Processing Syntactic Ambiguities

Chapter 8 (pp. 289-306)

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Previous Class
Sentence Processing

- The immediacy of interpretation
- Two approaches to sentence processing
  - Modular
  - Interactive
- Methods for studying sentence processing
  - Off-line vs. on-line.
- Complexity effects in sentence processing
  - Grammatical sentences are not always rated better than ungrammatical sentences.
Syntactic Ambiguities

- Being led up the garden path (GP):

  The horse raced past the barn fell.

  The horse that was raced past the barn fell.

  The florist sent the flowers was very pleased.

  The florist sent the flowers to the elderly widow.
The Modular Approach

Lexical Access → Syntactic Parsing → Semantic Processing → (interpretation) Output

Input (words) → Syntactic Ambiguity
The Modular Perspective on Syntactic Ambiguities (I)

- GP sentences violate basic syntactic parsing strategies.
  - Use the simplest possible phrase-structure tree to reduce cognitive load.

- Late Closure: Attach incoming material to the phrase/clause currently being processed.

- Jessie put the book Kathy was reading in the library…
The Modular Perspective on Syntactic Ambiguities (II)

- Minimal Attachment (MA): New clauses should be attached so as to create the legal syntactic tree with the fewest nodes.

- The spy saw the cop with the binoculars but …
The spy saw the cop with binoculars but the cop didn’t see him.
The spy saw the cop with binoculars, but the cop didn’t see him.
Evidence for Minimal Attachment

The spy saw the cop with the *binoculars*/*revolver* but the cop didn’t see him
Evidence against Minimal Attachment

The couple admired the house with a friend/garden but knew that it was overpriced.

Taraban & McClelland (1988)
Semantics can override MA.
The Interactive Approach

Lexical Access $\rightarrow$ Syntactic Parsing $\rightarrow$ Semantic Processing

(translation) Output

Input (words)
The Interactive Perspective on Syntactic Ambiguities (I)

- GP sentences involve low-frequency syntactic structures:
  - Different syntactic structures are activated in parallel.
  - Activation resting levels are determined by frequency.
    1. The horse \textcolor{red}{raced} \textit{main verb} past the barn. (MA freq)
    2. The horse \textcolor{red}{raced} \textit{past part} past the barn fell_{MV}. (-MA infreq)

- RTs:
The Interactive Perspective on Syntactic Ambiguities (II)

- Semantic information may inhibit the activation of some structures.
- Expectations
  3. The couple admired the house with a friend ... (MA -expt)
  4. The couple admired the house with a garden ... (-MA +expt)
- RTs:
- Animacy
  5. The \texttt{defendant_{ANIM}} examined by the lawyer was unreliable.
  6. The \texttt{evidence_{INANIM}} examined by the lawyer was unreliable.
- RTs:
Rapid Integration of Information in Sentence Processing (I)

- Head-mounted eye-tracking:
  - Eye movements are recorded as people listen to instructions and manipulate objects.
    - Put the saltshaker on the envelope in the bowl.
      - Ambiguous - MA: on the envelope → where to place the saltshaker
    - Put the saltshaker that's on the envelope in the bowl.
      - Unambiguous
- Subjects integrated visual information so rapidly that they were not misled by MA.
Rapid Integration of Information in Sentence Processing (II)

• People can rapidly integrate visual, auditory, syntactic and semantic information
  • People determine the appropriate reference for a word within ~50 msec of offset (= 1/20 sec).

• This integration ability is acquired gradually in development.
  • 5-year-olds have not yet learned to integrate visual context.
Next Class
Expertise and Sentence Processing

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The importance of the input

Individual differences in sentence processing

The role of memory and experience