Hypertext as a tool for planning in the writing process

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Hypertextuelle Verfahren erlauben, Planungen als Teil des Schreibprozesses explizit werden zu lassen. Damit wird ein kontinuierliches Monitoring des Prozesses möglich und der Schreiber mental entlastet. Er kann sich auf inhaltliche Fragen konzentrieren. Hypertextuelle Vernetzungssysteme mit strukturellen und semantischen Verknüpfungen bieten verschiedene Möglichkeiten der Planung, sowohl bei freien, jedoch expliziten Textstrukturen als auch bei extern vorgegebenen Standardstrukturen. Das System paßt sich jeweils der vom Schreiber präferierten Schreibstrategie (depth first oder breadth first) an.

1. Planning in writing processes

In the commonly accepted Writing Task Model (WTM) introduced by Flower and Hayes (1980, 1981) much attention has been paid to planning processes that writers use or should use. In the WTM planning is a complexity of generating ideas, structuring and goal setting. On empirical grounds Flower and Hayes distinguish, not surprisingly more or less in accordance with the model, three planning activities used by writers:

(1) rhetorical planning (audience and goals)

(2) content planning (global content, subjects and themes)

(3) process planning (the organization of the writing process and textual structure).

In the whole writing process the planning processes are recursive, which means that at every stage of the total process these processes may occur as a part of complex monitoring.

Concerning the cognitive background Flower and Hayes refer to the influential book by Newell and Simon *Human Problem Solving* (1972). Though they borrowed the idea of using thinking aloud protocols to establish what strategies people use as a sufficient condition (thus not a necessary condition) to solve a problem, they did not go further into the complexity of planning processes. They merely categorized vaguely what writers were thinking of in the pre-writing phase and later-on when something alike recurred. The absence of the description of mental representations as well as the operations that lead to these representations may cause too strong generalizations and conclusions. The meticulous descriptions of operations and representations by Newell and Simon contrast sharply with the Flower and Hayes approach.

Cognitive processing is the alternation of automatic unconscious operations and controlled or guided conscious operations (Van Berkel 1991, 9-10). Consequently, this also goes for plan processing. As automatic operations do not allow any introspection by the writer himself and cannot be influenced by the writer's goals, there is a lack in the WTM as far as it is based on thinking aloud protocols.

Basically, observing planning behavior by experienced writers in order to deduce useful strategies for problem solving in writing by inexperienced writers presumes that mental processes or actions can be decomposed like physical actions (cf. Van Berkel 1989), which is obviously not the case. If we really want to improve writing behavior and its results, the texts, then we need not only tell writers what to do but we must also give them tools for doing it. This can be illustrated by a simple example. A doctor has lots of patients he wants to cure. As inexperienced as he is, he makes no appointments but waits in his practice who will come with what (= generating ideas). He discovers that this does not work and he structures the consultations by making appointments (= structuring). After that, due to memory problems (long term memory), he experiences problems like double appointments and confusion about the patient. So, he buys a diary to write the appointments down (= organizing). The main point in this example is, that the diary as a tool for structuring and organizing is already prestructured in a natural order. Metaphorically, the doctor had to deal with the same planning problems that writers have. After generating and structuring ideas most writers forget what the structure looked like so they have to start recovering and reconstructing. This kind of recursivity can be highly insufficient. Being part of the whole problem solving process in writing, planning is merely heuristic than algorhythmic. In that way planning is a continuous means-ends analysis (Simon 1975) that produces an organized sequence of possible actions. As a possible tool for text planning I will propose a more or less explicit text model based on hypertext techniques that displays a sequence of possible actions or subtasks in writing.

2. The hypertext tool for text planning

2.1 A simple description of a procedure

Hypertexts are texts that are organized as an electronic card index. On each "card" there is a short text (the length of a paragraph). These nodes are linked to one or more other nodes where the reader is able to make choices which node he wants to read ("navigating"). A node may be not only texts but also navigation aids like menus, indexes, and tables of content. In a hypermedial system nodes may contain pictures, sounds and motion pictures.

As most newer word processors (*WordPerfect for Windows*, *Word for Windows*) offer advanced hypertext applications in combination with macros, there is no hindrance any more for writers to use hypertext techniques. Formerly they had to deal with complicated hypertext programs that were not compatible with other word

processors. As an example we take the Hypertext dialog from WordPerfect 6.0 for Windows (Figure 1).

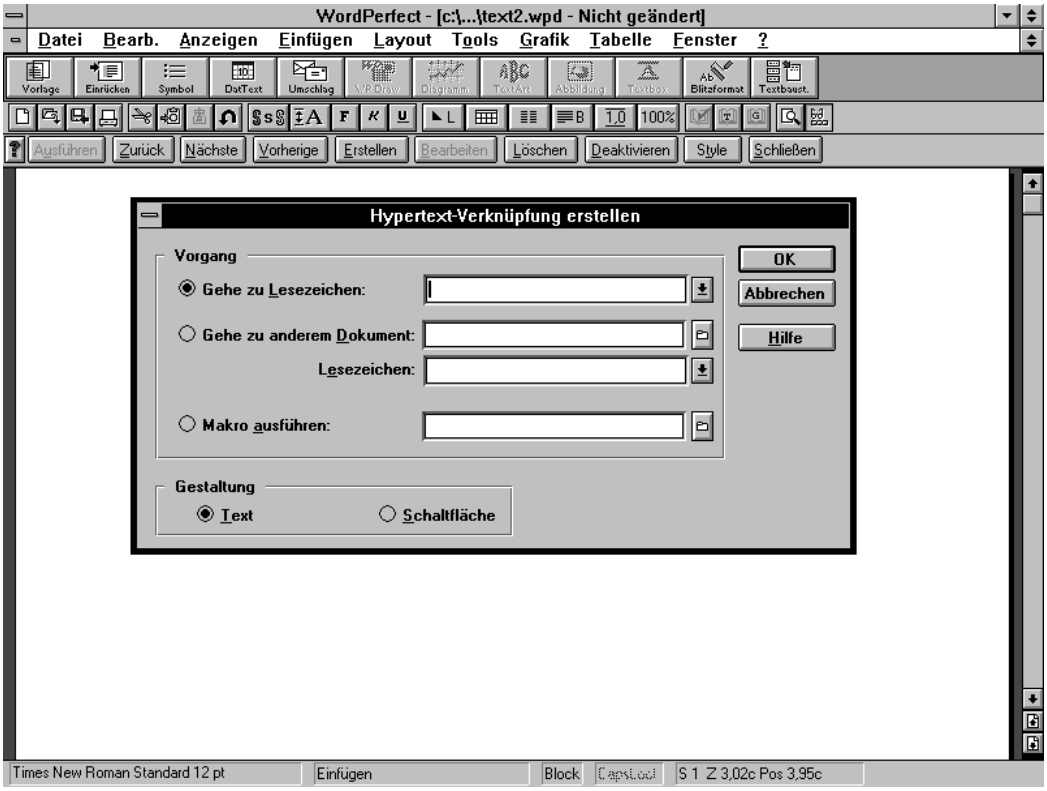

Fig. 1: WordPerfect 6.0 for Windows Hypertext dialog

The making of a hyperdocument (“authoring”) consists mainly of structuring, and further writing texts for nodes and linking them. The structure of the hyperdocument can be made explicit in a special node (the dialog) that will be linked to main nodes. For writers the whole text structure can be planned and fixed in menus and submenus. Behind these menus empty nodes can be nested with short plans, indications and hints. The result of these activities is a skeleton with empty textual bricks. Some may be linked already, others are free textual nodes to be linked later-on. In order to keep this information from the planning process accessible, the writer should make nodes identifiable by using a unique keyword. The result will be a hierarchical network of keywords (cf. Waern 1989, 154). Eventually the writer might use special hypertext programs like Storyspace (Bernstein 1991) or Orpheus that can handle complicated networks. The advantage is that under window-like operating programs it is possible to construct, manipulate and control the whole network on the screen (cf. Figure 2). Links can be made by simple mouse clicking.

Though hypertext facilitates other ways of writing like multi-authoring and writing reusable texts (Buchanan 1992), we restrict ourselves to the individual writing pro-

cess. Writers may choose from different strategies to fill the empty nodes: as linear as possible or totally unlinear ("patchwork writing"). Linking enables the writer to look up notes, scratch nodes, quotes or what ever he put on a node. During the writing process the author can retrieve nodes quickly and easily and even backtracking is possible. Another option, especially for writing research, is that navigation decisions by the writer can be recorded in the system.

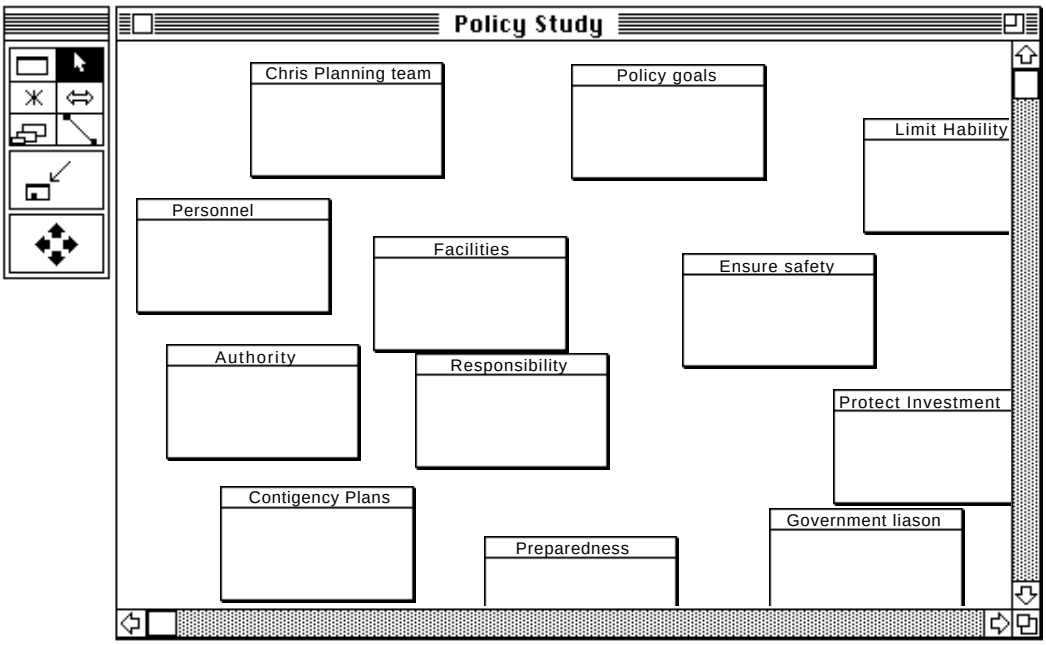

Fig. 2: Multiple windows in Storyspace (Eastgate Systems).
The writer may link any node with simple mouse clicking

2.2 The architecture of cognition and text

In the last paragraph we treated a possible procedure to use hypertext techniques in a loose way. The writer's planning process that leads to an explicit and accessible network of keywords, which is the temporary text architecture, needs more discussion. Generating ideas is retrieval from memory. Without going into a detailed discussion about cognitive aspects of retrieving information from memory (e. g. Gardner 1985, Newell 1990, ch.3), just a few remarks. Anderson (1983) has developed the so-called ACT, which stands for Adaptive Control of Thought. In the cognitive system he distinguishes different kinds of memory: a working memory (something like an operating system), a declarative memory (a set of propositions) and a production system (performs actions by the system). Retrieving information is a process that works on the declarative memory and a process of matching puts the data in the working memory according to the conditions of the production system. Thus, the cognitive architecture is a dynamic one and not a system of fixed informational structures. Though ACT can be considered as "internally coherent rather

than externally linked to the actual flowing processes of human thought" (Gardner 1985, 132), it yields some rules that may be useful for a more accurate approach of the generating process in writing and especially when this process results in an explicit structure. The production rules that are specific for a certain task, constitute a compiled representation which speeds up and extends the performance. This may be one of the explanations why experienced writers are better generators and organizers than the unexperienced (cf. Frenay and Gerritsma 1986).

The output of the production system is bipartite: there are elements that are connected in a structural way and elements that are connected in a semantic way. Figure 3 shows what the difference means in a hypertextual structure.

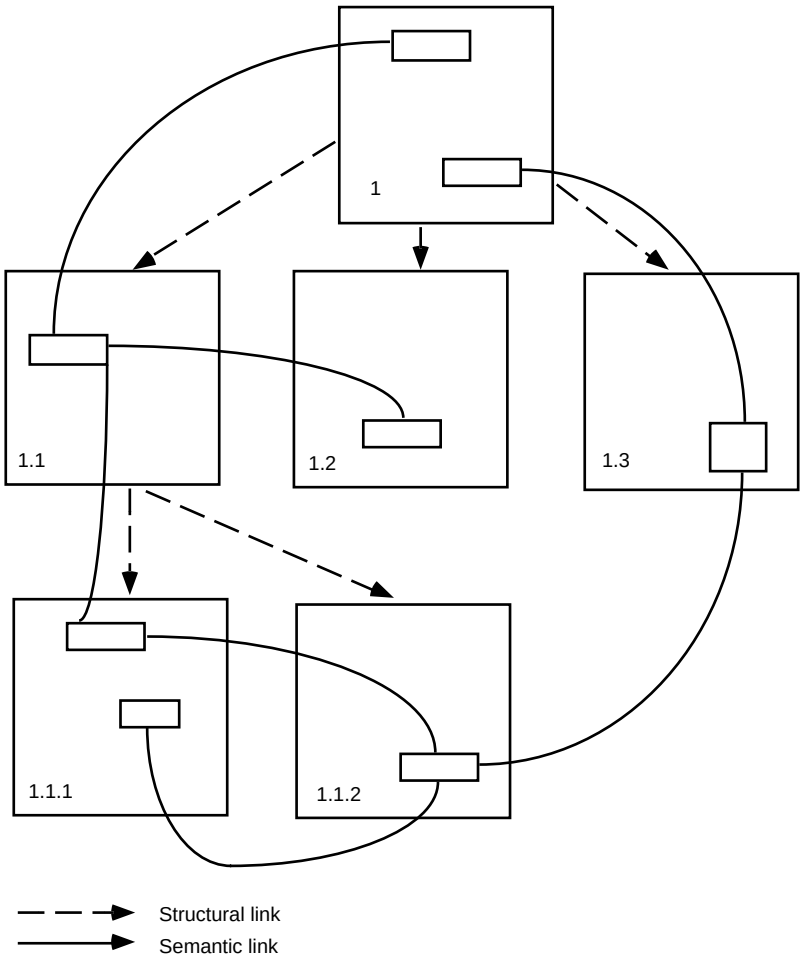

Fig. 3: Structural and semantic links in a hyperdocument (from Ghaoui et al. 1992, 128)

All structural links constitute the textual superstructure and all semantic links (being conceptual and propositional) constitute the textual macrostructure which is the same difference that Van Dijk (1980) established.

Superstructures, also known as (narrative or rhetoric) schemes are based on conventions that may be constituted by a natural logic. They are comparable with the architectural blueprint of the construction that makes a building look as it looks from the outside and the blueprint of the construction as it looks from the inside. The outside and the inside mutually dictate certain constraints. Just like specific structural outside elements for specific building types there are specific superstructures for each text type. In the next chapter this will be shown when we are going to deal with the architecture of a scientific text.

2.3 The organization of the hypertextual tool

In the previous paragraphs the generating and organizing process in writing under hypertext has been treated in a rather informal way. The organizational process, i. c. prestructuring, can be formalized under hypertext conditions. The writer can be forced by himself or others to prestructure the nonexisting text and even the standard structure itself can be enforced. The last possibility allows multi-authoring within a common hypertextual structure. The hypertextually organized architecture may vary from totally free to a complete blueprint. Thus, the set of constraints will differ in the various writing tasks. In all cases the hypertextual tool is the controlling device in the writing process that makes monitoring processes explicit. The variety in "strongness" will be discussed in the next paragraphs. Only two extreme positions on the strongness scale will be dealt with.

(1) Writers are free to choose options and contents. There are only a few constraints by which the hypertext forces the writers to solve them before formulating. Firstly, the system asks to fill in under which superstructural part the node must be ordered. The writer is enforced to put the node in a structural framework which may be temporarily. Secondly, the node must have a topic. When both conditions will not be satisfied then the system will refuse to record the node. It may be accepted as a scratch node for later use. Superstructural elements are automatically ordered in a menu or list of contents. Writers are free to link the nodes on the macrostructural, macropropositional and conceptual level. A node may look like Figure 4. When writers choose to write longer texts than short paragraph-like nodes, then they simply connect the nodes in a linear way.

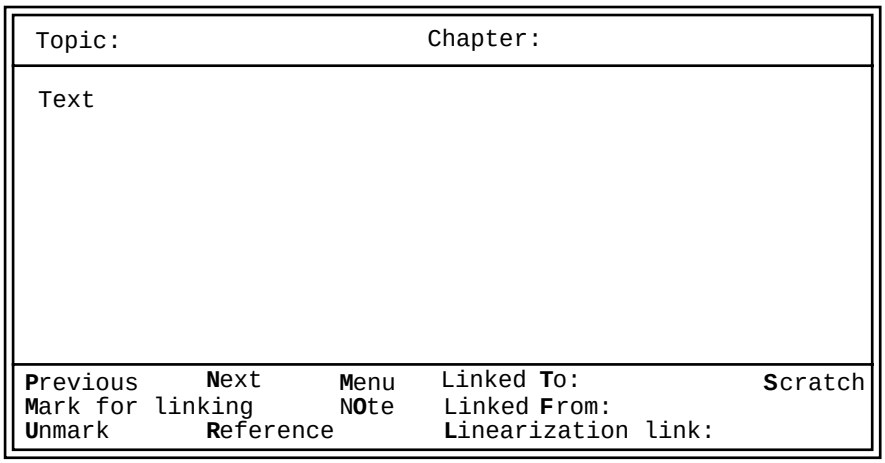

Fig. 4: A text node with menu options and options for linking

(2) As many texts are structurally standardized, hypertext can be used as a tool that allows writers to formulate within a fixed prestructured architecture, where writers have to struggle with structural constraints. When we take a scientific text as an example then it is obvious that experimental research papers are standardized superstructures. Variations may occur depending on the writer's strategy: depth first or breadth first (cf. Flower and Hayes 1980). When we borrow Van Dijk's (1980, 120) general superstructure of a research paper and add the depth first strategy to it, then we have a general structure like Figure 5 in which the arrows indicate the first and second choices. In this case a writer first chooses to go upwards in the structure diagram and then rightwards.

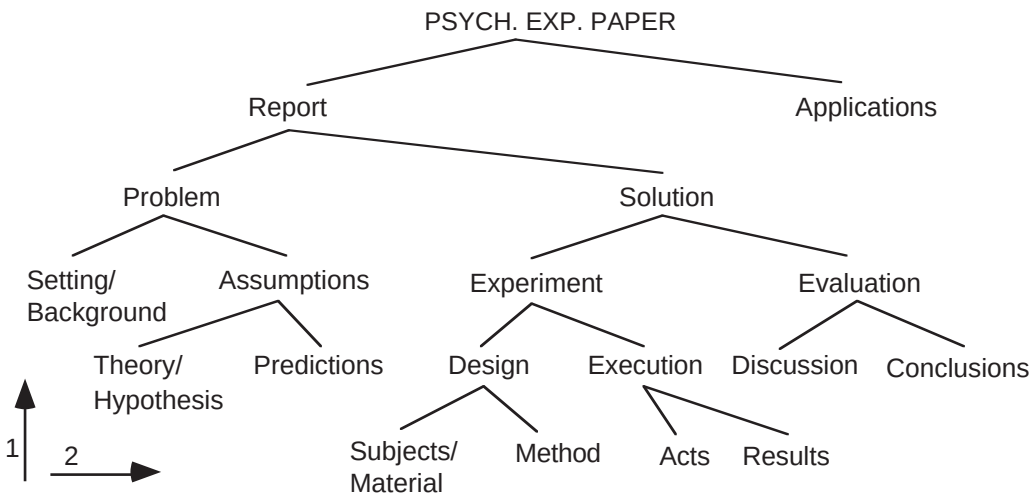

Fig. 5: Structuring the research paper using a depth first strategy
(the superstructure has been adapted from Van Dijk 1980, 120)

The breadth first approach leads to a superstructural consequence like Figure 6, p. 176. Again the direction of the arrows indicate first and second choices.

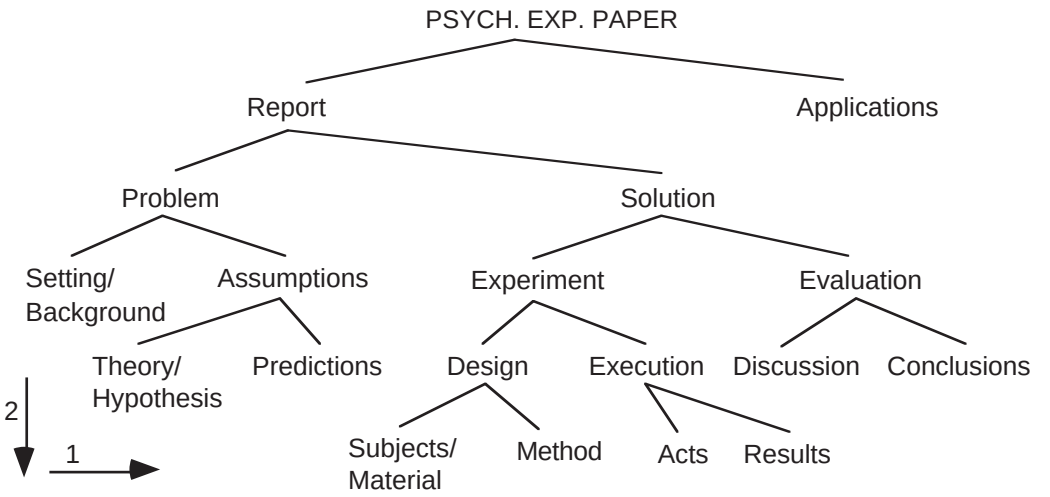

Fig. 6: Structuring the research paper using a breadth first strategy
(the superstructure has been adapted from Van Dijk 1980, 120)

Both approaches allow different “paths” through the diagram depending on the place where the writer prefers a second choice. It is even possible to change the approach because the structural and semantic structure thusfar has been explicitly established as a hypertext. When writers do not make choices concerning the temporarily order, they are allowed to write structurally at random which may be called patchwork writing.

3. Conclusion

Hypertext, even in a simple form, can be used as an useful tool in the writing process. It enables explicit monitoring of planning strategies without being too rigid, but it can also be used to enforce writers to use a standardized framework for editorial reasons that facilitates the production of scientific or educational texts.

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