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The Interaction between Prior Knowledge and Text Structure: Evidence from Recall and Recognition

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This research investigates the effect of two types of semantic structure, causal and teleological, on the construction of a coherent mental representation by readers with different levels of knowledge: Beginners, Intermediates and Advanced in the domain to be acquired (Patel & Groen, 1991). We assumed that Advanced learners build a mental representation of the domain organized in a hierarchical goal/sub-goals structure, whereas Beginners and Intermediates have a mental representation organized in a causal path (Baudet & Denhière, 1991). We further assumed that recall and recognition tasks would allow us to test our hypothesis of the structure homology between prior knowledge and texts. If this is so, the results should indicate a significant interaction between prior knowledge and the semantic structure of the texts: for the Advanced learners, recall and recognition of the teleological text should be better, whereas for the Beginners and Intermediates, the reverse was expected. The Construction-Integration model proposed by Kintsch (1988) was used as an interpretation framework for recall and recognition results. This model (i) distinguishes the three levels of representation: surface structure, textbase and situation model, (ii) takes into account the reader's knowledge during text comprehension (Kintsch, 1994), (iii) and can be used to simulate the results obtained.

Method

Subjects

Ninety–six students participated in the experiment: 32 Beginners, 32 Intermediates and 32 Advanced.

Material

Two texts were constructed: a causal text in which information was temporally and causally organized and a teleological text in which information was hierarchically organized in goal/sub-goals. Both types of text presented the same information and differed only in their semantic structure. For each type of text, four types of sentences to be recognized were constructed: Verbatim, Syntactic surface variations, and Close and Distant semantic variations.

Procedure

Beginners, Intermediates and Advanced read either the causal or the teleological text describing three functions of a text editor, then performed a cued recall and a recognition task.

Results

Cued recall: Beginners and Intermediates significantly recalled more information after reading the causal text than after reading the teleological text, whereas the reverse was obtained for the Advanced. As in the study of Patel and Groen (1991), Intermediates had better performances than Advanced subjects for recall of the causal text.

Recognition: Recognition times and proportion of correct responses varied with the type of distractors. The results showed a significant interaction between prior knowledge and texts for distractors but not for verbatim.

Simulations

We simulated the intermediate effect obtained with recall of the causal text. We performed three simulations: a simulation of the textbase alone, of the textbase plus the prior knowledge of Intermediates, and of the textbase plus the prior knowledge of Advanced. Significant correlations between activation values and experimental data were obtained for the last two simulations.

Conclusion

The interaction that we demonstrated between the semantic structure of texts and the prior knowledge structure supports the hypothesis that Advanced have a representation of the domain of knowledge homologous to the teleological structure, and that Beginners and Intermediates organize their knowledge in a causal path. Thus, becoming expert implies not only to increase but also to restructure knowledge.

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