

Language as a structure

- language in the form of a signal
- structure of sounds: phonology
- structure of words: morphology
- structure of sentences: syntax

adapted from a lecture by Dr Andrew Hippisley, 2007

Language in signal form

Communication systems:

- mode of communication
 - means by which a message is transmitted
 - e.g. vocal-auditory, visual, chemical

Language in signal form

Communication systems:

- mode of communication
- semantics
 - signals in the communication have meaning

Language in signal form

Communication systems:

- mode of communication
- semantics
- pragmatic function
 - what purpose does the communication serve?

Language in signal form

Communication systems:

- mode of communication
- semantics
- pragmatic function
- interchangeable
 - ability to both send and receive messages
 - language generation and understanding
 - speaking and listening

Language in signal form

Communication systems:

- mode of communication
- semantics
- pragmatic function
- interchangeable
- arbitrary
 - form of the signal is not logically related to the signal's meaning
 - c.f. iconic systems "woof woof"

Language in signal form

Communication systems:

- mode of communication
- semantics
- pragmatic function
- interchangeable
- arbitrary
- discrete
 - a single large complex message can be built up out of smaller simpler messages

Language in signal form

Human communication:

- all of the above PLUS
- displacement
 - ability to talk about things not present in space and time

Language in signal form

Human communication:

- all of the above PLUS
- displacement
- productivity
 - ability to generate and understand novel messages that convey novel ideas
 - human communication is therefore an open system

Hierarchy of spoken language from the signal up

- social world
 - interactive human beings
- pragmatics
 - purpose of communication
- semantics
 - meaning of message
- syntax
 - structured phrases
- empirics
 - speech patterns
- physical world
 - acoustical signal

Structure of sounds: phonetics and phonology

- Phoneme
 - unit of sound structure
 - abstraction of a set of sounds (allophones) with linguistic content
 - *run*
 - *bun* /b/
 - *rum* /m/
 - /b/ and /m/ are phonemes in English
- Phone
 - a realisation of a phoneme

Units of sound structure: consonants and vowels

CONSONANTS (PULMONIC)										
	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k ɡ	q ɢ	ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ	
Tail		β		ɣ						
Tap or Flap				ɾ		ɽ				
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ				
Lateral fricative				ɬ ɮ						
Approximant				ɹ		ɻ				
Lateral approximant				l		ɭ				

VOWELS										
	Front			Central			Back			
	Close	Close-mid	Open-mid	Open	Close	Close-mid	Open-mid	Open	Close	Open
Close	i	ɨ	ɪ	ɯ	ɯ	ɯ	ɯ	ɯ	ɯ	ɯ
Close-mid	e	ɛ	ɜ	ɞ	ɞ	ɞ	ɞ	ɞ	ɞ	ɞ
Open-mid	ɛ	ɛ	ɛ	ɛ	ɛ	ɛ	ɛ	ɛ	ɛ	ɛ
Open	a	ɶ	ɶ	ɶ	ɶ	ɶ	ɶ	ɶ	ɶ	ɶ

When symbols appear in pairs, the one to the right represents a voiced consonant. Shaded cells represent a rounded vowel.

Structure of words: morphology

- morphemes
 - smallest meaningful units
 - *buns* is bun+s
 - *rerun* is re+run
- morphological rules

Morphological rules

madness:	reader:
[[mad] _{Adj} ness] _N	[[read] _V er] _N
solidify:	rerun (verb):
[[solid] _{Adj} ify] _V	[re [run] _V] _V
	rerun (noun):
	[[re [run] _V] _V Ø] _N

A morphological rule: word formation

READ:
 phonology: /read/
 syntax: Verb
 semantics: 'to read'

READER:
 phonology: /read+er/
 syntax: Noun
 semantics: 'person who reads'

Morphological conversions

Word formation rule '+er':

	Base term	→	Derived term
phon:	/stem/		/stem+er/
syntax:	Verb		Noun
semantics:	'X'		'person who Xes'

Word conversion rule:

	Base term	→	Derived term
phon:	/stem/		/stem+Ø/
syntax:	Verb		Noun
semantics:	'X'		'the result of X'

Structure of sentences: syntax

What is syntax?

"characteriz[ing] the relation between semantic predicate-argument relations and the superficial word and phrase configurations by which a language expresses them" (Kaplan 2003)

It relates word sequences to their meaning.

Structure of sentences: syntax

(a) John saw Mary	<i>syntactic level</i>
(b) saw (John ₁ , Mary ₂)	<i>semantic level</i>
(c) Mary was seen by John	<i>syntactic level</i>
(d) Mary sent John books	<i>syntactic level</i>
(e) sent (Mary ₁ , John ₂ , books ₃)	<i>semantic level</i>

(a,b,c) see: 1 = agent, 2 = patient

(d,e) send: 1 = agent, 2 = goal, 3 = patient

Structure of sentences: syntax

- N V N
Max met Jane

- N V N N
Max gave Jane bananas

Structure of sentences: syntax

- NP V NP
[The boys] watched [the game]

- NP V NP
[The boys from Brazil] watched [an interesting game on TV]

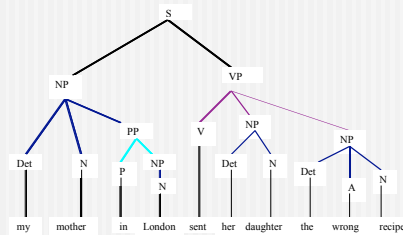
- NP V NP NP
[My mother] sent [a recipe] to Mary

- NP V NP NP
[My mother in London] sent my sister [her favourite recipe]

Structure of sentences: syntax

- (a) $S \rightarrow NP VP$ rule
- (b) $NP \rightarrow (Det) (A) N$ rule
- (c) $NP \rightarrow (Det) (A) N PP$ rule
- (d) $VP \rightarrow V NP$ rule
- (e) $VP \rightarrow V NP NP$ rule
- (e) $PP \rightarrow P NP$ rule

[My mother [in London]] sent [her daughter] [the wrong recipe]



Summary

- The flat speech signal from an utterance contains meaning and structure
- By abstraction and generalisation (i.e., rules), we can assign hierarchical structure to the linear signal to get at the semantics
- Levels of structure in spoken language:
 - phonology
 - morphology
 - syntax