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

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

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 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 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
- Guinness book of world records says longest English sentence is 1,300 words
- “They both bore it as though in deliberate flagellant 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”

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.

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 I don’t exactly know what they are. ... Somebody killed something: that’s clear, at any rate.”
  -- Alice (in Through the Looking Glass)

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

More Syntactic Anomalies

The girls hits the boys.
The girl hit the boys?
The boy hit the girl.
The boys were hit the girl.

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

Directing the Flow

- To disconnect nasal cavity
  - Raise velum (soft palate)
- To cut off air from oral cavity
  - Close lips
  - Raise tongue
**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
  - L 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
- Smeggegie
- There sure were a lot of _______ !

Syntax

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