Two metaphors have dominated cognitive psychology throughout its history: ‘activation’ and ‘computation.’ Activation (itself metaphorically based on neural firing rate) assumes that representations (mental symbols or patterns of non-symbolic ‘nodes’) exist at varying degrees of activation, and high activation of a representation amounts to something like perception or recall. Computation assumes that representations are instead constructed from more elementary components, and that a representation does not exist prior to its construction.

We examine the differential implications of these metaphors in the domain of sentence comprehension. Most theories that claim the representation of a sentence is something that is activated by input propose that multiple representations are at least temporarily activated, and in order for one representation to be selected, it must deactivate the others in a time-consuming process of competition. Theories that claim that the representation of a sentence is constructed, on the other hand, have to posit rules for how the input guides construction, but by and large, these theories do not claim that alternative possible representations compete with each other. We review evidence indicating that time-consuming competition does exist in the process of recognizing
individual words, but propose that nearly all existing evidence denies competition in the case of sentence comprehension.

**Annotated References**


This chapter contains an extensive review of experiments on eye movements made while reading sentences, examining a number of questions in addition to the one addressed here, namely, whether they eyes slow down while reading a syntactically-ambiguous phrase.


An accessible review of eyetracking research supporting the existence of competition between alternative meanings of ambiguous words.

This chapter presents an implemented constraint-based model of sentence comprehension, making a clear prediction that time-consuming competition exists during the reading and the resolution of a syntactic ambiguity, and presenting data that indicate that reading is slowed only during the resolution.


This is probably the most-cited presentation of the ‘garden-path’ model discussed in the paper. It predates the full development of constraint-based competition models.


This article presents a variety of criticisms of constraint-based models of sentence processing in addition to the current claim that competition in the region of a syntactic ambiguity is not observed.


Green and Mitchell present an interesting claim that local ambiguity does not necessarily result in competition. The claim seems to be correct, but we argue that it does not plausibly apply to most instances of sentence comprehension.

MacDonald, M. C., N. J. Pearlmutter, and M. S. Seidenberg. 1994. The lexical nature of

This is an important article, advocating the claim that sentence comprehension is much the same as word recognition, and that both are characterized by competition between multiple possible representations.


One of a series of studies indicating that syntactic ambiguity can speed reading rather than slowing it.

**Focus Questions**

1. Assuming the authors’ perspective that there is parallel activation of, and competition between, multiple meanings of a word, but not between multiple syntactic analyses, why might this be the case? Are there considerations of efficiency or resource constraints that would give rise to this difference?

2. In what other areas of cognition is there evidence of competition for selection between activated representations, or between response options?

3. The authors suggest that the Green and Mitchell (2006) argument is implausible because it assumes pre-activation of all possible sentence continuations. Do you agree that this is implausible? Why or why not?
4. In discussing Levy’s (2008) proposals, the authors raise the issue of whether processing behavior at the point of syntactic disambiguation is bimodal or unimodal. Why is this important? How could you tell if there is bimodality?

5. Can you think of predictions made by an account of syntactic processing that assumes parallel activation of multiple alternatives, other than the ones discussed in the article?

6. One possibility that is alluded to briefly in the article is that the reading time advantage obtained by van Gompel and colleagues for globally ambiguous sentences may be due to a failure to fully resolve the ambiguity. Do you know of any specific evidence suggestive of this? Can you think of critical experiments that might address this issue?

**Topical Outline**

Syntactic Parsing

A. Early models: Heuristics, Delay

B. The Garden Path (GP) Model
   - Focuses on ambiguity resolution
   - proposes structural simplicity as primary principle
   - assumes a separate reanalysis stage when first-pass parsing fails

C. Constraint-Based Models
   - simultaneous (optimal) use of many information types
   - parallel activation of multiple analyses
   - reanalysis as re-weighting or re-ranking

D. The state of the art
   - problems for the GP model
- evidence for rapid use of non-syntactic information
- cases in which parsing preferences do not conform to simplicity metrics
  
  - problems for constraint-based models
    - failure to show reversals of GP-predicted preferences
    - failure to show evidence of competition during ambiguity (PRESENT REVIEW GOES HERE)
  
  - emergence of new perspectives
    - frequency-based accounts
    - importance of structural prediction