

A number of theorists (e.g., Rumelhart, Lindsay, & Norman, 1972; Schank, 1973) and Kintsch at one time (Kintsch, 1972) believed that words were decomposed into their semantic primitives during comprehension. Kintsch (1974, ch. 11) reports a series of experiments testing the validity of this notion. Using the derivations of generative semanticists (e.g., Lakoff, 1970), Kintsch determined which words were more complex (i.e., had the longest derivation to unpack). These words, if decomposed when parsed, should be more difficult to process. Examples of complex words are kindness, prosecutor, accuse, and persuade; simple words include environment, orchestra, relate, and save. The word "persuade" should decompose to "cause y to intend to do x ." In one experiment, Kintsch had subjects complete sentences (make a sentence out of a phrase) while varying the complexity of a word in the presented phrase. Length, imagery, and frequency were controlled. Latency to initiate writing in a sentence-completion task was not a function of complexity. Phoneme monitoring tasks did not reflect this factor either. Failing to obtain a difference in sentence processing, Kintsch looked at recall of sentences with words of differing complexity, but found no effect here either. He concluded from this series of studies that one does not typically decompose words during comprehension. He noted too that it is unlikely that we would have developed single words to express complex ideas had it been necessary to "unpack" the words each time they were heard.

In some respects, Kintsch's (1974) theory is rather similar to Frederiksen's latest (1975c) theory. Frederiksen gives more emphasis to a low-level (sentence) representation, while Kintsch's hierarchical structure seems somewhat better suited to text organization. Certainly a linear notation is more tractable for text representations than is a network structure, although formally there is no difference. Both theorists include mechanisms for cross-proposition inferences. However, they both seem more concerned with representing sentences within a passage than the ideas of the passage itself (i.e., the inferences in both systems seem to be narrow in scope). They are not of as low a level as those of Dawes, Crothers, and the earlier work of Frederiksen, but the inferences tend to focus on such problems as causation and reference. Table I illustrates the levels of inference used in Kintsch's experiment. They give an idea of the range of inferences he considers.

The inferences one would like to see in representations or models for comprehension are those derived from knowledge about the passage as a whole (e.g., inferences about characters' motivation, goals, and responses to events). Elaborations about spatial locations and instantiation of physical details of people and objects are probably made during comprehension also. Perhaps Kintsch and Frederiksen consider the elaborations suggested above to be idiosyncratic, and, therefore, impossible to represent. Kintsch (1974) does state that some inferences are made during comprehension and in one chapter (ch. 4) in which he offers a theoretical explanation for Encoding Specificity (Tulving & Thomson, 1973), he postulates the use of elaborations to modify the memory structure of "episodic events" (Tulving, 1972). Unfortunately, his notion of elaborations here seems restricted to phonemic information, superset, and property information.

Meyer (1975), like Kintsch, has a hierarchical, rather than a network, representation. Her theory, adapted from Grimes (1975), has a greater resemblance to Fillmore's (1968) grammar than do other theories. The similarity between her model and Fillmore's is in the emphasis of the role or case terms to represent the relation

between the verb (predicate) and the other words (arguments) in the sentence. (Use of Fillmore's case grammar has also been adopted to a lesser extent by Rumelhart et al. [1972]; Kintsch [1972, 1974]; and Frederiksen [1972, 1975c].) Meyer lists nine cases or roles quite similar to Fillmore's, which she calls "lexical predicates." Unlike Fillmore (but very much like Grimes), she has "rhetorical predicates" at a level above the lexical predicates. These higher level predicates give prose its organization. Neither Frederiksen's nor Kintsch's representations (discussed above) have such a well-developed, higher level organization.

The representation Meyer uses resembles an outline of a passage. Propositions are indented according to their importance. Unlike an outline, however, every idea is included and relationships are indicated between branches at the same level and at differing levels. These relations are the rhetorical predicates and they fall into three categories: (a) paratactic relations, which have at least two arguments of equal weight (e.g., *RESPONSE*: problems and solution); (b) hypotactic relations in which the arguments are unequal (e.g., *SPECIFIC*: problem and the details of the problem); and (c) neutral relations in which a collection of arguments can have equal weight or not (e.g., *ATTRIBUTE*: a listing of attributes about a topic).

Meyer has attempted to validate her representation empirically with a recall experiment. The experiment was designed to show that the probability of recall of a sentence was a function of its "height" in the content structure (i.e., its importance indicated by degree of indentation). Meyer constructed two passages with the identical target paragraph embedded in each. The paragraph was placed high in content structure in one passage and low in the other, but its serial position was the same. She found that the two passages as a whole were recalled equally well but that the recall of the target paragraph differed as a function of "height." The differences in recall between the two paragraphs increased with a week's delay.

After the free recall task at a week's delay, subjects were given a cued recall test. Cued recall in her experiment meant giving subjects all the content words from the passage in any unsystematic (scrambled) order and asking them to arrange the words in the correct order. Even in this task, the advantage of the paragraph high in the content structure was maintained over the paragraph low in the content structure. From these results, Meyer concluded that the difference in memory representation for "low" and "high" paragraphs can not just be a function of differential accessibility. She argued that if the paragraphs were stored equally well, any differences due to accessibility would be avoided by the cued recall methodology. Meyer's task, however, seems sufficiently different from the standard cued recall task that differential accessibility still seems a possible explanation. People have great difficulty solving anagrams, yet few would doubt that these puzzle-solvers have the word (whose letters are presented in scrambled order) stored in memory. It may well be in her task that subjects tried to retrieve aspects of the story and then looked for the words to put in the appropriate slots of the retrieved aspects.

Meyer found that the frequency of recall of an idea unit high in the paragraph structure was determined by the unit's functional relationships to other units, rather than its content per se. This was not true, however, for idea units that were low in the content structure. In other words, two different passages with the same structure of specific relations, but with different content, would yield a high positive correlation of probability of an item's recall from the same point in the structure, so long as that