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ABSTRACT

Word processors have been shown to favor a local perspective over a global perspective on the text during writing. Recently, advanced outline processors or "idea processors" have appeared that allow the writer to represent and handle structural aspects of a text so that the writer may compose the text within an outline and experiment with different organizations of the ideas during the process. Data are presented from case studies of writers who used an idea processor for writing long, complex texts. Results suggest that the use of an idea processor may encourage writers to focus early on global properties of the text. Specific properties of the idea-processing program that may affect the writing process are discussed, as well as the compatibility of idea processors with different writing tasks and writer styles. (Author/JB)

The use of "idea processors" for studying structural aspects of text production

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Abstract

Word processors have been shown to favour a local perspective on the text during writing. Recently, advanced outline processors or "idea processors" have appeared, which allow the writer to represent and handle structural aspects of a text. In such a program, the writer may compose the text within an outline, and experiment with different organizations of the ideas during the process. In other words, the text grows together with the text plan, which results in a new kind of writing process.

In this paper, data are presented from case studies of a few writers who used an idea processor for writing long and complex texts. Results suggest that the use of an idea processor may encourage writers to focus early on global properties of the text. Specific properties of the idea-processing program which may affect the writing process are discussed, as well as the compatibility of idea processors with different writing tasks and writer styles.

1. Introduction

The use of word processors has implied greater flexibility and freedom for many writers. However, there is increasing evidence that they do not provide the optimal tool when it comes to supporting global aspects of text production. In fact, recent findings indicate that the word processor tends to produce a "local bias" in the writing process for many writers.

The local perspective on the text shows up in writers' strategies of revision. One frequently hears from writers that the use of a word processor has made them pay greater attention to the style and appearance of the text (see e.g. Severinson Eklundh and Sjöholm, 1989). Experimental studies have shown that writers revise up to 5 times more when using word processors than when writing on paper (Card, Roberts and Keenan, 1984, Lutz, 1987). Most of those changes were on word and phrase levels, and in one of the studies (Card et al.), as many as half of the changes did not measurably improve the quality of the text.

Moreover, many such changes occur early in the writing process, when the text is only partly planned. This can be seen in preliminary results from a current writing experiment in our laboratory, using keystroke recording.

Experimental studies using think-aloud methodology have also shown that writers tend to plan less when using a word processor than when writing on paper

(Haas, 1989). In particular, the effort spent on planning at the beginning of the writing process is significantly lower for writers using a word processor.

Taken together, this seems to be an inefficient allocation of resources during the writing process. One might raise the question of why writers devote so much time at an early stage to local revision and so little time to planning (see also the discussion in Eleanor Wikborg's paper in this volume). In a survey of writing at the Royal Institute of Technology (Severinson Eklundh and Sjöholm, 1989), we found that a number of writers have come to realize this deficiency after using word processing for some time, and started to work on planning as a conscious strategy.

In this paper, I will discuss a new kind of computer support for writing, "idea processors," which are explicitly designed to support planning and text organization during writing. By describing results from case studies, I intend to show that these kinds of programs have properties quite different from word processors, and that they may, for some writers and tasks, promote a global perspective on the text.

2. What is an idea processor?

The notion of an "idea processor" might seem strange. Of course, it does not imply that the computer has any active role in the idea-generating process during writing. In fact, the term itself is far from being generally accepted. Using the same abbreviation, one might instead prefer to talk about an "integrated text and planning support" (IP support) for writers.

In essence, these programs are computer aids for organizing notes as well as composing text. The most common case is a straightforward outline editor. In their early forms, such programs could only be used for creating and restructuring outlines consisting of headings, and not for writing text in paragraph form. Today, the outline editors are generally integrated with word processing. A few idea processors are full-blown hypertext programs, which means that the writer can use them to represent text "nodes" as interconnected with "links" in a free and partly non-hierarchic manner. In certain experimental environments, idea processing facilities are included in more comprehensive sets of tools designed for various stages of writing (see e.g. Halasz, Moran and Trigg, 1987, Smith, Weiss, and Ferguson, 1987, Streitz, Hannemann and Thüring, 1989).

When using the term "idea processor" in this paper, I shall only presuppose the following basic properties, also typical of advanced outline programs:

• There should be a general facility for *entering, structuring and reorganizing text notes* to form an outline. In this way, a hierarchic text structure is represented.

• This should be combined with *word-processing functions* so tnat the outline can be expanded to full text at each level of the hierarchy. It should be possible to alter the text at any time while having simultaneous access to the structure.

• The current structure of the text should be *visible* (so that the subordination and superordination of ideas is spatially rendered) and *easy to revise.*

• An important property which distinguishes these programs from traditional tools for writing is that the structure (outline plus text) can be "collapsed", to be viewed only on a selected level. This is an aspect which many writers seem to appreciate particularly, and which seems to compensate partly for the restricted view of a long text on a computer screen.

Many idea processors also contain additional facilities such as commands for displaying a diagram of the text structure, for sorting, marking and hiding headings or notes, and so on.

3. The relevance of idea processors for text structuring

In an idea processor, the text can be composed "within" the text plan or outline, which is a new way of writing compared to both traditional tools and word processing. By means of this property, idea processors also have the potential to become powerful research tools. They make it possible to study writers' textual planning together with the successive development of the text itself.

Moreover, structural operations are given priority in an idea processor. The current structure of the text is visualized and can be shown on different levels of detail. One might expect that the use of an idea processor would support the writer's memory of the whole text and facilitate further planning. Another hypothesis is that in the early stages of the writing process such a structuring aid will encourage the writer to pay attention to the overall organization of ideas and text rather than to low-level issues.

4. Case studies of writing with an idea processor

In the interdisciplinary research environment IPlab, a small number of case studies are being carried out, involving writers using an idea processor in their ordinary text production. A survey has also been carried out with 24 writers who used idea processors, the results of which are currently being reported. In this paper, I will discuss data from two of the case studies, representing two different writers and their strategies with regard to aspects of planning, text structuring and revision during the writing process. The first of the case studies is described in more detail in Severinson Eklundh (1989).

4.1. Data collection

The data was collected in the following way: The writers regularly saved new versions of the text on disk. It was agreed that they would save a version at least once every day of writing, and preferably more often if and as soon as a "considerable change" had been made in the text (what was a major change was to be determined by the writer). This may seem a subjective criterion, but it was judged to be of minimal disturbance to the writing process. The versions were later printed out, the print-outs were compared manually and revisions were recorded. Computer programs that compare the text versions were also used. In addition, the writers were interviewed several times during the period of writing about the status of the text and her/his attitudes towards the outlining program.

Case study 1

The subject was a graduate student of architecture, with good writing skills and considerable interest in computers. During a period of approximately 18 months, he used an idea processor (More 1.1) for writing several long and complex texts.

As an idea processor, More 1.1 (now a trademark of Symantec Corp.) was used with an Apple Macintosh. More is one of the most advanced outline processors with integrated word processing functions. The writer enters notes in the form of headings to form a hierarchy. To write sequential text, a text window connected to the heading is opened and text of arbitrary length can be written in it as in a word processor. At any time, the writer can return to the outline with the text still visible. When the text window is closed, a small mark in front of the current heading will show that it "contains" text. Opening and closing text windows, as

well as restructuring operations, can be done instantly either by clicking with the mouse, by selecting in a menu or by using keyboard commands.

The writer was already familiar with computers and with the More program when the study was initiated. He was about to compose a long text and volunteered to be a subject of the study.

The observational study involved 4 writing tasks (see Severinson Eklundh 1989). Several other tasks were initiated during the period and were commented on in the interviews. The four tasks were: A paper about expert systems to be used as reading material in connection with a lecture; a conference paper about creativity and computers; an essay about postmodernism for a journal (which was not finished in time); and a building description to be submitted together with drawings for an architectural design competition.

Altogether, between 18 and 28 versions of the text were collected for each of the four writing tasks. This corresponded to more than 50 hours of writing on-line. The length of the final texts ranged beween 4,000 and 6,000 words for those three of the tasks that were eventually completed.

I will now try to summarize the main strategies used by this subject in building up the text structure and in arriving at a final version. For all the tasks, the work proceeded roughly in the following three stages.

Stage 1. In the first stage, the subject attempted to create a detailed outline for the text. This was an extensive planning period which also included much revision of structure. The interviews supported the impression that the writer attempted to think through the whole writing task at this stage, and produce a plan as useful and complete as possible before writing linear text.

These initial outlines comprised between 400 and 600 words in each of the four tasks. They consisted of short headings in a hierarchy with 3-6 levels. The linguistic properties of the headings reveal that the writer did not just attempt to create a traditional outline of the main sections of the text, but used the idea processor to engage in more detailed planning. (See Fig. 1, where part of an outline is shown with one introductory paragraph.) On the highest levels, the headings are usually phrased as section labels in an envisioned final text ("Introduction", "Points of departure", etc.). But on the lower levels, the outline entries more often act as loose containers of enumerated ideas, rendered in very different forms. These low level notes are sometimes given the form of full clauses, sometimes they are elliptic constructions, and generally they have a linguistic form which is *not* characteristic of headings in a final text of this genre. This contributes to the impression, confirmed by the subsequent composition

stage, that the subject used the idea processor for detailed planning of his argument down to the level of individual sentences, but without actually formulating these sentences.

Figure 1. *Case study 1: The first page of outline 2 of "Building description" (translated into English)*

- **Ideas**
  - **Points of departure**
    - **The position by the water**

      The point of departure for the external form of the proposal and its relation to the environment has of course been the building's position by the water, which has come to serve both as source of inspiration and and as organizing principle. Its location in a central position in Oslo's harbour basin will make it the focus of everything and everyone moving on the water.

      In the same way the building becomes a lookout point for those who are within it; the location of their encounter with the water. We have wanted to create the opportunity to sit down, to view the sea, but also to experience the sea more tangibly.

      Finally we have also wanted the building to become a means for the structures of the town to meet the water, to make the houses, the quays and the water reflect and balance one another.

    - **A place in which to relax, to unwind from the stress of the city**
    - **Encounter beween needs of the body and the mind**
  - **Inspiration**
    - **Venice (and Byzantine architecture)**
    - **Roman baths with their simple volumes**
    - **The antique theaters**
    - **Nordic harbours and fishing villages**
  - **Organizing principle**
    - **The basin is also an amphitheatre, oriented towards the water**
    - **The building is centered around the basin - the theatre as nucleus or center**
    - **The restaurant becomes a minor center, directed towards the bath, the town and the marina**
    - **The remaining areas are arranged along the quay in the form of shops, packing warehouses in traditional sea towns**
- **Description**
  - **Relation to the environment**
    - **Visually central position**
    - **Modest in size and scale**
    - **Own powerful characteristics to "resist" the volumes of the dominating structures**
    - **Terminates and simultaneously makes a break with the taller buildings behind**
    - **Connects to the central axis through the buildings, but straightens out its diagonal**
    - **"From the town to the harbour and the water"**
    - **"A pearl by the water"?**

Stage 2. In the next stage, the writer gradually worked from outline to linear text by "filling" the headings with text. This process had a somewhat different character in the different tasks, depending on the writer's knowledge and the situation surrounding it (see Severinson Eklundh, 1989). The writer generally attempted to proceed linearly through the outline, sometimes skipping headings to come back to them later. In none of the tasks, however, did the outline remain unchanged as linear text was created. Instead, the structure was regularly reorganized and revised as a result of formulating text. Often these changes consisted of new ideas that were entered in the outline, but it was also frequent that "old" ideas were restructured as a result of formulating text.

In most cases, the restructuring operations affected only the parts of the outline that had not yet been filled with text. This strategy was commented on by the writer in the interviews. He found it to be one of the main advantages of using an idea processor that one can explore and experiment with one's ideas about the writing task down to a very detailed level, and then change the macro-structure at any time without having to bother about consequences in the form of linguistic "contracts" taken by sentence formulations. However, in one of the tasks, there were several changes made to parts of the outline that already contained text paragraphs. This was evidently due to a problem of overlapping content between sections which the writer encountered rather early during the writing process. He made repeated macro-structure changes, using More's structuring capabilities to explore different organizations of the text before arriving at an acceptable solution. Some of these changes resulted in sentence-level revisions to achieve cohesive transitions between paragraphs.

During the composition of text there was usually a considerable "pruning" of the outline tree. In other words, as the writer went on to transform the ideas of the outline into full sentences and paragraphs, he continuously deleted part of the headings of the outline. Generally, the headings that were deleted at this point were on the lower levels in the hierarchy, and corresponded in their content to sentences rather than whole paragraphs or sections. This means that many headings still remained as titles of smaller sections of the paper. However, it was clear that the writer did not intend these remaining headings to be kept as titles in the final texts. (He reported that he viewed these texts as "not very hierarchic in themselves".) Rather, he wanted them in order to "keep a consistent structure" and as a future record of the content of the text.

There was practically no low-level revision of sentence formulations during this main stage of composition. This is also supported by the interviews. The writer wanted to avoid working on details of formulations until he had a draft of the

whole text. He also found that the outline processor encouraged this way of writing.

Stage 3. Finally, the text was transferred to a word processor. The reason for this was that the writer was not satisfied with the word processing functions in More. He was quite interested in typography and wanted to have maximal freedom to choose a layout for the texts. Also, he felt that More made it difficult to see the document as a continuous text. As he worked through the text in the word processor, he made a large number of stylistic changes, and it also took comparatively long to finish writing, considering that very few ideas were altered at this stage. Although the writer himself claimed that the only work that remained for this stage was polishing sentences "to make them fit together more smoothly", he actually put a lot of work into the sentence and phrase level formulations. This was particularly true for one of the tasks (the building description), in which the writer evidently saw exact formulations as being particularly important.

Most of the remaining headings were also deleted at this stage, so that the final texts only contained a small number of section titles (fewer than 1/5 of the headings in the final More files were kept in all of the finished texts). Very few macro-structure revisions were made at this final stage (between 0 and 5 for all tasks); nearly all of them were deletions of whole paragraphs.

The final texts were readable and generally had a cohesive style. In fact, much of this fluency had been created in the earliest stage of composition in More. As the writer composed the text during stage 2, he often kept the text windows of previous outline headings open simultaneously, in order to be able to fit in the current sentence with the previously written text.

To sum up, this writer used the idea processor consciously for planning the content of the text, and kept the resulting outline as a guide to the macro-structure of the text while composing, though it underwent substantial revision during the process of writing. He was satisfied with the program as a support in these tasks, and mentioned explicitly in an interview that it had made him refrain from working on a low level of formulation too early during writing. He felt that he could not have worked in a similar way in a word processor: "In a word processor, I may get stuck for five minutes working on a formulation so that it will fit into the context and express exactly what I want to say - instead of going on with the overall structure of the text."

The writer found one major disadvantage with the particular outlining program used: It did not allow easy viewing of the whole linear text. In More, the text windows under different headings have to be opened one by one, and therefore, it

may not always be a simple operation to view the whole text written so far. Even when the whole written text was expanded, the writer felt that the presence of the headings disturbed the view of the linear text, and he needed an option to see the text with the headings suppressed. Finally, he missed being able to write notes outside of the hierarchic structure.

4.3. Case study 2

The subject of the second case study is a researcher in English language and literature, and an experienced writer. She is using the outline facility of the advanced word processor Word 4.0 (of Microsoft Corp.) on an Apple Macintosh to write a book about English 18th-century women writers, based on extensive literary material. This is a much more comprehensive writing task than the papers written by the first subject. Since the book is not yet finished, the discussion here will deal only with the planning stage.

This was not the writer's first experience of idea processors. Before engaging in this task, she had used an advanced outline processor (MindWrite) to plan and compose a short essay on a related topic. Her reason for choosing Word for this task was that the production of a complete monograph required a more powerful word processor. In other words, the writer wished to use an outline program that could also be used later to finish the writing of the whole book.

Word 4.0 operates in two different modes: text mode and outline mode. One can write and edit text in either of the two modes. The main difference is that in the outline mode, the document is written and represented in a structured outline form, and commands are available to select and reorganize structural units of the text. (On the other hand, several of the typographic options are not available in this mode.) Just like in the More program, the mouse (or menu options) can be used to move a heading and its subordinate text upwards or downwards within the document, or to otherwise change its place within the hierarchy. Also, the writer can directly select a desired level on which to view the text, by pointing at a line of symbols on the screen. For example, in order to hide all parts of the outline which are placed on level 3 or lower in the hierarchy, one simply points at the figure 2 on the symbol line with the mouse.

The most important difference between More and Word is that Word (like many other commercially available outliners) does not make a distinction between headings and text in paragraph form. Text of any length can be entered as a "heading" or note. In order to write linear text under a heading, one must make it subordinate to the heading, i.e. place it on the next lower level in the hierarchy. In

More 1.1, as we recall, one can write text under a heading by opening a window under it, and this text will then be linked to the heading. (A more recent version of More allows headings to be of arbitrary length. This means that one can choose either to use it like Word, writing all text as entries in the outline, or keeping the linear text in document windows which can be opened or closed individually.)

I will now briefly summarize this writer's main strategies in using the outline program for planning and idea development. These observations are mainly taken from the growth of chapter 5 of the book, for which 18 versions are available. Similar strategies were used for the planning of the other chapters.

The writer used the outline program both for detailed planning of her argument, and for organizing the mass of literary support material for the task. The latter consisted of extensive handwritten notes from the reading of about 50 books, some of which are only available in research libraries.

The writer started in Word with brief sketches of each of the 5 chapters of the book. After this, she turned to a detailed planning of the last chapter, which included the conclusions and a summary of the main ideas that had grown from her reading. The general strategy for the continued work was to go through the handwritten notes again, and gradually expand the different chapter outlines into a more detailed argument.

The outlines are based on a small number of *governing ideas* (this is the term used by the writer), often in the form of a topic sentence. These notes are usually entered on the highest levels in the outline for a chapter. Support for the governing ideas is then gradually built up by listing "arguments" in the form of observations from the literature, which are entered as subordinated notes.

The writer uses several levels of depth for representing this argumentation. The higher the level in the outline hierarchy, the more abstract and the more generalized in form are the ideas. On the lowest level, the argument is supported by quotations and explicit references to the literature. These "support lists" are organized chronologically. (See Fig. 2.)

Figure 2. *Case study 2: The first page of outline 4 of Chapter 5.*

Chapter 5: The Ideal Love Relation

I. The lover is attentive to a woman who is at the center of his attention

1. He shows life-long devotion: (Rejection is ruled out)
•In Delaviere Manley's Rivella (1714) Lovemore's devotion and admiration of Rivella never fails, despite her loss of innocence, her lack of beauty, her life-long preference for other men , and despite the fact that he clearly sees her as she really is.(pn 4).
• In Aphra Behn's The Fair Jilt(1688) and The History of the Nun (1689), the lovers/husbands feel undying passion and concern for their wives, no matter how guilty they are.
•The Prince Tarquin is so sexually intoxicated by his wife that years of living with her lechery and murderousness, (he himself is caught attempting to murder her trouble- some sister for her) do not dminish his ardor. Even at his lowest ebb in prison:"Nor could all his Sufferings, and the Prospect of Death itself, drive from his Soul one Spark of that Fire the obstinate God had fatally kindled there." (115).
•Villenoys helps Isabella dispose of the body of Henault, his friend and her first husband.
2. He is shown as preferring the company of his beloved to the comradeship and pursuits of of men:
A Aphra Behn's The History of the Nun :
•Henault is bookish and "given to Repose"(106).
•"He car'd not for the Conversation of Men, because he lov'd not Debauch, as they usually did"(106).
•Even when under pressure from everyone (father, aunt, bishop, as well as the example of all his friends); even when he realises it is in his own interest, he resists until Isabella herself urges him to go: "Love, which everyday grew fonder and fonder in his Heart, oppos'd all their Reasonings" (126).
B. Mary Hearne's The Lover's Week (1718) and The Female Deserters (1719):
•Philander prefers life in retirement with his beloved to a life of pursuing ambitions at court: "I prefer this small Cottage before the glittering Court " (LW,51-52). Also: "For my part, I am resolved, as soon as good Manners permit, to quit all Publick Places, having now arriv'd to the great Height of my Ambition, being in possession of my dear Amaryllis, which Happiness I esteem more than possessing the Imperial Diadem" (LW, pn 2b)
•Similarly Torismund prefers Calista's company in retirement to the enjoyment of "State and Pomp" (FD, pn 3).
3. What about the daughter as enjoying the child's role - as the absolute center of a father's attention in any of the books?

II. Passion lasts, i.e. desire is accompanied by fidelity (stripped of its element of betrayal, the libertine ethic is thus celebrated)

III. The lover alternates the masterful and submissive roles in the relation.

1. In Behn's The History of the Nun,
•Isabella envisages a pastoral idyll of mutual mastery and submission between the lovers: "I thought of living in some lonely cottage, far

Compared with the subject of Case study 1, the outlines of this writer consist more of complete sentences. She mentioned in an interview that she preferred to write her text plan in full sentences rather than keywords, because this forces one to work out one's ideas explicitly.

The outlines also contain a small number of "process notes", i.e. instructions and reminders, which the writer addressed to herself for the continued writing process.

During the development of the outlines, the writer continually went back to reconsider the governing ideas to check if they were consistent with the new material. While working on-line, she used Word's collapsing function in order to view only the highest levels of the outlines. Her original motivation for making this a habit was that she could not print out the text as often as she wanted, the printer in her home being a rather slow one. However, as the text grew longer, this also became part of a conscious strategy which aimed at achieving consistency and coherence in the main argumentation of the text. When printing out a chapter, she also often made a separate print-out of the top level of the outline, a feature supported by the program.

Just like the writer of the first case study, this writer made structural changes in almost every new version of the text. However, these changes were of a somewhat different kind. She rarely reordered the governing ideas; rather, she would often increase the total number of levels by inserting newly formulated sub-arguments and adding new notes on literary material. The only types of text that would sometimes be moved to a quite different place in the outlines were a few general observations in the form of a short paragraph, which seemed to connect to the whole outline of the chapter.

In contrast with the writer of Case study 1, this writer worked repeatedly on formulations, especially of the "governing ideas" of a chapter. Consequently, the text on the higher levels gradually took on a well formulated character. Apparently, the writer thought more and more of these sentences as parts of a formulated text.

Generally, this writer seemed to integrate linguistic formulation into her thinking about the task much more than the subject of Case study 1, who wanted to postpone formulating his ideas into sentences until the plan was complete. This was evident also in her first essay written earlier in MindWrite. The writer's recollection of how work with this article began was typical: "Long before I started writing, I was sitting in Oxford with this sentence". This key sentence was in fact kept through all versions and occurred, slightly revised, in the second paragraph of the final text.

Since the book is not yet completed, we cannot comment on the final stage for this task. In the earlier task using MindWrite, the writer chose to write the final version as a running text of its own, under a separate heading. In the same document, she kept the structured outline for reference during the writing process. In other words, she preferred to rewrite the text from the start, rather than convert the individual notes of the outline into sentences and paragraphs.

In sum, this writer used the outline program both to develop a coherent and consistent argument and to keep a record of her supporting notes. In contrast to the first writer, she rarely reordered the basic ideas of the text; instead she used an increasing number of different levels for representing a gradually more elaborated argument. The program also enabled a quick orientation in the growing text by its facility of shifting between a high-level and a detailed presentation of the text on the screen. This way of planning seemed based both on a tradition of writing pedagogy, known by the writer through her experience as a teacher, and on her accumulated experience of the idea processor.

The strategies should also be understood against the background of the writer's own reflections about her writing style. She felt that the program suited her personal style with its support for detailed outlining.

> "I am the kind that adds one sentence at a time, very carefully. I think and I think, perhaps moving a sentence but no large chunks, once I have started writing."
> "It is the first time that I have used a computer for the planning stage. In this way one can save one's ideas, instead of perhaps forgetting them."

5. The compatibility of idea processors with different writing tasks and writer styles

As has been indicated earlier, idea processors cannot be expected to suit all writing tasks. The tasks involved in the current studies were long and rather complex. It seems clear that an idea processor, or any support for text organization, will favour those tasks that are inherently structured, or for which the writer has a certain structure in mind.

This was indicated by an experience of the writer in Case study 1. He was invited to give an introductory presentation at a workshop on a subject which he knew well. Although he did not have very specific ideas about what he should talk about, he tried to use an idea processor to explore his ideas about the subject. After trying intensely to compose outlines in More, starting from the beginning four times with partly new ideas, he gave up and took a break from writing. Finally, he had to use pen and paper to sketch his ideas before he rewrote the final

text in a word processor. Afterwards, he said that his ideas had been just too vague for successful use of the outline processor: "It is best for tasks where you know fairly well what the text should be about, and where you also have some idea of a possible structure in mind."

It also seems clear that some writers do not feel their personal style to be supported by a structure support of this type. Rather than starting by making a plan for the text, they want to start writing directly to find out what they want to say. This was the case with a third writer, a psychologist, who tried to use an idea processor (More II) for writing an essay about learning computer programs. He was a competent writer with a personal, fluent style. After three sessions in More, he reported that he had abandoned the idea processor and started writing in a regular word processor. He gave as his reason that he "did not know when to stop structuring and start writing", and that he felt that "there is a risk for excessive structuring". He described his normal way of writing as follows:

> "I usually write to see what comes out, and then I write again. It is not really a structure, but a lot of words... Some parts of the text may turn out to be OK; others will change direction as I go along".

Although both the task and the writer's knowledge about it seemed to invite structuring, the explicit plan created was felt by the writer to be an obstacle rather than a support in his continued writing. He felt more inclined to make the text structure grow invisibly through the formulation of words and sentences in the word processor, and gradually develop the text from these notes.

Even for writers who favour explicit structuring, it is important that the program supports a "bottom up" strategy as well as the typical, "top-down" expansion of an outline. A writer may often need to write in the form of sentences and paragraphs for a while, and then go back to the global structure to relate it to what has been written. The writer of Case study 1 sometimes worked in this way in one of the tasks: He wrote a long text in a document window, and then he clipped it into smaller parts under separate headings. The reason was that he wanted to keep the whole structure consistent, thus being able to read the text in the outline mode (with only headings visible), to check his argument and the current content of the text.

6. The influence of specific program properties on writing strategies

In other respects too, the design of the program may influence writers' strategies considerably. The distinguishing aspect most relevant in this study is perhaps how the system represents "ideas" in relation to "text."

As mentioned in connection with Case study 2, there is a difference between More 1.1 and Word 4.0 in that More keeps a clear distinction between headings and linear text. They are separate entities, although connected in the system. The text connected to a heading may be opened individually. In Word, however, text of any length can be entered as a heading or "idea". The writer determines the function of a text node by its linguistic form, and all text notes on a certain level can be opened in one and the same operation.

Evidently, More promotes a clearer distinction between ideas and text than Word. This may have contributed to some of the differences between the writers of case study 1 and case study 2. Whereas the first writer started with a straightforward outlining stage, and only opened a text window when he was ready to formulate full sentences and paragraphs, the text of the second writer gradually took the form of full sentences, a way which also seemed to support her individual style.

Both ways of functioning of an idea processor have their advantages. From the point of view of the researcher, a clear distinction between plan and text in the outline may be preferable when studying certain aspects of the writing process. On the other hand, it may be difficult for a writer to maintain a distinction between notes/ideas and "real" text. In some situations a writer might prefer to let thoughts in elliptic form grow freely into sentences with no clear borderlines between them, and therefore the program should support this way of writing as well.

In several other respects, the design of the program contributed to the writers' strategies. We have already mentioned that in Word, selecting a single level to view the whole text is especially easy (by pointing at a number of the symbol line on the screen). In More and some other programs, it is not as quick and simple to do this, and writers therefore seem to find it more natural to select a level individually for each heading. In this respect too, one can debate which build-up of the program is the most natural procedure from the point of view of the writing process.

Finally, the program's basic way of operation may support outlining or structuring more or less clearly. There is in fact a distinguishing property between what is usually called an "outline processor" and a "word-processor with inbuilt outlining". In an outline processor, the outline is treated as the basic mode to view and operate on the structure of the text. In word processors, on the other hand, one often has to exit to a special mode in order to see the text in outline form, and in this mode, it may not always be possible to perform all the usual text-editing operations.

7. Preliminary findings

The experiences from these case studies suggest that for some writers and tasks "idea processing," or explicit planning in an integrated outline program, will promote a perspective of the whole text during the writing process. The writers of this study made frequent use of the structuring functions of an advanced outlining program when planning and composing a complex text. They frequently attended to global properties of the text while elaborating the plan, and gradually arrived at an acceptable macro-structure. This seemed to contribute to postponing local, surface level changes completely for one of the writers, whereas the other writer made such changes only in the formulations of governing ideas.

The idea processor also seems to have made it easier for these writers to orient themselves in the growing text. This is consistent with the preliminary results of a survey of writers using idea processors. They mentioned as the most important property of an idea processor that it gives them an improved global view (Sw. *överblick*) of the text, something that they have missed when using word processing.

Some writers, however, do not appear to have strategies that are supported by a program of this kind, but need to write continuous text in order to arrive at a mental plan for the text. Further, many writing tasks are not suitable for structuring support. They may be too short and simple, or focused on personal expression rather than structure. In the future, many of us will still need paper and pencil, a typewriter or a word processor to find out what we want to say.

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