**Linguistics**

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

**Types of Grammars**

- **Type 0 Grammars**
  - No restrictions on rules: rules may be recursive, and any number of symbols may occur on either side of a rule
- **Type 1 Grammars**  
  - Context-Sensitive Grammars
    - Grammars in which every rule is of the form $\alpha A \tau \rightarrow \alpha \phi \tau$
    - Where $A$ is nonterminal and $\alpha$ and $\tau$ are arbitrary strings of terminals and nonterminals, with $\phi$ nonempty

**Types of Grammars**

- **Type 2**  
  - Context-Free Grammars
    - Grammars in which every rule is of the form $A \rightarrow \phi$
    - Where $A$ is a nonterminal and $\phi$ is an arbitrary nonempty string of terminals and nonterminals
- **Type 3**  
  - Finite State Grammars
    - Grammars in which every rule is of the form $A \rightarrow x B$ or $A \rightarrow x$
    - $A$ and $B$ are single nonterminals
    - $x$ is an arbitrary string of terminals

**Chomsky Hierarchy**

- **Type 0**
  - Recursively Enumerable Grammar
  - Turing Machine
- **Type 1**
  - Context-Sensitive Grammar
  - Linear Bounded Automata
- **Type 2**
  - Context Free Grammar
  - Pushdown Automata
- **Type 3**
  - Finite State Grammar
  - Finite State Automata

**Ice Cream Sentences**

- Either the girl eats ice cream, or the girl eats candy.
- If the girl eats ice cream, then the boy eats hot dogs.
FSG can't account for ice cream!

Either the girl eats ice cream, or the girl eats candy.
If the girl eats ice cream, then the boy eats hot dogs.
*Either the girl eats ice cream, then the boy eats hot dogs.
*If the girl eats ice cream or the girl likes candy.

Embedded English Sentences

• If either the girl eats ice cream or the girl eats candy then the boy eats hot dogs.

Embedded English Sentences (Dependencies)

• Daddy, what did you bring that book I don’t want to be read to out of up for?
• How Ann can claim Pam Dawber’s anger at not receiving her fair share of acclaim for Mork and Mindy’s success derives from a fragile ego escapes me.

Deep Structure, Surface Structure

The cat chased the mouse.
The mouse was chased by the cat.
Active:
Deep = Surface
Structure Structure
Passive:
Deep structure undergoes transformation
NP1 V NP2 ➔
NP2 was V’d by NP1

NP Aux VP → Aux NP VP

The cat did chase the mouse.
Did the cat chase the mouse?
The cat is chasing the mouse.
Is the cat chasing the mouse?
The mouse could have been chased by the cat.
Could the mouse have been chased by the cat?

D-structure

• Linguists posit d-structure to account for the way verbs change in different contexts
  He put the car in the garage.
  *He put the car.
  *He put in the garage.
The car was put in the garage.
  What did he put in the garage?
  Where did he put the car?
Movement and Traces

[Diagram]

Parsing

- Parse Tree – represents how grammatical structure has been assigned to the string
- Parsing process does 2 things:
  - Determines which sentences are grammatical and which are not
  - For grammatical sentences, assigns a structure

Syntactic Ambiguity

- Syntactic Ambiguity
  - Sentences or phrases that have 2 or more interpretations because there are multiple ways to parse them
  - The old man in the chair with the broken leg

High Attachment (man’s leg)

Garden Path Sentences

- Sentences in which your initial parse is likely to be wrong

Low Attachment (chair’s leg)
Garden Path Sentences

• Sentences in which your initial parse is likely to be wrong

S
NP
Det Adj N
The old train the

Correct Parse

S
NP VP
Det N V NP
Det N
The old train the young.

Linguistics

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• Syntax – structure
• Semantics – meaning
• Pragmatics – implications

Semantics & Pragmatics

• Semantics
  – Study of how meaning is specified in words, sentences, texts
• Reference Theory (problematic)
  – Meaning of word is what it refers to in the world
    • Unicorn
    • Jerry hunted a tiger.
    • Justice
    • The
    • Morning star vs. Evening Star

Semantic Theories

• Image Theory (overly simplistic)
  – Meaning of a word is an image
    • Truth
    • the
• Cognitive Semantics
  – Words refer to elements in simple cognitive models
  – Locates meaning in cognitive processes
    • She gave her hotdog to the hungry boy.
    • She gave her hotdog to a hungry boy.

Truth Conditional Semantics

• Truth Conditional (Formal) Semantics
  – Conditions that have to hold for a word to be true constitute its meaning
  – Word Meaning: necessary and sufficient conditions for category membership
  – Sentence Meaning: set of conditions that have to hold for sentence to be true
• Problem: human establishment of truth conditions for complex sentences doesn’t always follow rules of logic
Psychologists & Semantics

• “Loose” truth-conditional semantics
  – Prototypes & Exemplars constitute “truth conditions” for words
• Cognitive Semantics
  – Meaning established with respect to knowledge of prototypes, exemplars, & frames
  – Comprehension involves construction of mental models

Pragmatics

• Study of meaning in context
• Cooperativeness Principle
  – Speakers and listeners must be cooperative in order for successful communication to occur
• Conversational Maxims
  – Guidelines followed by cooperative speakers

Grice’s Conversational Maxims

• Maxim of Quantity
  – Make your contribution as informative as required for the current purpose of the exchange
  – Do not make your contribution more informative than is required
• Maxim of Quality
  – Try to make your contribution one that is true
  – Do not say what you believe to be false
  – Do not say that for which you lack relevant evidence
• Maxim of Manner
  – Be perspicuous*
  – Avoid obscurity of expression
  – Avoid ambiguity
  – Be brief (avoid unnecessary prolixity)
  – Be orderly
• Maxim of Relation
  – Be relevant
  +“perspicuous” means clear and easy to understand

Maxims & Conversation

• Quantity most important
• Supposition
  – Making contact with concepts in the listener’s memory
• Assertion
  – Changing the structure around these concepts

Disobedience

• People frequently flout the maxims
  – Speaker deliberately violates a maxim
  – Listener assesses nature of violation in current context
  – Listener computes implicature
• Implicature
  – Inferences a listener draws when a speaker blatantly violates one of the maxims

Maxim of Quantity

“the black one”

“the round one”

“the round, black one”
### Quantity

- Olson – amount that needs to be said depends on context
  - The boy is a good soccer player.
  - The boy with curly hair is a good soccer player.

### Common Ground

- Mutual suppositions, beliefs, and knowledge
  - Willie bought Tom's old Bug.
  - Dr. Smith bought the orange car parked outside your office.
  - “Consider the stallion.”

### How do referents enter common ground?

- Physical Co-Presence
- Linguistic Co-Presence
- Cultural Co-Presence

### Speech Acts

- **Locutionary Force**
  - Effect derived from literal meaning
- **Illocutionary Force**
  - Effect derived from speaker's goal
  - Promise, insult, inquire
- **Perlocutionary Force**
  - Intended or unintended effect of statement
  - Enter contract, sentence prisoner to jail

### Five Types of Speech Acts

- **Representatives**
  - My desk has disappeared.
- **Directives**
  - Stop putting things on my desk.
- **Commissives**
  - If you put anything else on my desk, I’m throwing it in the trash.
- **Expressives**
  - I’m happy it’s raining today.
- **Declarations**
  - You’re fired!