Human Parsing

Mary Dungan
University of Arizona
Dec. 3, 2007
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?