Sentence Processing: Chapter 5

“A sentence consists of one or more propositions that represent a complete thought.” (Jay, 2003, p. 143)

Sentence Processing:

Problems We Encounter in Sentence Processing

- **Rapid Speech**: 140-180 wpm
- In fluent speech individual words run together and are often not clearly articulated.
  - Coarticulation
  - Parallel Transmission

Segmentation Problems

3 Factors That Affect Sentence Processing

- Syntactic Structure of the sentence
- Parsing Strategies
- Memory Capacity

Real-World Knowledge Can Supply Constraints That Operate As Part of the Structure of Language

- Regularities in the language make statistical prediction possible.

Syntactic Processing Syntactic Structure of A Sentence

- In order to understand a sentence, the listener or reader must determine its syntactic structure.
► Parsing

- Tree Diagram

- S → NP + VP
- NP → Adjective + Adjective + Noun
- VP → Verb + Adverb

Deep Structure vs. Surface Structure

► Surface Structure

► Deep Structure

► 2 sentences can have very different surface structure, but the same deep structure and vice versa.

► 2 sentences can have the identical surface structure but very different deep structure.

► Some sentences contain phrase-structure ambiguities, where different hypotheses about the intended structure of a sentence could give rise to different meanings.

► This distinction between deep and surface structure suggest that

CLAUSAL PROCESSING

► One way the perceptual system can reduce the processing load is to break up incoming sentences into their constituent clauses.

► **Processing this sentence for meaning requires at least 3 operations:**
Research has demonstrated that the more clauses a sentence contains, ________________________________.

MODELS OF SENTENCE PARSING

► **Garden Path Sentence (GPS)**

► There are 2 major theories that try to explain how people process such sentences.

- Garden Path Model Of Sentence Processing
- Constraint Satisfaction Model Of Sentence Processing

GARDEN PATH MODEL OF SENTENCE PROCESSING

► This model states that the parser makes ________________________________ of a word sequence.

► When the text contains syntactic ambiguities, ________________________________

2 Important Principles of the GP Model:

- late closure principle
- minimal attachment principle

► **Late Closure Principle**

- It suggests that listeners (or readers) hold off until the latest point possible.

- *Because Jay always jogs a mile …*,

► The late closure strategy reflects the tendency ________________________________.

► The alternative would ________________________________ and consider all kinds of different interpretations.

► The problem with the ________________________________ alternative is that is places a greater load on ________________________________ than trying to retain one option at a time.

► **Minimal Attachment Principle:**
This is done by using the ____________________________.

Many studies have shown that the simplest tree structure __________________________.

**CONSTRAINT SATISFACTION MODEL OF SENTENCE PROCESSING**

• This model states that more than one syntactic analysis of a word sequence may be generated during comprehension.

When we reach the end of the sentence and discover that we must have made a parsing error, we resolve this confusion by

________________________________

______________

**GARDEN PATH MODELS VS. CONSTRAINT SATISFACTION MODEL**

• **Eye Movement Studies:**

• **Reading Experiments:**
  
  ➢ Trueswell, Tanenhaus, and Garnsey (1994)
    
    • *The witness* examined by *the lawyer* was useless
    • *The evidence* examined by *the lawyer* was useless.

  ➢ Clifton & Ferreira (1987)

**SENTENCE PROCESSING & PROSODY**

• **Speakers** can and usually do __________________________ by using such __________________________ as stress, intonation, and pauses.

**MEANING: THE GOAL OF SENTENCE PROCESSING**

• We discard the _____________ to retain only the _____________ of a sentence.
Sachs (1967): had Ss listen to paragraph length stories that contained a critical test sentence.

- Results:

TWO MODELS OF SENTENCE PROCESSING

- Autonomous/Modularity Model Of Language Processing: activation of word meaning is ______________ of sentence context in which the word is embedded.

- Interactive Model of Language Processing: both ______________ analyses occur together and continuously interact as we hear a sentence.

  - Bottom-up Processing: An interactive view begins with bottom-up processing.

  - Top-down Processing:

  - Top-down/bottom-up interact

  - Semantic processing co-occurs with syntactic processing

INTERACTIVE MODEL OF LANGUAGE PROCESSING

Shadowing & Gating Studies

- Marslen-Wilson (1975): had Ss listen to spoken passages and repeat what they were hearing as it was being spoken (Shadowing).

  - He found that even ______________ would often spontaneously correct errors in ______________ before the word was completed.

  - From the lags obtained in this study it was estimated that recognition for words
heard in context can occur within ______________ of their onset.

- Grosjean (1980) confirmed this time estimate by using a technique call **gating**.
  - Ss could recognize words in context within ______________ of their onset.
  - The average time for words out of context is ______________.
  - The typical one-, two-, and three-syllable words may average between ______________ in duration.

- Only a limited number of words in the lexicon share the same initial sounds:

**Conclusion**

- Context appears to reduce the initial cohort of possible words based on word-onset sounds.

- Less clear is whether listeners reduce cohort size based on ______________, without ______________ information.

**WHERE DOES CONTEXT OPERATE?**

- **Modularity (autonomous) theorist**: believe that input processes such as lexical activation are performed rapidly, automatically, and autonomously -- “informationally encapsulated.”

- The **interactive model** assumes that the only way you can handle speech so rapidly is because ______________.

- **Modularity models** suggests that lexical analysis is so rapid because it is not slowed ______________.

- Both models assume multiple levels of processing.

- How could we peek into automatic unconscious processing activity to see whether semantic context is operating on a word the instant it is being heard?

- **Swinney (1979) Cross-Modal Lexical Priming Experiment**: He wanted to see whether a ______________ to just the appropriate meaning of an ambiguous word, or whether other meanings of the ambiguous word ______________.

- **Homophones**: pairs of words that ______________
Swinney tape-recorded a person reading the following passage in a natural tone at a normal rate of speech.

“Rumor had it that, for year, the government building had been plagued with problems. The man was not surprised when he found several spiders, roaches, and other **bugs** [1] in the [2] corner of the room.”

Swinney flashed on a screen for a lexical decision task. The word that was either related to the contextually appropriate meaning of **bugs** (for example, **ant**), the contextually inappropriate meaning (for example, **spy**), or a control word (for example, **sew**).

These words were presented either immediately after the ambiguous word, at the position marked [1] or at a point several syllables later [2].

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**Results**

**Conclusions**

**Why would all meanings of an ambiguous word be activated regardless of context?**