

Word Knowledge in a Theory of Reading Comprehension

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This study reintroduces a wide-angled view of reading comprehension and the Reading Systems Framework, which places word knowledge in the centre of the picture. Within this framework, word-to-text integration processes can serve as a model for the study of local comprehension processes. Studies of these processes allows the influence of one sentence on the reading of a single word in a second sentence to be examined, which enables the integration of the word meaning into the reader's mental model of the text.

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This study reintroduces a wide-angle view of reading comprehension and the Reading Systems Framework, which places word knowledge in the centre of the picture. Within this framework, word-to-text integration processes can serve as a model for the study of local comprehension processes. These processes require a linkage between the word identification system and the comprehension system, with lexicon performing the linking role. Studies of these processes allows examining the influence of one sentence on the reading of a single word in a second sentence, which enables the integration of the

word meaning into the reader's mental model of the text. Skilled comprehenders show immediate use of word meanings in the integration process.

- This modern study of reading comprehension was propelled by two complementary ideas: an enriched level of comprehension beyond the literal meaning of a text (the reader's situation model) and the cognitive dynamics of text comprehension (the construction-integration (C-I) model).
- An important benefit of the C-I model was demonstrating that text comprehension could be explained by an interactive combination of top-down (knowledge-driven) and bottom-up (word-based) processes.

The Reading Systems Framework: Claims about reading:

- Three classes of knowledge sources are used in reading: linguistic, orthographic, and general.
- The processes of reading-decoding, word identification, meaning retrieval, constituent building, inferencing, and comprehension monitoring use the three knowledge sources in both constrained and interactive ways.
- These processes take place within a cognitive system that has pathways between perceptual and long-term memory systems and limited processing resources.

A neurobiological model of language processing

- Hagoort (2005) asserted that memory, unification, and control operations are the functional core of a processing system that emerges from a distributed network of subsystems.
- When a reader encounters a word, input from the visual orthographic system drives operations in the temporal lobes to retrieve associated linguistic and general knowledge from long-term memory.
- Unification computation in the left inferior frontal

gyrus integrates the word-level syntactic and semantic knowledge into the ongoing context.

- Limitations in cognitive resources are managed through the application of control operations in the dorsolateral prefrontal cortex and anterior cingulate.

Comprehension skill within the lexical system of the Reading Systems Framework

Two complementary hypotheses:

- Text comprehension depends on understanding words and integrating their meaning into a mental model of the text.
- Learning words depends on acquiring information about both word forms and meanings from word-learning events.

Comprehending texts includes comprehending words

- A key set of processes links lexical outcomes with comprehension (selection of meaning and grammatical form).
- Early sentence comprehension processes that build sentence constituents and propositions make use of this link.
- There are three important methods for obtaining online measures of these links: word-by-word reading controlled by reader, eye-tracking, and event-related potentials (ERPs) during text reading.

Word-to-text integration

- For a motivated reader, it is assumed that understanding entails a mental representation of the situation described by a text.
- Identifying the structure and situational dimensions of representations and how they interact as the reader builds an understanding of the text are important topics of comprehension research.

- It is assumed that an unfolding narrative text asserts situations and events and that the reader builds and updates a situation model accordingly.
- A key additional assumption is that comprehension proceeds along multiple input units.

The paraphrase effect and comprehension skill

- The paraphrase is an implicit co-referential relation between a word or phrase in one sentence and a word or phrase in a following sentence.
- The co-referential relation is defined by the contents of the mental representation of the enriched semantic content of the text—the situation model.
- The paraphrase can update the situation model modestly while maintaining coherence.
- The paraphrase effect reflects online comprehension—an updating of the situation model that integrates a word with a text representation.
- Skilled comprehenders use the paraphrase effect more robustly than less skilled comprehenders, who are described as exhibiting sluggish word-to-text integration.
- Word-to-text integration can involve inferences and it can be argued that the paraphrase effect is a type of bridging inference.

Knowledge of word meanings is instrumental in reading comprehension

- The Lexical Quality Hypothesis assumes that word knowledge (both form and meaning) is central to reading skill.
- High-quality form knowledge includes phonological specificity and orthographic precision.
- The semantic constituent of lexical quality is closely connected to comprehension, as established by

correlations between vocabulary and reading comprehension.

- Accounting for word meaning knowledge as part of reading challenges the assumption that decoding a word unlocks all the knowledge associated with the spoken word.
- The Simple View of Reading would need to accommodate the direct effects of vocabulary on reading comprehension by allowing vocabulary knowledge to influence decoding.
- Word meaning would contribute to reading as a component of language comprehension and through word reading.
- A second aspect of the word knowledge-comprehension connection concerns learning new words.
- During reading, readers implicitly infer meanings from imperfectly understood text, allowing the establishment of a new (or refinement of an existing) lexical entry.

Word comprehension within the reading systems framework

- Word comprehension is the output of the word identification system and the input to the comprehension systems (sentence, text, and situation).
- The word comprehension model corresponds approximately to the construction and integration phases of the C-I model.
- The integration phase is partly a memory-driven process, in which words from recently-read text and the proposition they encode (the text model) are highly accessible in memory.
- The memory-driven process is adaptive for comprehension insofar as what is activated in memory is relevant and consistent with the current state of the situation model.
- Active construction can become necessary when coherence breaks down and requires new structures to be built.
- The minimum set of overlapping processors required for fluent word-to-text integration are as follows:
 - Rapid, automatic lexical access based on word

form;

- Rapid, automatic activation of associated knowledge from memory;
- Access to memory for recently read text at the level of text model, situation model, or both;
- Knowledge of context-relevant meaning associated with the lexical entry and its rapid retrieval; and
- Word-to-text integration resulting from these overlapping processes.