

## Linguistics

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

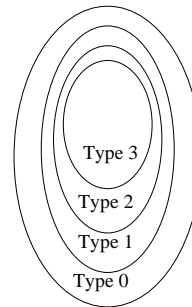
## Types of Grammars

- 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  $\sigma A \tau \rightarrow \sigma \phi \tau$
  - Where A is nonterminal and  $\sigma$  and  $\tau$  are arbitrary strings of terminals and nonterminals, with  $\phi$  nonempty

## Types of Grammars

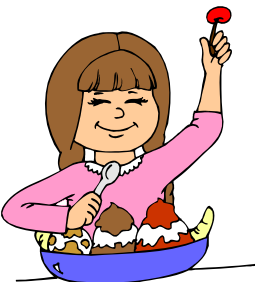
- Type 2 *Context-Free Grammars*
  - Grammars in which every rule is of the form  $A \rightarrow \phi$
  - Where A is a nonterminal and  $\phi$  is an arbitrary nonempty string of terminals and nonterminals
- Type 3 *Finite State Grammars*
  - Grammars in which every rule is of the form  $A \rightarrow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

## Chomsky Hierarchy

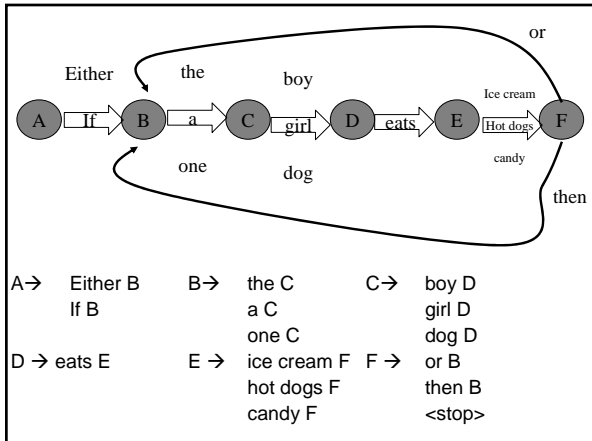


- Type 0
  - Recursively Enumerable Grammar
  - Turing Machine
- Type 1
  - Context-Sensitive Grammar
  - Linear Bounded Automata
- Type 2
  - Context Free Grammar
  - Pushdown Automata
- Type 3
  - Finite State Grammar
  - Finite State Automata

## 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 Structure = Surface 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.

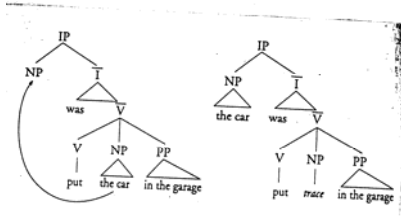
The car **was put** in the garage.

What **did** he **put** in the garage?

Where **did** he **put** the car?



## Movement and Traces



## Parsing

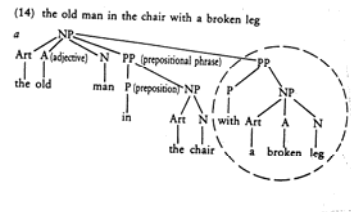
- Parse Tree – represents how grammatical structure has been assigned to the string
- Parsing process does 2 things:
  - Determines which sentences are grammatical and which are not
  - For grammatical sentences, assigns a structure

## Syntactic Ambiguity

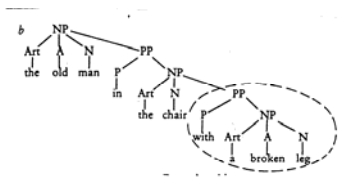
- Syntactic Ambiguity
  - Sentences or phrases that have 2 or more interpretations because there are multiple ways to parse them
- The old man in the chair with the broken leg



## High Attachment (man's leg)

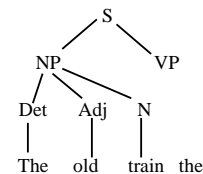


## Low Attachment (chair's leg)



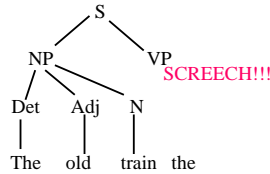
## Garden Path Sentences

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

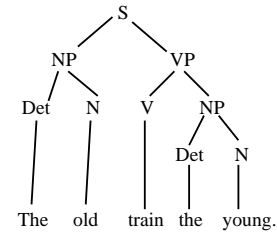


## Garden Path Sentences

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



## Correct Parse

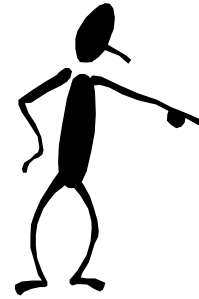


## Linguistics

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## 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

## 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

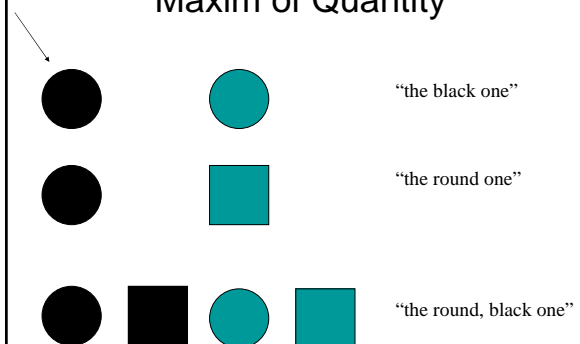


## Maxims & Conversation



- Quantity most important
- Supposition
  - Making contact with concepts in the listener's memory
- Assertion
  - Changing the structure around these concepts

## Maxim of Quantity



## 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.

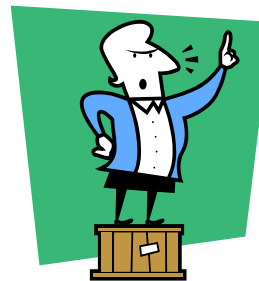
## Common Ground

- 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!