Language

Language

- Unique Human Ability
- Productive
  - Allows possibility of representing infinite number of meaningful states of affairs
- Displacement
  - Present, past, & future
  - Alternatives to reality, false states of affairs
  - Ability to talk about things that haven't happened makes language medium for persuasion, coercion, and bargaining

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Uniquely Human?

- Only humans have language
  (but also: chess, tennis, art, clothing…)
  (also: only US citizens vote for US Pres.)

Biological Factors for Human Language

- Human Vocal Tract
- Hemispheric Specialization
- Language Acquisition Ability

Vocal Tract

- Vocal tract and facial musculature allows for sophisticated control over production of sounds
- Humans have ability to produce extremely rapid sound sequences

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Hemispheric Specialization

- Human brain has two hemispheres
- Typically left hemisphere specialized for language tasks, right hemisphere for spatial cognition
- May underpin ability to translate rapid sound sequences into meaning and represent wide range of meanings in a flexible way

Language Acquisition

- Humans innately predisposed to learn language
- All children go through similar stages of language learning
  - Specific maturational changes to brain may be important
- Children learn language spontaneously, w/o formal training

Linguistic Universals

Features of human language that pertain to all languages.

- Universality
  - All humans use language
- Complexity
  - All languages equally complex and have equal expressive power
- Arbitrary Mapping from Signs to Meanings
  - Dog, chien, perro
  - No similarity between 3 words
  - No similarity between word and thing they represent
  - Words are arbitrary symbols whose meanings have to be learned
- Infinite Meanings, Finite Signs
  - Finite number of sounds (approx. 50)
  - Large number of words (100,000)
  - Infinite number of sentences

The Linguist's Mission

- Characterize abstract structure of language
- Understand how a particular language works
- Capture commonalities across languages
- Productivity
  - Infinite number of utterances possible in any language
- Regularity
  - Utterances in a given language are systematic in many ways

Productive & Creative Character of Language

- Select a sentence from any book at random
- Attempt to find the exact same sentence in another book
- In the billions of sentences in the library's books, you are unlikely to find a repetition

Productive & Creative Character of Language

- Number of sentences an ordinary person is capable of producing quite high
- If interrupted mid-sentence, there are on average 10 different words that could be inserted for grammatical, meaningful continuation
- Assuming we can produce sentences 20 words long, number a speaker can deal with is
  - 100,000,000,000,000,000,000
  - aka 10 to the 20th power
  - aka a hundred million trillion
- Capability defies memorization strategies
  - If you could memorize 1 sentence every 5 seconds, you would need one hundred trillion years to memorize all of the 20 word sentences

Infinity…

- Same logic that shows integers are infinite shows number of sentences infinite
- Guiness book of world records says longest English sentence is 1,300 words
- "They both bore it as though in deliberate flaggellant exaltation…"
- Faulkner wrote, "They…"
- Coulson said that Faulkner wrote, "They…"
- They broke the world record for the longest English sentence when she said that Faulkner wrote, "They…"
- My friend told me that she broke the world record when she said that Faulkner wrote, "They…"

Productive Character of Language

- Infinite use of finite media distinguishes human language from artificial language devices
  - Cars that say "A door is ajar."
  - Telephone menu systems "Press the pound key for more options

Regularity of Language

- Grammar – set of rules that account for both the productivity and regularity of natural languages
  - Generate all acceptable sentences
  - Reject all unacceptable sentences

Syntactic Anomalies

- Strings of words that don't conform to grammatical code
- The following sentences interpretable, but not grammatical:

This sentence no verb.

This sentence has contains two verbs.

This sentence has cabbage six words.

This is not a complete.
This either.
It's a flying finches, they are.
The child seems sleeping.
Is raining.
Sally poured the glass with water.
Who did a book impress you?
Skid crash hospital.
Drum vapor worker cigarette flick boom.

More Syntactic Anomalies

The girls hits the boys.   >PRINT (x+1
Did hit the girl the boys?   **SYNTAX ERROR**
The girl hit a boys.
The boys were hit the girl.

- Grammar must rule out these sorts of sentences, while accepting all grammatical ones

Semantic Anomalies

- Grammatical sentences that don't make any sense.
- Colorless green ideas sleep furiously.
–Chomsky

- "Somehow it seems to fill my head with ideas -- only Idon't exactly know what they are....Somebody killed something: that's clear, at any rate--."
-- Alice (in *Through the Looking Glass*)

And, as uffish thought he stood,
The Jabberwock, with eyes of flame,
Came whiffling through the tulgey wood,
And burbled as it came!
One, two! One, two! And through and through
The vorpal blade went snicker-snack!
He left it dead, and with its head
He went galumphing back.
 – Lewis Carroll

Linguistic Intuitions

- Judgments about nature of linguistic utterances or relationship between linguistic utterances
  - Syntactic anomalies
  - Semantic anomalies
  - Paraphrase
  - Ambiguity
    - Syntactic/Structural
      They are cooking apples.
    - Lexical
      I'm headed to the bank.

Grammar and Linguistic Intuitions

- Specify the nature of well-formed sentences
- Specify which utterances are ill-formed and why
- Explain intuitions speakers have about paraphrase and ambiguity

Competence & Performance

- Everyday language use isn't always grammatical
- Linguistic intuitions aren't always clear cut
  Tell John where the concert's this afternoon.
  Tell John that the concert's this afternoon.
- Linguistic Competence
  – Abstract knowledge of language
- Linguistic Performance
  – Actual application of linguistic knowledge in speaking or listening

Relationship between Competence & Performance

- Academic Division of Labor
  – Linguistics: Competence
  – Psychology: Performance
- Theory of Competence is central to performance (Chomsky)
- Theory of Competence based on rather unnatural activity of making grammaticality judgments (Alternative)

Topic for Linguists

- How do linguists account for regularity in phonology (sound), syntax (structure), and semantics (meaning)?

Linguistics

- Phonology – sound
- Morphology – word composition
- Syntax – structure
- Semantics – meaning
- Pragmatics – implications

Phonetics & Phonology

- Phones
  – Sounds produced by human articulatory system
- Phonology
  – How sounds distinguish one word from another
- Phoneme
  – Smallest unit of sound that makes a difference for meaning; set of phones equivalent in determination of meaning
    - /cat/ vs. /mat/
    - 'p' in tap vs. tape (aspirated in tape but not tap)
      – Distinction has to do with sound of 'a' not 'p'
      – Aspirate the 'p' in 'tap' (sounds funny, but has same meaning)

Speech Sounds & Distinctive Features

- Trubetsky & Jakobson
  - One major discovery in phonological theory
  - Speech sounds are encoded in the brain in terms of more primitive specifications called *distinctive features*
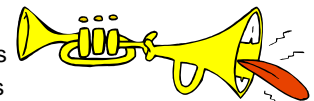- Phonological structure relates to movements of the vocal tract

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Mechanics of Speaking

- Vibration is a function of the vibration of the lips and the resonant frequencies of the trumpet's tube

Imaginary Trumpet

- Made of rubber
- Has 2 tubes
- Stretching changes resonant frequencies
- Choice of tube offers possibility of different tone qualities

Analogy

- Trumpet Player's Lips
- Trumpet Tube
  - Tube 1
  - Tube 2
- Vocal Cords in Larynx
- Throat & its Branches
  - Nasal Cavity
  - Oral Cavity
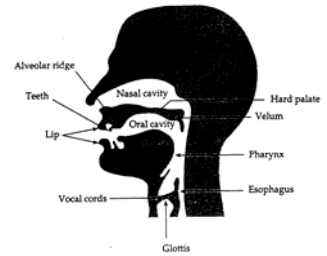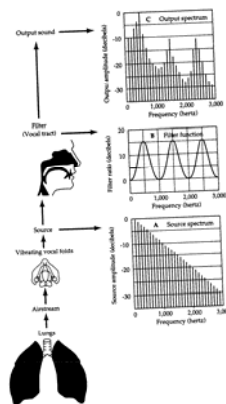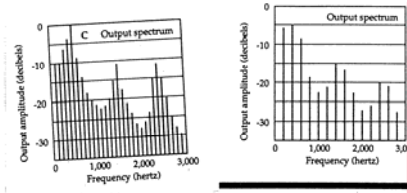
Vocal Tract

Figure 9.1   Positions of Articulation in the Mouth.
Source: Clark, H. H., & Clark, E. V. (1977).

Directing the Flow

- To disconnect nasal cavity
  - Raise velum (soft palate)
- To cut off air from oral cavity
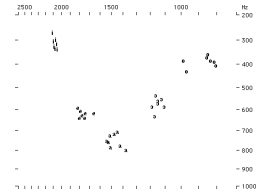 - Close lips
  - Raise tongue

Output

Vowels

- Tongue Height
- Tongue Position

Consonants

- Place of Articulation
  - Which part of mouth constricts to make consonant?
- Manner of Articulation
  - How is the sound made?
- Voicing
  - Are vocal cords vibrating or relaxed?

Consonants

- Place of Articulation

Bilabial	p	b
Labiodental	f	v
Dental	th	
Alveolar	t	d
Velar	k	g
Glottal	ch in Bach	

- Manner of Articulation

Stops	b		
Fricatives	s	f	v
th			
Affricates	ch	j	
Nasals	m	n	
Laterals	m	n	
Semivowels	w	r	

- Voicing

  | Voiced | b |
  | Voiceless | s |

Why Distinctive Features

- Phonemes described as combo of distinctive features
- Distinctive because they allow us to discriminate between phonemes
  - Voicing   t vs d
  - Manner of Articulation   n vs d
  - Place of Articulation   b vs d

Rules & Plurals

- Rule A: If the noun ends with one of the sounds s,z,sh,ch,j, the plural is pronounced [iz]
- Rule B: If the noun ends with one of the sounds p,t,k,f, or th, the plural is pronounced [s]
- Rule C: If the noun ends with anything else, the plural is pronounced z [z]

More Formally (Halle, 1990)

- [iz] if the ending is strident and coronal OTHERWISE
- [s] if the ending is voiceless OTHERWISE
- [z] if the ending is voiced (and non-strident)

Phonological Rules

- Distinctive features define perceptual discriminations via articulatory characteristics
- Pronunciation regularities describable in terms of distinctive features
- Regularities are productive

Novel Plurals

- Kvetch
- Dybbuk
- Smeggeggie
- There sure were a lot of _____ !

Syntax

- Grammar – discrete combinatorial system
  - Finite number of elements sampled & combined to create larger structures
    - Words → sentences