

# Human Parsing

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# Why is this interesting...to us?

- So far, we still beat computers at parsing!
- Ultimately, we want computers to be able to mimic perfectly our judgments.
- If we're doing something that computers can do, we want to know.

# Problems in Parsing

- Basic syntax--not interesting
- Ambiguity--very interesting
  - Sentence ambiguity
    - The women kept the dogs on the beach.
    - The complex houses married and single students and their families.
  - Phrase ambiguity
    - wooden French onion soup bowl handle

# Garden Paths

- The complex houses

# Garden Paths

- The complex houses married and single students and their families.
- The student forgot the solution

# Garden Paths

- The student forgot the solution was

# Garden Paths

- The student forgot the solution was in the back of the book.
  - Confusing!
  - Humans, however, handle it pretty well, given the entire sentence and an extra few milliseconds.

# Theories of Human Parsing

- Modularist
  - Syntax is the basis of the first interpretation
  - Semantic, thematic, discourse knowledge come in later to revise the interpretation
  - Frazier and Clifton, 1996



# Theories of Human Parsing

- Interactionist
  - Interpretation formed based on interaction of multiple kinds of information, including syntax, semantic, thematic, & discourse knowledge
  - MacDonald, 1994; MacWhinney, 1987; Pearlmutter & MacDonald, 1992; etc, etc, etc

# Theories of Human Parsing

- Probabilistic (computers love that!)
  - Multiple parallel interpretations are computed
  - Each interpretation assigned a probability based upon thematic, semantic, and syntactic probabilities of each sentence
  - “The student forgot *that* the solution was in the back of the book” loses after the first three words of the garden path sentence

# Theories of Human Parsing

- Correct interpretation can be eliminated because of the probability after the first three words
- This explains the confusion caused by garden path sentences

**QUESTIONS?**