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Study of the Time Course of the Updating Process

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This study focuses on the way readers integrate new incoming textual information into the mental representation they initially constructed. According to Morrow, Bower and Greenspan (1989), the mental representation activated at the beginning of the reading is on-line updated by the integration of new incoming information. More specifically, their findings based on on-line probed task are consistent with the assumption that readers make on-line inferences to update their mental representation. To the opposite, de Vega (1995) postulates that the integration of new incoming information is a backward process. By using an inference judgment task, he provided experimental supports to this assumption. Thus, models of comprehension differ in their hypothesis on the occurrence of the updating (i.e., integration) process. Issued from these opposite results, our intention was to demonstrate that the updating process is composed of two temporal components, a first one occurring on-line and a second one intervening with a certain delay. According to our view, each incoming information may be mapped on-line into the existing mental representation, but its final integration to the complete model depends on a backward updating which occurrence is function of readers' prior knowledge. In line with Ericsson and Kintsch (1995), we proposed that the expansion of short-term working memory due to a high level of prior knowledge allows to maintain more new incoming information and to delay their integration in long-term memory as a function of their relevance for the rest of the text. On the contrary, if subjects do not have enough knowledge about the situation, they should use an on-line process to integrate new incoming information. This assumption also leads to rise questions on the duration of the integration process (temporary or definitive) and how this duration interacts with readers' prior knowledge.

Experiment

Method

72 students from the University of Lyon II (France) were instructed to read a text that described a play with two topics, the scenery of the stage and the characters' goal and actions. The text was divided into two equal parts, the first one described the spatial arrangement of objects in the layout and the location of three characters, and the second one mentioned the movement of the characters with some of the objects previously located. The scenery of the stage was composed of a living and a dining room that contained 8 objects each. Prior to the reading of the first part of the text, we provided subjects with prior information on the described situation. They received a short text that described either all the spatial arrangement of objects in the scenery (high specific condition), or the location of fixed objects only (low specific condition), or general information about the layout of a theatre (general condition). The situation model built was tested after the reading of each part of the text via an inference judgment task that contained 8 spatial inferences for each topic. Participants judged whether each statement was true or false in relation to the part of the text previously read. The first task dealt with location information only and the second one concerned only motion information that were also probed during the reading of the second part of the text (Morrow et al., 1989). After each sentence describing a character's movement, 6 pairs of words naming objects of the scenery were presented one after another. Participants judged whether they were located in the character's goal room. The objects were either located in the same or in different rooms and were either fixed or moved by a character in the second part of the text.

Results and Discussion

From the results obtained to these different tasks, we draw four main conclusions. First, the updating process can occur either in an on-line or in a backward way. Second, readers' prior knowledge determine the time course of the updating process. Readers with high specific prior knowledge used the two temporal components whereas subjects in the low specific and general conditions preferentially used the on-line component. Third, the duration of the integration varies as a function of prior knowledge: Whereas performances increased between on-line and backward tasks for readers with high specific prior knowledge, the reverse pattern was observed for readers of the two other conditions. In other words, these latters appear to temporarily update their situation model whereas the former seems to definitively integrate new incoming information. Finally, these results highlighted the limits of on-line tasks that mainly assess the temporary integration whereas backward tasks evaluate the permanent integration. Thus, we underlined that the effects of readers' prior knowledge as well as the task bias have to be taken into account in the study of the updating process.

References

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