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Sequential Display of Text-Picture Information and Its Implications

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Computerized documents now offer a wide range of options to display information, but little is known about their effect on the user's cognitive processes. This research[1] investigated the effect on the user's mental representation of sequentially displaying text-picture information, each element or group of elements appearing in a selected order.

Sequentiality in information processing

When a writer has to describe an object or an event, he has to segment the object to be described and then to order the selected segments. This process must be carefully handled by the writer since it has dramatic effect on the reader understanding (Denis & Cocude, 1992). Conversely, a picture is usually not provided to the reader until it is completed. Therefore the order in which the picture is drawn does not take part to the communicative act (Taylor & Tversky, 1992). Often the reader is helped in his processing of the picture by an adjacent text.

Some studies have investigated the cognitive effect of the sequential display of different pictures representing several stages of a dynamic process (Mayer & Anderson, 1992). But, to our knowledge, none has addressed the effect of the sequential display, part by part, of a static configuration. A first study (Betrancourt, Bisseret & Faure, 1996) supported the assumption that the sequential display of a spatial configuration (library and village maps) affects the user's mental segmentation of the configuration.

The experiment

Subjects were presented with a text-picture document explaining the biological control system involved when a human is cold. Three displays were created: a *procedural display*, where items involved in the same information flow were temporally clustered (process group); a *functional display*, where items providing the same function were temporally clustered (function group) and a static display of the whole document (static group).

When drawing the document from memory, most subjects followed a procedural order regardless to the condition. In contrast, when describing the system, 90% of the subjects in the process group followed the procedural order, against 40% in the static group and none in the function group. However, subjects in the function group did not use the functional order. Differences between groups were statistically significant ($\chi^2(4)=17.5$, $p<.005$).

In the test phase, subjects were asked to solve paraphrase or inference questions, either from a procedural perspective or from a functional perspective. For the paraphrases, all groups performed equally regardless the perspective of the questions. However, for inferences, there was a significant interaction between the perspective and the type of display ($F(2,27) = 7.6$, $p <.005$). More precisely, the process group scored better to procedural inferences than did the static group ($F(1,27) = 4.5$, $p <.05$) and the function group ($F(1,27) = 8.6$, $p <.05$). The function group scored better to functional inferences than both the other groups, but the differences were not statistically significant.

Discussion

This experiment reinforced the hypothesis that a sequential display affects the cognitive processing of text-picture information. First, regarding the order used to describe the system from memory, the procedural display reinforced the spontaneous trend toward the procedural order whereas the functional display hindered this spontaneous trend. Second, we observed that the sequential display had no effect on paraphrase solving but improved performance to inferences corresponding to the learned perspective. This last result suggests that the sequential display has no influence on the surface level, where the explicit content is represented, but rather on the mental model of the situation described in the text. Further research is now in progress to investigate in which extent a sequential display may affect the structure of the representation in memory.

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