)
 - *Dave, I'm sorry I'm afraid I can't do **that**.*
 - *The word "**that**" is referring to something which is not part of the sentences*

Phonetics & Phonology

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- **Phonetics** -- What are the sounds? How are they made in the vocal tract?

Assignment: Write a report on IPA
(not more than two pages)

- **Phonology** -- How do sounds combine? How do they affect each other in a specific language?

Speech production: The IPA table

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- the basic idea behind the IPA is to have one symbolic representation for each sound

THE INTERNATIONAL PHONETIC ALPHABET (revised to 2005)

CONSONANTS (PULMONIC)

© 2005 IPA

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			ʀ					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

What is the difference between phonetics and phonology?

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- Phonetics deals with the physical properties of the elements of the sound system, e.g. how the sound is physically produced.
 - ▣ Eg: Sound production system by humans

- Phonology deals with the sound systems of languages
 - ▣ *How speech are organized into systems in **different languages***
 - ▣ *How **sounds are combined***
 - ▣ *The relation between them and how they affect each other.*

Phonology

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- *What knowledge do we possess about the phonological rules in our language?*
 - **Which sound sequences** *might be a word in our language*
 - **How to pronounce** *words we never heard before?*
 - *Change foreign words to pattern like the words in our language?*
 - *We know how to apply rules to words we never heard before?*

Phonology

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- How do you pronounce a sequence of morphemes?
 - Especially, how & why do you fix up the pronunciation at the seams between morphemes?
 - *phonology doesn't care about the spelling*
 - ▣ (spelling is the concern of applied morphology)
- Eg: know** (spelling)...../'**no**/ (sound)

What is Phonology?

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Pronunciation

- cat + -s
- dog + -s
- rose + -s
- kiss + -s

"kats"

"dawgz"

"roziz"

"kisiz"

why?

Spelling

cats

dogs

roses

kisses

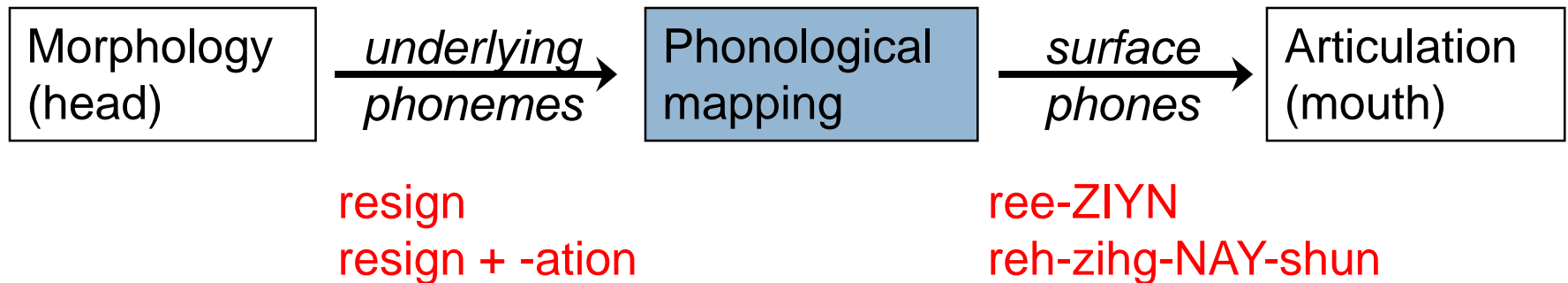
How do you pronounce a sequence of morphemes?
Especially, how & why do you fix up the pronunciation at the seams between morphemes?

phonology doesn't care about the spelling (that's just applied morphology)

What is Phonology?

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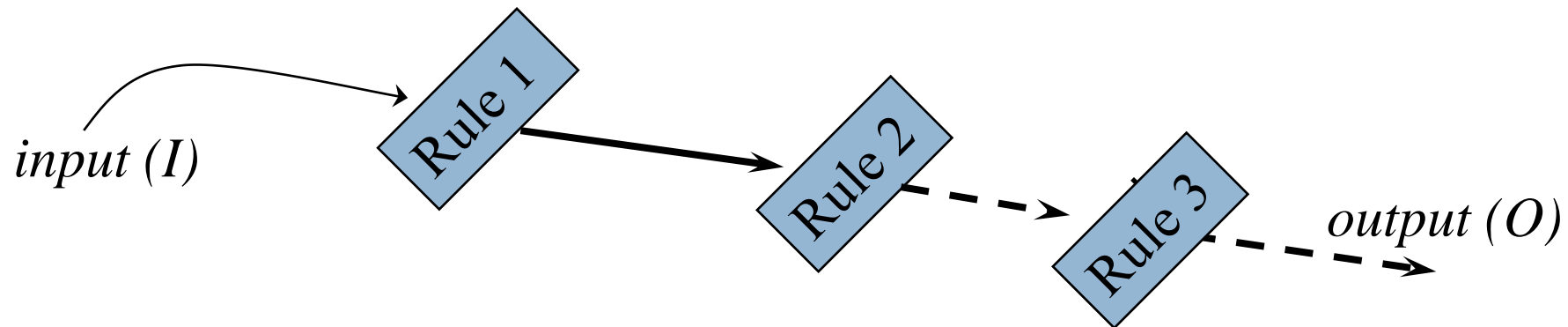
- A function twists head and lip



- What class of functions is allowed?
 - ▣ Differs from one language to another
 - ▣ Often complicated, but not arbitrary (some patterns... but few exceptions)
- In NLP, the question is: How to compute, invert, learn?

Successive Fixups for Phonology

- **Chomsky & Halle (1968)**
- Stepwise **refinement** of a single form
- How to handle “resignation” example?



- That is $O = f(I) = g_3(g_2(g_1(I)))$
 - ▣ Function composition (e.g., transducer composition)

What do you think are the “rules” about?

The *phoneme*

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- The smallest speech sound that distinguishes meaning. Its serves to create meaning differences, e.g. /f/ is different than /d/.
eg. **f**og vs **d**og
- The phoneme is an abstract term, specific to a **particular language**.
- It forms the structure of sound system in a language.

The *allophone*

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- Each phoneme may have different realisations depending on the context in which it is found.
 - ▣ the different articulations of /s/
 - ▣ /s/ in **seen** and **soon**.
 - 'seen' is produced with spread lips, as /i/ follows.
 - 'soon' is realised with rounded lips, to prepare for the following rounded vowel, /u/.
 - ▣ This second, rounded /s/ is a variation, or *allophone* of the phoneme.
- *Allophones are what we actually produce and hear (not what is seen or written).*

Allophones of /t/

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- There are more [t]'s than you know
- Example: the [t] in *time* is **aspirated**, but that in *stop* is not. (aspiration= pause + forceful air release prior to next sound)
- All these are allophones of the phoneme /t/.
- These differences are usually expressed using phonological rules. (what happens when one sound is followed by another?)

	word	transcription	context
1	stop	[stɒp]	After [s]
2	time	[t ^h aɪm]	Syllable initial
3	butter	bʌrər	Between vowels

Finding Phonemes

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- **minimal pairs** of words
- A minimal pair is a pair of words that have **different** meanings and which differ in only **one** sound.
- Here is an example from English:
 - Sip* [sɪp]
 - Zip* [zɪp]

Co-articulation

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- When humans talk, we often are **fast** and **spontaneous**;
- articulators move from one sound to another without stopping.
- Co-articulation:
 - ▣ *one sound becomes more like its neighboring sound.*
- Assimilation & elision

Assimilation

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- A rule that makes neighboring sounds similar by spreading a phonetic property from one sound to another
- Ease of articulation
- E.g. nasalized vowels occur before nasal sounds
man vs. map / bob vs. bomb

Elision

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- *elision* is the instance of omitting a sound that comes after another one in certain circumstances.
- Note the [d] in “*you and me*” or in “*friendship*”
- The [d] is usually omitted in spoken English

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Morphology

Morphology

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- Morphology deals with the syntax of complex words and parts of words, also called **morphemes**, as well as with the semantics of their lexical meanings.
- Understanding how words are formed and what **semantic properties** they convey through their forms enables human beings to easily recognize individual words and their meanings in discourse.

Morphology

- **Morphology** is the branch of linguistics that *studies the structure of words*.
- In English and many other languages, many words can be broken down into parts. For example:
 - unhappiness un-happi-ness
 - horses horse-s
 - walking walk-ing
 - አልተሰበርኩልህምና አል-ተ-ሰበር-ኩ-ል-ህ-ም-ና
ሰበር ሰ+ኧ+ብ+ኧ+C

Morphology

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- *un* - carries a negative meaning
- *ness* - expresses a state or quality
- *s* - expresses plurality
- *ing* - conveys a sense of duration
- A word like “yes”, however, has no internal grammatical structure. We can analyze the sounds, but none of them has any meaning in isolation.

Morphology

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- *The smallest unit which has a meaning or grammatical function that words can be broken down into* are known as **morphemes**.
- So to be clear: “un” is a morpheme.
- “clear” is also a morpheme, but also happens to be a word.

Free and Bound Morpheme

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- Analysis at a morphological level is concerned with structural elements of meaning called **morphemes**.
- Morphemes are classified into two types:
 - ▣ **Free Morphemes:** girl, boy, mother, etc. These are words with a complete meaning, so they can stand alone as an independent word in a sentence.
 - ▣ **Bound Morphemes:** These are lexical items incorporated into a word as a dependent part. They cannot stand alone, but must be connected to another morpheme to give meaning.

Free and Bound Morpheme

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- Bound morphemes operates in the connection processes by means of **derivation, inflection, and compounding.**

Eg: **ing ed s**

- Drive.....Drive+**ing** = Driving
- Kill.....Kill+**ed** = Killed
- Cat.....Cat+**s** = Cats

In the above example, **Cat, Drive, Kill** are Free Morphemes while **ing ed** and **s** are bound morphemes

Word Formation Methods

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- **(1) Affixation** is concerned with the way morphemes are connected to existing lexical forms as attachments to show different grammatical feature.
- We distinguish affixes of various types:
- **Prefixes** - attached at the beginning of a lexical item or base-morpheme –
 - eg: un-, pre-, post-, dis, im-, etc.
- **Suffixes** – attached at the end of a lexical item
 - eg: -age, -ing, -ful, -able, -ness, -hood, -ly, etc.

Rare Cases

- **Infix-** inserted in the middle of a lexical item or base-morpheme –
 - eg: **sbr** + **ee** + CVCVC, which leads to the stem **seber** ‘broke’
- **Circumfix-** attached on the left and right end of a lexical item
 - eg: Amharic negative marker **al**-seberkut-**m** (አል-ሰበርኩት-ም)

Word Formation Methods

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- Tagalog (from Philippines) uses the *infix* 'um' to form infinitive forms of verbs
 - ▣ sulat 'write' **sum**ulat 'to write'
 - ▣ bili 'buy' **bum**ili 'to buy'
 - ▣ kuha 'take' **kum**uha 'to take'

Word Formation Methods

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- **(2) Compounding**, words can be created by *Compounding*, which is *forming new words from two or more independent words*: the words can be free morphemes, words derived by affixation, or even words formed by compounds themselves.
- e.g.
 - girlfriend air-conditioner
 - blackbird looking-glass
 - textbook watchmaker

Word Formation Methods

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- **(3) Reduplication**, which is *forming new words either by doubling an entire free morpheme (total reduplication) or part of a morpheme (partial reduplication)*.
- English doesn't use this, but other languages make much more extensive use of reduplication.
- Sber /sbr/ (sbr) seberber /sbrsbr/ (sbrsbr)....
seberberber /sbrsbrsbr/ (sbrsbrsbr)

Derivational vs. Inflectional

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- **Derivational morphemes** create or *derive* new words by changing the meaning or the *word class* of the word (change verb into noun), while **Inflectional morphemes** creates a word with similar meaning but more grammatical feature without affecting the word class.
- For example:

happy → unhappy (Inflectional)

Both words are adjectives, but the meaning changes.

quick → quickness (Derivational)

The affix changes both meaning and word class - adjective to a noun.

INFLECTIONAL MORPHOLOGY

- Inflection is a morphological process that adapts existing words so that they function effectively in sentences without changing the category of the base morpheme.
- Swahili has the following inflectional suffixes:

Swahili (East Africa).

1.	ninaku sikia	'I hear you'
2.	ninamsikia	'I hear him'
3.	ninakisikia	'I hear it'
4.	ninawasikia	'I hear them'
5.	anakusikia	'he hears you'
6.	anamsikia	'he hears him'
7.	anawasikia	'he hears them'
8.	anatusikia	'he hears us'
9.	unanisikia	'you hear me'
10.	unawasikia	'you hear them'
11.	tunakisikia	'we hear it'
12.	wanakusikia	'they hear you'
13.	ninakujibu	'I answer you'
14.	nitakujibu	'I will answer you'
15.	nimekujibu	'I have answered you'
16.	nilikujibu	'I answered you'
17.	unamjibu	'you answer him'
18.	utamjibu	'you will answer him'
19.	umemjibu	'you have answered him'
20.	ulimjibu	'you answered him'
21.	mnanisikia	'you (pl.) hear me'
22.	mmewasikia	'you (pl.) have heard them'
23.	mtatusikia	'you (pl.) will hear us'
24.	mlikisikia	'you (pl.) heard it'
25.	ninamjua	'I know him'
26.	niliwajua	'I knew them'
27.	atanisaidia	'he will help me'
28.	wamekusaidia	'they have helped you'

ROOTS AND STEMS

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Roots

The root is generally the principle **carrier of the lexical meaning of a word**, while affixes generally carry grammatical meanings.

- For example, in cats, the root cat carries the basic meaning, while -s carries the grammatical information 'plural.'

Stems

In addition to roots, we also distinguish stems. A stem may be also a root, as cat in cats.

Exercise: Amharic Root vs Stem

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Syntax

Syntax is:

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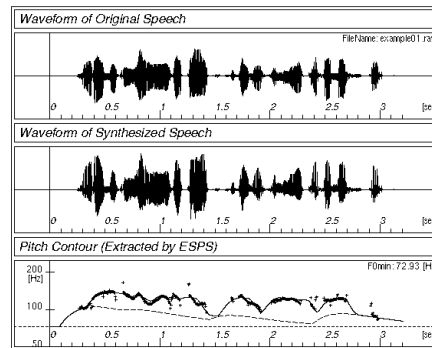
Syntax, is the study of grammatical relations between words and other units within the sentence.

- Study of structure of sentence in a language
- Word order or subconscious grammatical knowledge
- Refers to the way words are arranged together, and the relationship between them.
- Roughly, goal is to relate surface form (what we perceive when someone says something) to semantics (what that utterance means)
- Representational device is **tree structure**

Simplified View of Linguistics

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Phonology



⇔ /waddyasai/

Morphology

/waddyasai/ ⇔ what did you say

Syntax

what did you say ⇔

```

    say
   /  \
  subj  obj
   you  what
  
```

Semantics

```

    say
   /  \
  subj  obj
   you  what
  
```

⇔ $P[\lambda x. \text{say}(\text{you}, x)]$

Syntax: Useful for:

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- Grammar checkers
- Question answering
- Information extraction
- Machine translation

What do children know?

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- Children, when acquiring language learn the following from the language surrounding them:
 - *Word order (SVO, SOV, etc.)*
 - *N-Adj or Adj-N*
 - *What do you think (what's) in there?*
- How do kids master this so quickly?

Universal Grammar? (UG)

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- Child hears the surrounding language
- Detects patterns and matches them with already stored structures
- Switches on those that match; switches off those that don't (subconsciously)
- Kids seems to develop, instead of learn language.
(*Human children construct language!* Clark p. 222 (Heny))

What do native speakers know?

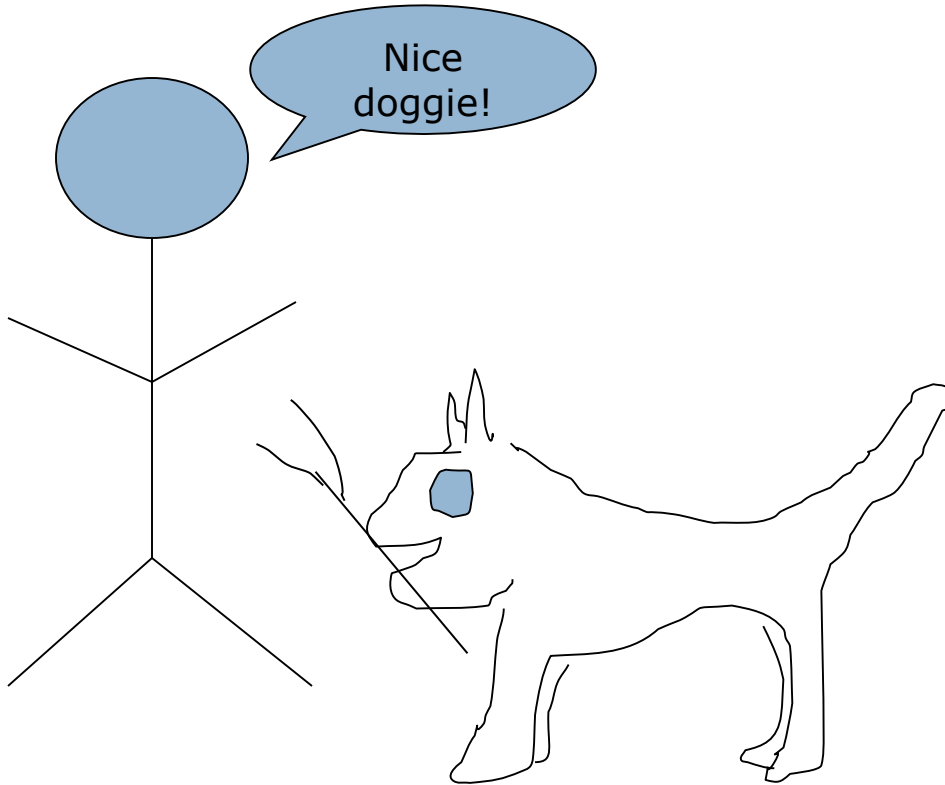
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- Grammaticality
- Implied interpretations
- Ambiguity
- Synonymy

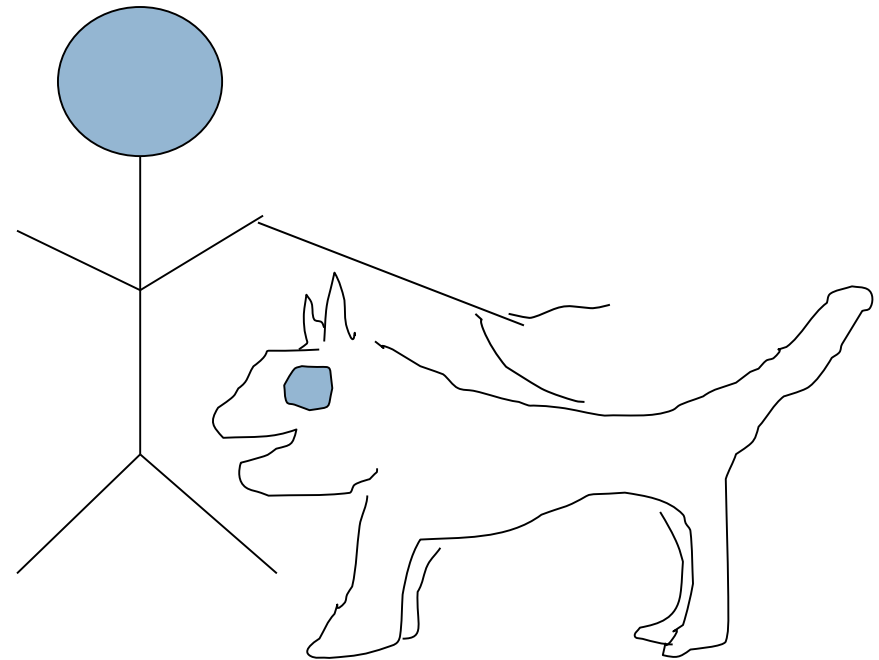
Do I mean this?

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I scratched (the dog with a stick)



I scratched (the dog) with a stick.

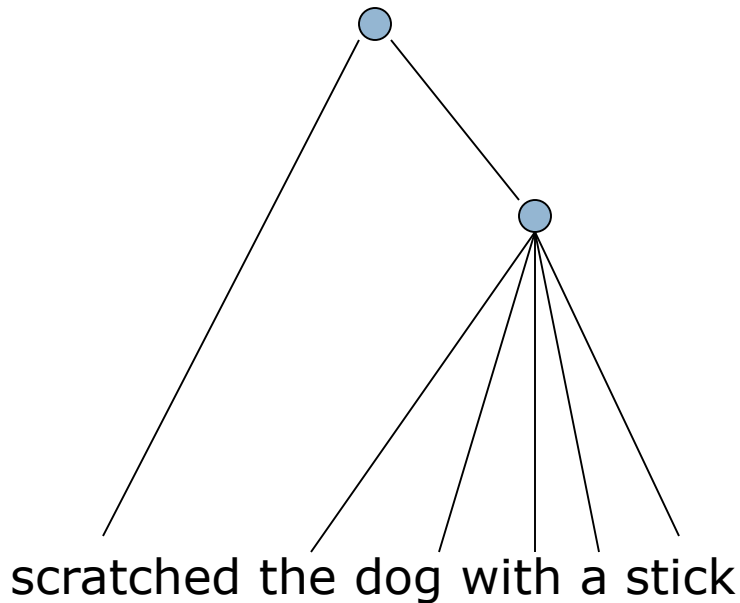


The two meanings are a result of:

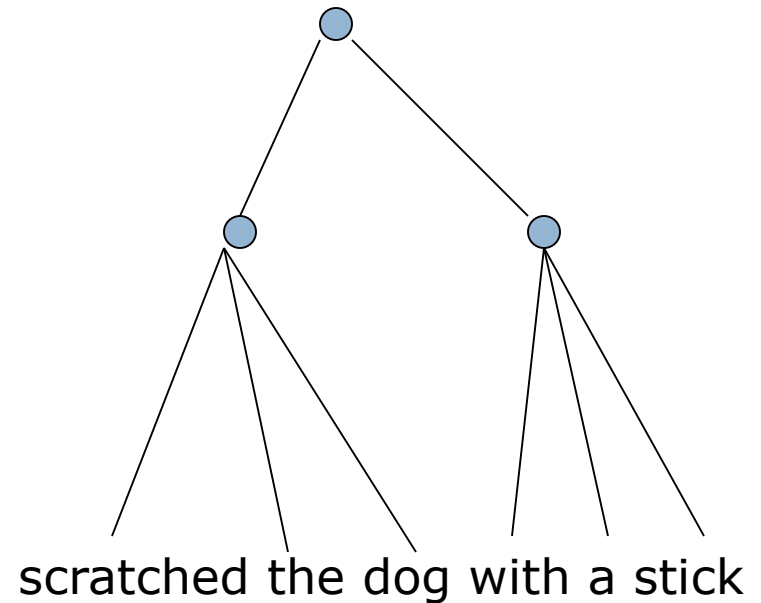
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Hierarchical Structure

- Sentences are more than just ordered sequences of words.
- They have internal hierarchical structure as well.



dog has stick



I have stick

Two kinds of ambiguity:

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- She called her boyfriend from Australia.
 - ▣ STRUCTURAL AMBIGUITY

- We went down to the bank yesterday
 - ▣ LEXICAL AMBIGUITY

Basic Word Order

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- SVO (English, Chinese)
 - ▣ *The boy saw the man.*
- SOV (Amharic, Russian, Turkish, Japanese)
 - ▣ *Pensive poets painful vigils keep. (Pope)*
 - ▣ ልጅ ቤቱ ሄደ :: አበበ አልማዝን መታት
- VSO (Irish, Arabic, Welsh)
 - ▣ *Govern thou my song. (Milton)*

Basic Word Order

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- **OSV** (Jamamadi & Yoda)
 - ▣ *When nine hundred years you reach, look as good you will not.*
 - ▣ *So...put subject in front of the verb, would you? Fail this test you will.*

- **OVS** (Apalai - Amazon basin)

- **VOS** (Malagasy (Madagascar))

Free Word Order (Walipiri, Dyirbal, Latin, Old English...)

E.g., Latin

Paulus Mariam vidit.

Paulus vidit Mariam.

Vidit Paulus Mariam

Mariam Paulus vidit.

Mariam vidit Paulus.

Vidit Mariam Paulus.

'Paul saw Mary'

SOV Word Order (Japanese, Navajo, Turkish, Persian ...)

E.g., Koyukon Athabaskan

Denaa deneege neeł'aanh

man moose is looking at

'the man is looking at the moose'

SVO Word Order (English, French, Chinese, Thai...)

E.g., Swahili

M-toto a-li-vunja ki-kombe.

WC-child he-PAST-break WC-cup

(WC=Word Class)

'the child broke the cup'

Wa-toto wa-na-vunja vi-kombe

WC-child they-PRESENT-break WC-cup

'the children broke the cups'

How would you say...

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□ English (SVO)

Susie

brings

coffee

□ Japanese (SOV)

sushi-ga

co:hi:-o

mottekuru

Susie

coffee

bring

□ Malagasy (VOS)

Entin'

kafe

Susie

bring

coffee

Susie

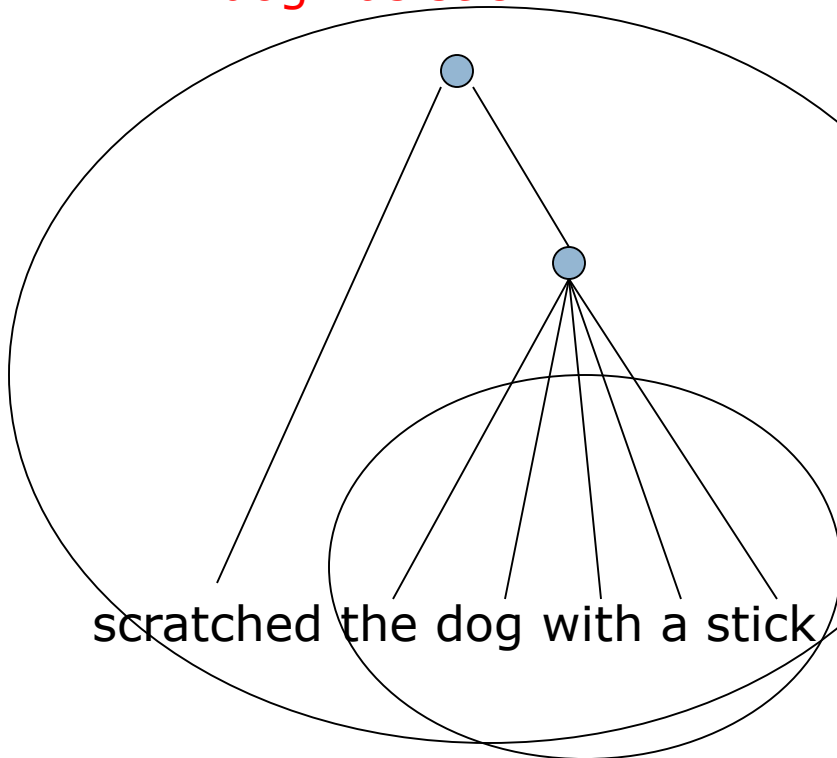
The Concept of Constituency

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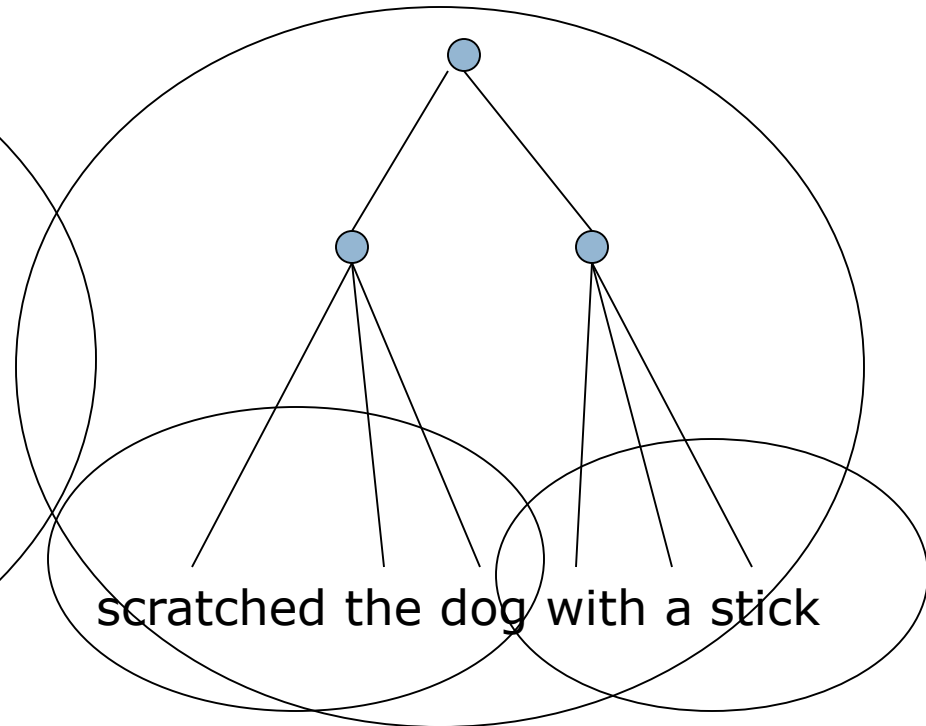
Constituent

a group of words in a sentence that behave syntactically and semantically as a *unit*.

dog has stick



I have stick



How to determine constituency

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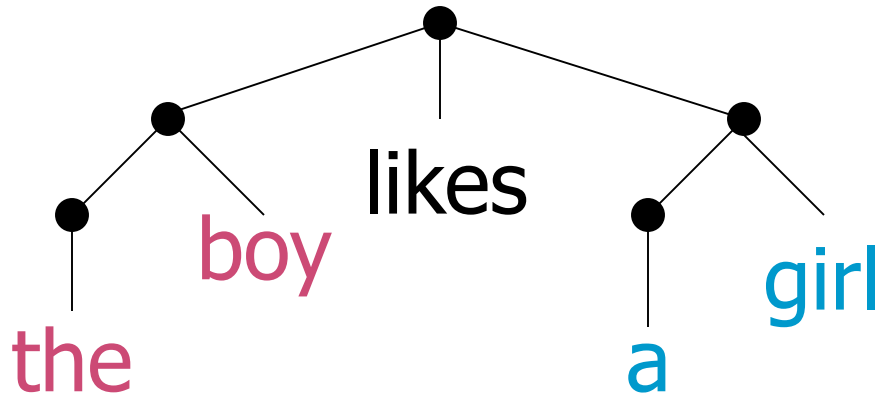
- Semantic intuitions
 - ▣ sometimes, we just know that certain strings of words go together as a unit.

- Constituency Tests (more reliable)
 - ▣ tests that can be applied to string of words **in a given** sentence to determine if the string is a constituent or not.

From Substrings to Trees

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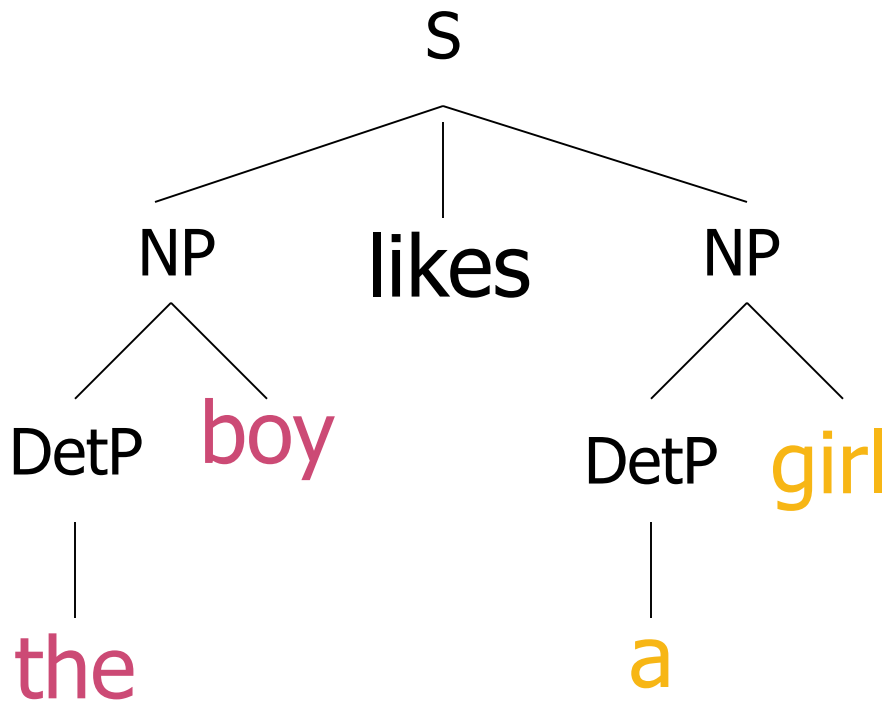
- (((the) boy) likes ((a) girl))



Node Labels

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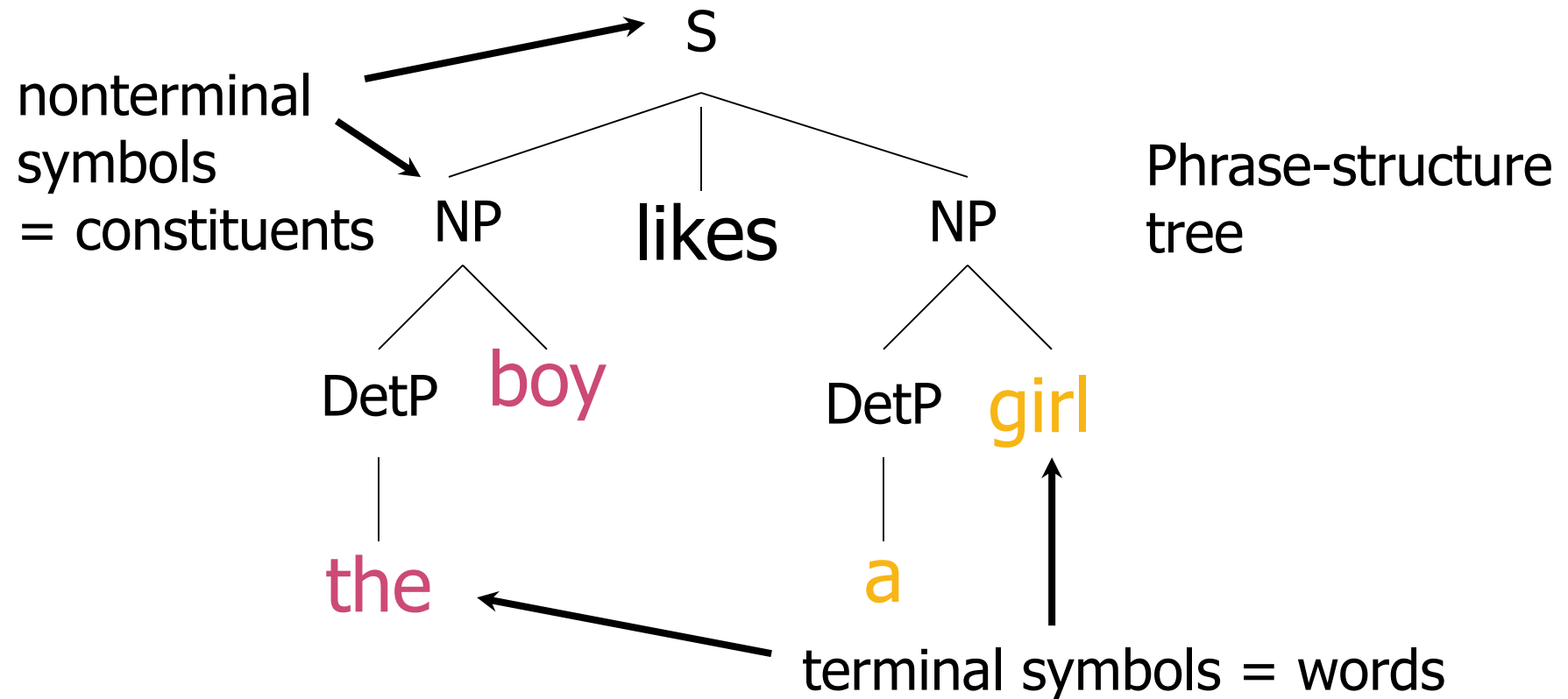
- (((the/Det) boy/N) likes/v ((a/Det) girl/N))



Types of Nodes

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- (((the/Det) boy/N) likes/v ((a/Det) girl/N))

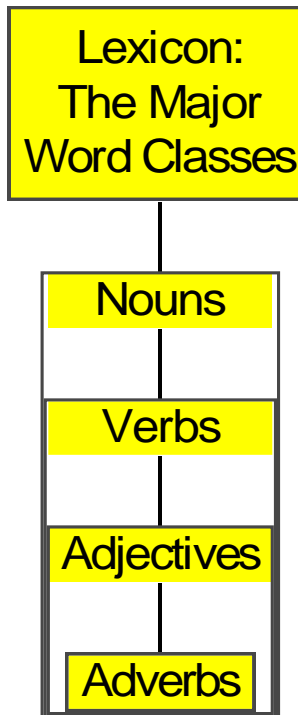


Determining Part-of-Speech

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Determining part of speech is crucial for building the hierarchical structure of sentences.

The Lexicon



Context-Free Grammars

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- Defined in formal language theory (comp sci)
- Terminals, nonterminals, start symbol, rules
- String-rewriting system
- Start with start symbol, rewrite using rules, done when only terminals left
- NOT A LINGUISTIC THEORY, just a formal device

CFG: Example

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- Many possible CFGs for English, here is an example (fragment):
 - $S \rightarrow NP VP$
 - $VP \rightarrow V NP$
 - $NP \rightarrow DetP N \mid AdjP NP$
 - $AdjP \rightarrow Adj \mid Adv AdjP$
 - $N \rightarrow boy \mid girl$
 - $V \rightarrow sees \mid likes$
 - $Adj \rightarrow big \mid small$
 - $Adv \rightarrow very$
 - $DetP \rightarrow a \mid the$

the very small boy likes a girl

Derivations in a CFG

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the boy likes a girl

$S \rightarrow NP VP$

$VP \rightarrow V NP$

$NP \rightarrow DetP N \mid AdjP NP$

$AdjP \rightarrow Adj \mid Adv AdjP$

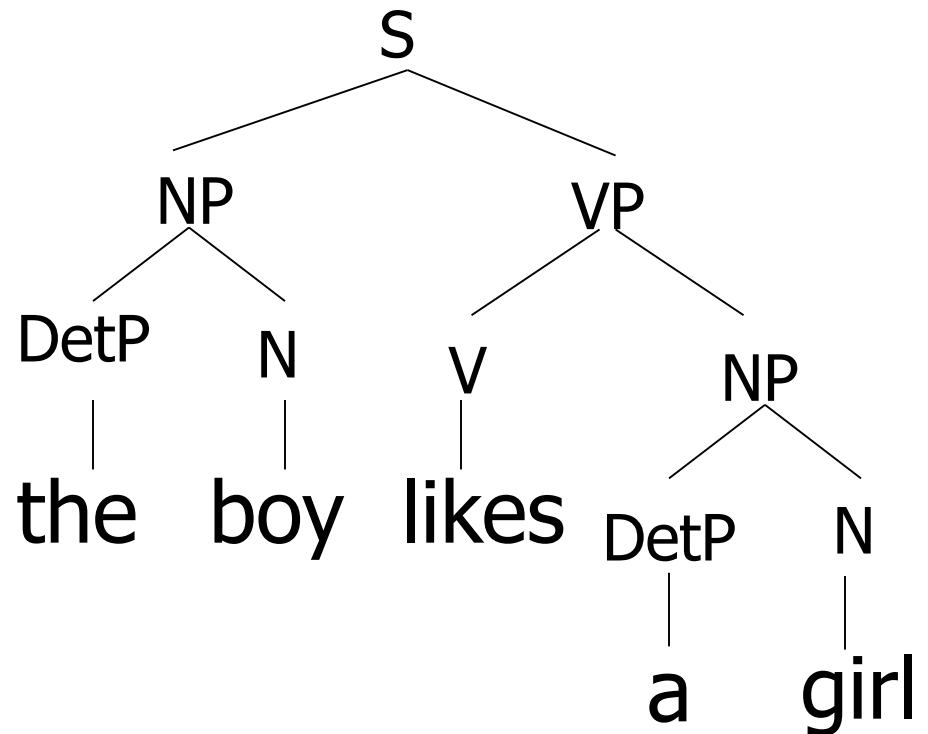
$N \rightarrow boy \mid girl$

$V \rightarrow sees \mid likes$

$Adj \rightarrow big \mid small$

$Adv \rightarrow very$

$DetP \rightarrow a \mid the$



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Semantics

What is Semantics?

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- The study of meaning of words, phrases, and sentences.
 - ▣ Lexical semantics (words and meaning relationship among words)
 - ▣ Phrasal/ sentential semantics (syntactic units larger than a word)

- What a speaker conventionally means (objective or general meaning)- **not** *what he is trying to say* (subjective or local meaning)

Semantics

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- What do you mean..?
- Words – Lexical Semantics
- Sentences – Compositional Semantics
- Converting the syntactic structures to semantic format – meaning representation.
- Semantics: the meaning of a word or phrase within a sentence
 - ▣ How to represent meaning?
 - Semantic network? Logic? Policy?
 - **What do you think is the best way?**

Semantic features

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- Syntactically correct sentences but semantically odd.
 - *The tree ate the hamburger .*
 - *My cat studies linguistics.*
 - *The table listens to the radio*

- This relates to the conceptual components of the words 'tree, cat & table' → *not human.*

Semantic Features

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- Semantic properties:
 - The components of meaning of a word.
 - Meaning as collection of properties/features typically with two possible values (+ / -)
 - Example of componential analysis:

baby is [+ young], [+ human], [+animate], [+fluid]

Semantic Features

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	<i>table</i>	<i>horse</i>	<i>boy</i>	<i>man</i>	<i>girl</i>	<i>woman</i>
animate	-	+	+	+	+	+
human	-	-	+	+	+	+
female	-	-	-	-	+	+
adult	-	+	-	+	-	+

Identify the features (1)

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1. (a) widow, mother, sister, aunt, maid

(b) widower, father, brother, uncle

→ The (a) and (b) words are [+ human]

→ The (a) words are [+ female]

→ The (b) words are [+ male]

2. (a) bachelor, paperboy, pope, chairman

(b) bull, rooster, drake, ram

→ The (a) and (b) words are [+ male]

→ The (a) words are [+ human]

→ The (b) words are [+ animal]

Semantic roles

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- Words are described according to the roles they fulfill with the situation described in a sentence.
 - The boy *kicked* the ball
 - verb → indicates action
 - Boy → performs the action = **agent**
 - Ball → undergoes the action = **theme**
- The NPs describe the role of entities (people or things) involved in the action, i.e. they have certain semantic (or thematic) roles.

Semantic Roles

- **Agent**= the entity that performs the action
- **Theme**= the entity that undergoes the action
- **Experiencer**= one who perceives something
- **Instrument**= an entity used to perform an action
- **Location**= the place where the action happens
- **Source**= the place from which an action originates
- **Goal**= the place where the action is directed

Semantic roles

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- John is writing with a pen

agent

instrument

- Mary saw a mosquito on the wall

experiencer

theme

location

- The children ran from the playground to the pool

agent

source

goal

- **Ex: (Self Experiment)**

- ▣ The boy opened the door with a key
- ▣ The dog bit the stick
- ▣ With a stick, the man hit the dog.

Lexical relations

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- What is the meaning of ‘big’?
 - ▣ ‘Large’ or the opposite of ‘small’

- What is the meaning of ‘duck’?
 - ▣ “a bird like animal” or “hiding the head”?

- Analysis in terms of lexical relations- *explain the meaning in terms of the relationship with other words*
 - Synonymy
 - Antonymy
 - Hyponymy
 - Homophones and Homonyms
 - Polysemy

Synonymy

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- **Synonymy**: words that have the same meanings or that are closely related in meaning
- E.g. answer/reply – almost/nearly – broad/wide – buy/purchase – freedom/ liberty
- ‘sameness’ is not ‘total sameness’- only one word would be appropriate in a sentence.
 - ▣ E.g. *Sandy only had one answer correct on the test.* (but NOT reply)
- Synonyms differ in formality
 - ▣ E.g buy/purchase – automobile/car

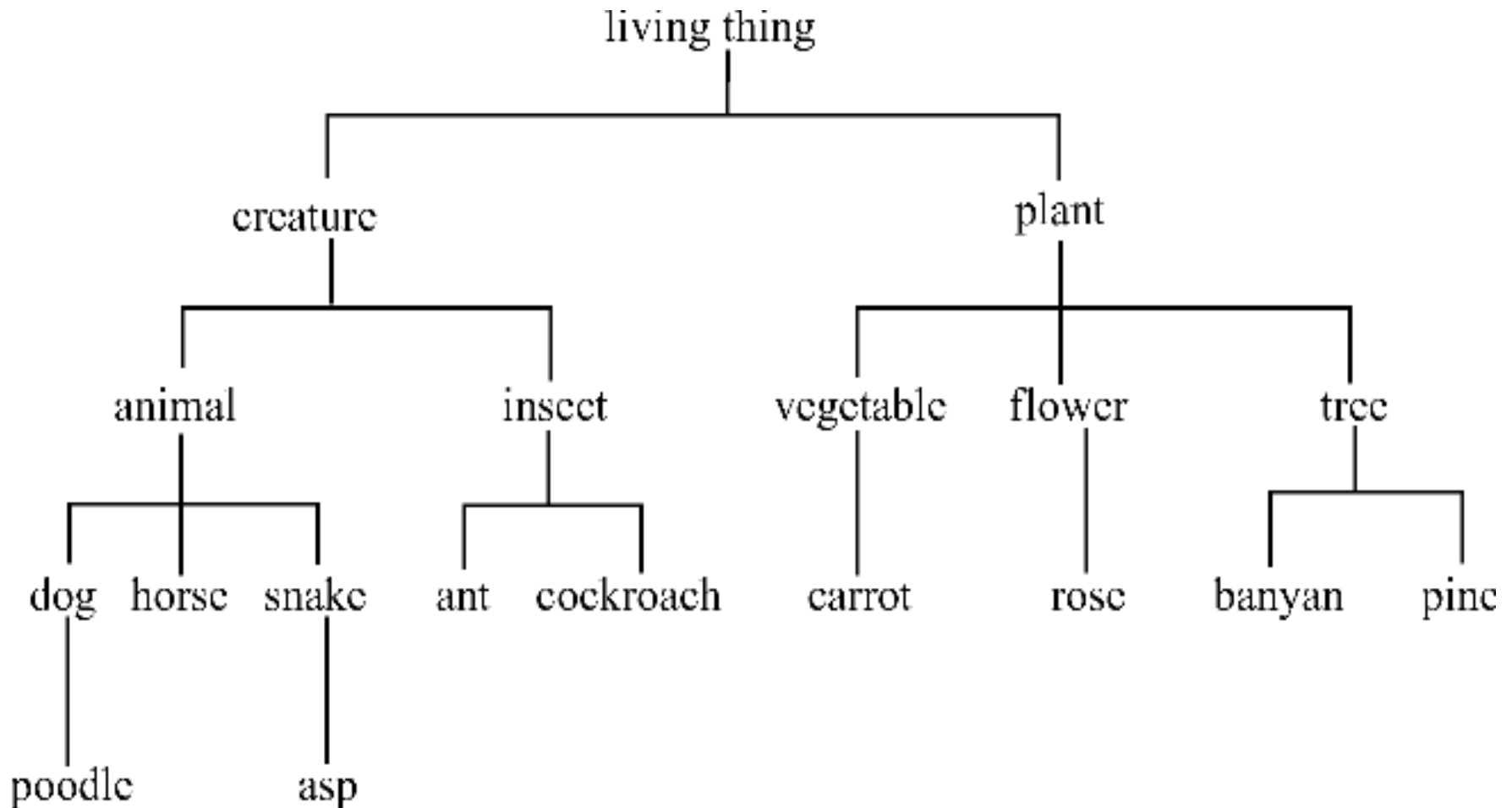
Hyponymy

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- **Hyponymy**: Words whose meanings are specific instances of a more general word, i.e. *one thing is included (kind of) in another thing*.
 - e.g. **cats** and **dogs** are hyponyms of the word **animal**.
- In this case cats and dogs are co-hyponyms share the same 'superclass'
- Other e.g. carrot & vegetable / ant & insect

Hyponymy

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Homophones and Homonyms

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- **Homonymy:** A word which has two or more entirely distinct (unrelated) meanings,
 - e.g. **bank:** ‘financial institution’ ; ‘of a river’.
 - **Bat:** ‘flying creature’ or ‘used in sports’
 - **Race:** ‘contest of speed’ or ‘ethnic group’
- **Homophony:** Different words pronounced the same but spelled differently,
 - e.g. *two, to* and *too*.
 - *Flour* and *flower*
 - *Meat* and *meet*
 - *Right* and *write*

Polysemy

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- **Polysemy:** A word which has multiple meanings related by extension,
 - e.g. *bright*: ‘shining’ ; ‘intelligent’
 - ‘Head’ of **the body** and the **person at the top of a company**.
 - ‘Foot’ of **a body** and **of a mountain** and **of the bed or chair**.
 - ‘Run’ a person runs, the water runs , the program runs

Collocation

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- Words tend to occur with other words.
- This is important to distinguish meaning (semantics)

- E.g. table/chair
- Butter/bread
- Salt/pepper
- Hammer/ nail

Pragmatics and Discourse

- **Pragmatics**: structures and patterns in discourses
- It is about the **use of language in a context**.
- Sentence standing alone may not mean so much. It may be ambiguous.
- What information is contained in the contextual sentences that is not conveyed in the actual sentence?
- Computation of the **speech act** intended by a speaker will be highly context- dependent, but essential to recovery of meaning in discourse.

Pragmatics and Discourse

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- Discourse / Context makes utterances more complicated.
- Discourse has an information structure, **discourses are about a topic:**
 - ▣ Co-reference resolution: Resolving the pronoun's reference.
 - "I read the book by Dr. Kalam. It was great"
 - "*We gave the monkeys the bananas because they were hungry*"
 - "*We gave the monkeys the bananas because they were over-ripe*"
 - *Jane races Mary on weekends. She often beats her.*
 - ▣ Incomplete sentences
 - "What's your name?"
 - "Almaz, and yours?"
 - The second sentence is not complete, but what it means can be inferred from the first one.

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End of Topic 2