SOFTWARE REVIEWS

REVIEW OF STORYBOARD
By Deborah Healey

Title: Storyboard
Author: Christopher Jones
Publisher: Holt, Rinehart and Winston
Copyright date: 1984
Medium: 5 1/4 disks
Copyable: yes
Hardware: Apple II, IIe, II+, IIc
Cost: $79.95 for a teacher disk, student disk, and manual ($4.75 for shipping and handling)

Storyboard is not a bells-and-whistles, flashy graphics program. It does not jump out at the causal conference browser; young children would not get a video game thrill from watching the program. Storyboard is a workhorse program, designed to meet a specific need, to perform a specific task. It allows a teacher to easily design an exercise that encourages ESL/EFL students to test hypotheses about patterns in English and gives the students practice in guessing from context. Described as a "reading reconstruction" program, Storyboard creates a whole-text cloze exercise -- one where every word is blanked and the student must fill all of them in.

General Description:

The first thing a student sees is

STORYBOARD

You can choose from these texts:

Imagination   \
Murder   > or others the teacher
has created
My Swiss Watch /

Use arrows to select. Then press RETURN
- - - - - - - - - - - - -
After selecting a text, the student sees

Do you want to:

1. start without seeing the text?
2. see the text for 5 seconds?
3. see the text for 30 seconds
4. see the text for as long as you want?
5. exit?
Type 1,2,3,4,5.
- - - - - - - - - - - -

If the student selects number 1, a screen filled with asterisks appears, one asterisk for each letter in the original text:
*****'* ********* ****** ** *** *****.
****'* ********* ****** ** ** ***.
** ** **** ********* ** ** ****.
+=letter, *=word, #=see, &=end
Guess a word:

Choices 2,3, and 4 allow the student to view the text before trying to fill in the blanks. The options listed at the bottom of the screen (+,*,#,&) allow the student to ask for help, see the whole text, or get out of the program at any time. To guess a word in the text, the student types that work at the bottom, and it appears on the screen wherever it appears in the text. If the student guesses a word not appearing in the text, the message "Bad luck" flashes and the student is prompted to guess again. This is not a testing program; it does not keep score. Students are free to check hypotheses without penalty. While Storyboard comes with four texts on the student's disk, the program is designed to be an authoring system, allowing teachers to enter their own texts on the teacher's disk which looks like this:

Storyboard Options Menu

1. Type a new text
2. Run Storyboard
3. Edit a text
4. Rename a text
5. Transfer a text
6. Delete a text
7. Delete all texts
8. Print a text
9. End
Press 1,2,3,4,5,6,7,8 or 9.

Usually the teacher will start with option 1. The typing goes much smoother with a prepared text in hand rather than just with something in mind. You can easily edit the line that you are typing but must go to option 3 to edit any other line.
After option 1 is chosen, the teacher is prompted to insert the student disk in the drive and press return so that the text will be written on the student disk. The material can also be written on the teacher disk and transferred to a

The Word Process of Writing
Using A Computer to Study the Writing Process
by Vance Stevens

I. ABSTRACT

In this project, the process of writing was studied using a word processor. In the initial part of the project, short, focused writings were used so as to develop a technique for using the computer to gather data on the writing process. In addition to technique, something was learned about how paragraphs were composed and strung together by a writer using his native language. In the second part of the project, a term paper prepared for a graduate level university class was studied from scratch to final product. This part of the project yielded insights into how a lengthy academic writing task was carried out by a native English speaker using a word processor.

In studying the longer paper, it became apparent that the technique developed for the shorter writings was too cumbersome to apply to the whole of a really huge piece of writing. Consequently, suggestions are made for software that might eliminate some of the problems encountered. It is also hoped that what is reported here might stimulate further research along similar lines.

II. RATIONALE

In their book on research in the composing process, Odell, Cooper, & Courts (1978: 7) raise the question of how a study of process might be designed. They mention, for example, Emig's (1971) suggestion of using time lapse photography or an electric pen to capture the act of writing. Their own suggestion for studying the writing process is to position TV cameras on the subjects and on their papers so as to capture every word and gesture associated with the writing. Toward the same purpose, Murray (1978: 99) suggests hooking writers up to eye movement detectors. Pianko (1979: 7) video taped writing sessions and followed up with post tests and interviews to elicit from the students explanations of their behavior and to delve into their past and present experiences of writing. These suggestions are constructive, but serve also to point up a certain disarray among researchers in deciding how a study of process should be carried out.

Odell et al also question what might be learned if any or all of this were done. In the one study mentioned above which was actually performed, Pianko related the rates at which students composed, the time it took them to reread their compositions, the number of drafts they composed, aspects of their planning behavior, and the like. It was found, for example, that looking around the room is typical pausing and scanning behavior for poor writers, whereas good writers concentrate on the paper they are writing. Although it is useful to have empirical confirmation of such behavior, this is not highly revealing to experienced teachers of writing.

Perl (1979: 317) notes that, regarding research on the writing process, "one limitation of work done to date is methodological." In her opinion, previous studies on process, such as Pianko's, were compromised by trying to explain in subjective narrative form what needs to be quantified by hard data. She says there is a lack of "sufficiently graphic evidence for the perception of underlying regularities and patterns" inherent in the writing process. She then describes a study she carried out in which she attempted to remedy this problem.

Perl filmed and recorded students talking, as they wrote, about what they were writing. Perl defends the most controversial aspect of her experiment by claiming that talking provided her writers with a heuristic for planning and writing; for at least one of her students, "talking led to writing which led to reading which led to planning which again led to writing." (p. 325) From the video and voice recordings, Perl was able to isolate and study such behaviors as commenting, interpreting, assessing, reading, repeating, editing, getting stuck, and talking about what one plans to do or means to say. In addition, she was able to record duration and sequence of all these behaviors.

Perl's study is significant because it is possibly the first study of process in which data on composing were quantified in a replicable way. It is a commendable and revealing study, but it does not completely escape one of the flaws that marred previous studies in that it introduces artifacts into the composing process and then measures a process which has been altered by these artifacts.

I believe there were at least two artifacts in Perl's study. One of these artifacts may have been the presence of extraneous equipment. It is widely believed, particularly in sociolinguistic research, that the presence of recording equipment can cause alteration of behavior in the person from whom language is being elicited, and this MAY have been a factor in Perl's study. But I feel that the most crucial artifact is that the students had to talk as they composed.

I have been talking to myself while composing these last two paragraphs, and I find personally that concentrating on talking OUT LOUD interferes just enough with my concentration on writing that I have to go back and repeat more than I would revising silently. Cooper and Odell (1976) also conducted a study in which they concluded that "composing aloud while transcribing was not a productive method." and suggested that "practice

and effort" are required to prepare subjects for the demands made on them when they are expected to talk while writing. (Furthermore, in a recent Rolaids commercial, one of the actors says, "This is how I spell relief: R-O-L ..." He begins to write each letter as he speaks it, but when he writes the last four letters, A-I-D-S, he has to stop talking.) Perl's study would have been more valid if more were known about the effects of talking out loud while writing.

III. WORD PROCESSING

Word processing has already begun to revolutionize the teaching of writing, especially as students using word processors are able to overcome the major problems with the process approach to writing. These problems center on the fact that it is theoretically compelling to ask students to work through the stages of freewriting, writing a rough draft, and revising several copies, but logistically this teacher's dream is a student's nightmare. Garrison (1974) mentions that a student might do ten revisions to produce a final copy he can be proud of. Ten revisions in longhand represents hours of copywork; on a word processor, ten revisions can be done in minutes. Many articles have lately appeared discussing the ramifications of word processing in writing instruction. Daiute (1983), for example, discusses in detail how word processing helps attenuate numerous physical and psychological constraints in writing.

Word processors could also be used to facilitate the study of writing. For one thing, the computer has the capability of capturing and saving each unique step in the writing process, extending possibilities for research into what goes on when people write. Yet word processors have been largely overlooked by those working with developing their own writing skills or the skills of others, and by those doing research in these areas.

IV. PROCEDURE

This project made use of an Apple II+ microcomputer and Apple Writer word processing software to study the writing processes of two skilled writers who were both native speakers of English. Four writing tasks were examined for the project, all written in extensive academic mode. Three of the tasks involved short writings of one or two typed pages, the author in each case having taken an article from a professional journal and condensed it as succinctly as possible. The researcher was the author in the writings designated #1 and #2, and a volunteer subject the author of writing #3. The remaining task was a term paper of about 35 pages (double spaced), written by the researcher.

The first step in the project was to work out a system for using the available software to save each change made in a given piece of writing. With Apple Writer's Control-K option, the writer can save a portion of any file from the cursor position back to any point in the file the writer specifies, so it was possible to save to disk only enough of the corrected portion of the piece being worked on that it could later be identified and placed within the whole piece of writing, thus obviating the need to compare lengthy versions of revised writing for instances of error. The files containing the corrections were named alphabetically, so that the first file was A, the second B, and so on up to Z and then AA, etc. In this way, typing involved in creating filenames was minimized, and the revisions were all ordered chronologically.

In examining the data, the files were printed out in alphabetical order with the result that all the changes made in producing a given text were arranged neatly and in order down the page. The succession of revisions could then be noted from one segment of text to the next. As in Perl's study, it seemed best to make up categories of revision as the data were examined, and not to try to fit the data into preconceived categories. Once the categories had been established, the revisions were tallied and the results placed in chart form (Figures 1 & 2). Conclusions were drawn from a rough survey of the data.

The short writing tasks were scrutinized closely in the manner described above. It was originally intended that the data from the term paper be examined in the same way. Toward this end, copious amounts of data were collected on the process of writing the term paper; however, since the processes involved in individual sections of the paper seemed similar, only the last two sections of the term paper, the Implications and Conclusions sections, were closely examined.

V. FINDINGS

The data lend credence to Murray's claim (1978) that there exist two distinct stages of revision in writing: internal and external. According to Murray, the writer enters the latter stage when he ceases writing chiefly for himself and begins concentrating on how he can best address his intended audience. In all writings examined in the present project, easily discernable points were reached at which it seemed convenient to stand back and view the almost completed piece in its entirety and to begin looking at it from a reader's point of view. Thus, in the data given in Fig. 1 for the short abstracts, a distinction is made between instances of change made in either mode of revision. For the longer paper, all data are from the external revision stage.

The number of revisions for each category devised in classifying them are given in Figures 1 & 2. The following categories subsume all the revisions found in this survey; that is, there was at least one revision of each of the following types:

1. A single word was occasionally expanded to a larger, more clarifying concept.

2. A completed idea was expanded with use of coordination; that is, once completed, an 'and' or 'but' + 'something else' was tacked on to the idea. This happened only in internal revision.

3. A change might be made in subordination or coordination. That is, 'and' might become 'but'. Or, a clause might attach to another with one subordinator, but a change in subordinator would reflect a corresponding change in the relationship between the ideas in the two clauses.

4. One word was occasionally changed to another. This was usually a matter of choosing a more precise word, or of communicating a nuance.

5. A concept might be altered for clarification, preserving the informational content of the original. Such an alteration might be a change in word order, or a reworking of the expression of the original idea.

6. A concept could be altered for economy (i.e. reduced).

7. There might be a formatting or cosmetic alteration, such as a paragraphing change, addition or deletion of commas, or alteration in the way dates and page numbers appeared.

8. A word might be added to indicate sequential ordering of ideas. Such a word might be 'secondly', or even numbers in parentheses.

9. A word might be deleted for economy of expression or to eliminate redundancy.

10. A word could be added for clarification. Usually, such words were adjectives, but they might also be pronouns, or prepositions or relative pronouns enhancing cohesion.

11. A phrase might be added for clarification. A phrase is here defined as being more than one or two words, but less than a sentence.

12. A concept might be begun but changed to another because the writer's mind raced ahead of his script. Perl (1979: 330) makes note of this when she says that her subjects "were shuttling back and forth, projecting what would come next and doubling back to be sure of the ground they had covered." This was exclusively an internal revision phenomenon.

13. More information was added. That is, a sentence or more was inserted with new information.

14. The order of sentences or paragraphs was transposed.

15. A change was made because register was deemed inappropriate.

16. Gender was neutralized. In this survey, these were all instances of anaphorae being pluralized and their pronouns being changed from 'he' to 'they'.

17. A topic sentence was attached to the beginning of a paragraph. This always occured in external revision.

18. The following five corrections were made in grammar: a change was made in definiteness, parallelism was corrected, subject-verb agreement was corrected, a change was made from active to passive, and pluralization was corrected.

The emergence of these categories in the writing process should facilitate future research. However, it is apparent (from Fig. 1) that what seems to be true for one short paper is not necessarily corroborated in the next. For example, eight instances of "shuttling" behavior (a concept begun but changed to another) are observed for writing #2, but only one other instance of this is recorded in the other two abstracts. This could be because of imperfections in data collection for the latter two papers, or because this behavior did not exist in those papers. From this exploratory survey, it is not clear which is the case.

Another reason that the data are not more revealing is that the processes under study were not well defined prior to this survey. Therefore, it was hoped mainly to explore the potential of this innovative technique and to see what sort of patterns would emerge. It is significant that seventeen categories of content revision were discovered. By way of comparison, Perl found eight categories of changes in content and an additional eight related to grammar and mechanics (as compared to my five). By using word processors to focus on a larger corpus of data, it seems likely that there will emerge an even finer definition of the processes in question.

VI. ANALYZING LENGTHY ACADEMIC WRITING

Murray (1973) says of the composing process that writers scan their subject first, then move "closer and closer", proceeding as follows: First, the writer assembles an abundance of information. Next, he teases meaning from this information. Then (shifting into the external revision mode) he begins to become aware of his audience. At this stage, form, or genre, must be made appropriate. Structure (logic, argument, & narrative) and development also get the writer's attention. The author gradually hones down the dimension of his piece by attending to "pleasing and effective proportion ... a continual process of subtracting and adding to keep the piece of writing in balance." (p. 170) Finally, voice, or authority and concern, must issue from the completed work.

Murray's characterization of the way authors approach and refine their products is an accurate description of the way the term paper was approached and written. I first scanned my subject, writing in four separate sessions at the computer keyboard about fifteen pages of loosely connected discourse, stopping finally when I felt a need for more precise information. I then reviewed readings on the subject matter, taking notes and writing down quotations as I was reminded of something I had touched on in the initial freewriting.

11

By then, a pattern was beginning to emerge, and I found I could begin putting meaning to the information. I found I could sort my quotations and writings under a series of working headings, and these headings evolved roughly into those used in the final term paper. I could have been keeping notes on index cards or writing them on a sheet of paper which I could have cut and pasted together, but as it happened, I had saved all my writing on disk, so I created files named after my working headings and then separated out the information I had gathered and stored the related bits in the appropriate files (a process parallel to sorting index cards and cuttings from freewritings into piles). Next, I created a master file and began pulling the separate files together in the order I thought they should be used in my final paper. This was analogous to putting sorted cards and clippings into some logical order in a rough draft.

At this point, I had one large file with all the pieces of my freewriting and quotations from the readings culled together, and so the next step was to run through the file, connecting the relevant pieces with prose and throwing out others that no longer seemed appropriate. Here, the technique which had worked well with the shorter writings began to get unwieldy. I was able to capture frequent intervals in the process, but it became awkward to try to preserve on disk all of what I was doing and still be able to write with reasonable competence and sanity. Consequently, I was not able to retain a satisfactorily detailed study of my process until I had already got under way with the external revision.

Hence, the data for the term paper in Fig. 2 reflect the final three revisions in the process of completion for the last two sections of the paper (chosen on the assumption that revisions done here were representative of the whole). By this stage, I had made the shift from writing to myself (as I had done in the freewrites) to writing academically. However, structure and development had not been well worked out, so the data reflect work on those aspects of revision, and particularly on the aspects of dimension and voice.

The data indicate that at first, concepts were mainly altered for clarification or reduced for economy and elegance, and that words were occasionally replaced. But as I moved "closer and closer", searching for the right dimension and voice, I began to concentrate more on formatting. Some support for there being increasing attention to cosmetics in the later stages of external revision is found in the data gleaned from the shorter papers also. Although this evidence is hardly conclusive, it does corroborate Murray's insights into the writing process.

a choice, and I simultaneously asked myself what I would have done had I been writing using another medium.

If I had been writing with a pen, I probably wouldn't have been writing so quickly, and I would have caught myself before having gone so far, scratched out the offending few words, and proceeded with the topic on which I had originally started. If I had been reading out loud and been video taped, I would probably have become slightly flustered and begun reading the paragraph from the beginning or perhaps thought hard to myself and maybe cheated a little bit and read silently, giving the researcher the impression that I had become stuck. But since I was using a word processor, I opted to continue with the train of thought I was on. I knew I would be able to go back and write what I had originally planned, and I wanted to follow the lead that I was then pursuing. In effect, I was taking advantage of an ability inherent in word processing to freely pursue two trains of thought at once, the one being preserved in that first clause, and the other being played out in my writing.

VII. IMPLICATIONS

I feel that computers will be the "electric pens" that will finally allow researchers to elucidate the process of writing, but it is apparent from my own preliminary efforts here that much work will have to be done in creating programming that is unobtrusive enough not to interfere with the process itself, and in defining and classifying what it is that is to be studied. One problem is that the computer alters the process of writing just as a typewriter alters that process when compared to the process of writing with a pen. Different media of composing are in this respect as different as pianos and guitars would be in a study of how people play music.

To illustrate this point, I can describe the process I went through in writing that last paragraph. I began: "I feel that computers will be the 'electric pens' that will finally allow researchers to elucidate the process of writing, but I can see from my own preliminary efforts here that much work will have to be done" etc. In fact, I had meant to write a paragraph about the advantages of computers over the instruments used up to now, but before I could finish the first sentence, I had started writing about some of the problems that would be encountered. When I realized I had got off my topic (at about where the 'etc.' is), I faced

But, if I had been a subject in the present study of the process of writing on a word processor, I might not have continued with the new train of thought as I did, for to do so, I would have generated data that I would have had to capture and later to explain. It would have been much easier to have cut the new idea off and to have said later that I had changed my mind a few words into a clause and that I had simply revised the concept. This "shuttling" happens so often (as indicated in the data "captured" in this survey) that it appears to be a genuine category in the writing process. But it seems to me that the shuttling behavior that Perl observed, and what we have together observed from the example above, is

12

influenced by the fact that the writer makes choices which are to a great extent governed by the circumstances in which he finds himself and by the medium which he happens to be using.

This makes it all the more crucial that, in elucidating the writing process, an instrument of research be found that can reduce to the greatest extent possible these artifacts affecting the process of subjects as they write. I suggest the computer. In the first place, research done using a computer could meet all the criteria set forth by Perl (p. 320), which are that a method of research be standardized, categorical, concise, structural, and diachronic. Assuming a computer could catch every written move that a person makes plus the timing of each move, and that a means were found to conveniently interpret this data (standardize and categorize concisely, the first three criteria), then the last two criteria would logically follow; that is, we would have a way of studying the relationships and sequence of all the parts (the structural and diachronic criteria).

The computer would not be a PERFECT instrument for research -- we would not know what the writer had done during a ten second or ten minute pause, for example. He may have been rereading what he had written, or he may have been taking a short break, but whatever he had done, we would know it was part of his NATURAL writing process. (Perl, on the other hand, may have forced behavior that does not correspond to what a person would normally do when writing.) But with a computer, every move of the cursor the writer had made, and the exact time that he made it, could conceivably be captured and stored. No data would be lost or indeciferable. Furthermore, data could be collected without having to set up an elaborate experimental apparatus (i.e. cameras) and without a researcher being present. Finally, this method of study would be replicable, and also applicable across a wide spectrum of writers: skilled and unskilled.

There are, however, two problems that must be overcome before the methods suggested here can be used effectively. The first is that in order for natural writing to be the subject of study, word processing must be a natural medium of writing for the subjects studied. When word processing finally becomes commonplace, there will be a pool of writers, even unskilled ones, from which a researcher could draw subjects (and in any case, the main problem here is not the skill of the student at the computer but the availability of terminals, since training in the use of word processing is simple.)

The second problem that must be overcome is that the software with which the research is conducted must be completely unobtrusive. That is, the computer must automatically record the moves that the writer makes without his or her having to think about them. I found this to be a serious limitation in the present study because the writer had to break his concentration every so often to attend to storing the data on disk, creating an artifact in his writing process. This is a difficult enough problem when the subject is the researcher, but the problem tends to become exacerbated when trying to get other subjects to alter their writing behavior for the purpose of saving scraps of data just to please the researcher. It should not, however, be an insurmountable problem to program a computer to do this busywork for the writer/subject.

VIII. CONCLUSIONS

Although the study described here was limited in scope, the potential of computer-assisted research for the study of writing processes was to some extent demonstrated. It is widely recognized that methodology to date has been sadly lacking in its ability to help us get to the root of the composing process. The major problem is in gathering and quantifying naturally derived data on writing in a replicable manner. I believe that computers, properly programmed, can help us to overcome this problem.

In the present exploratory survey, use of a computer has made possible a fairly comprehensive compilation of revision categories and given us some idea of the frequency of occurence of these categories in various stages of the revision process. In a more comprehensive experiment and with appropriate software, every keystroke that a writer commits to paper could be productively studied. Therefore, I urge researchers in this field to explore more fully the ability of computers to help shed light on what has until now been an area defying accurate assessment. The technology exists; it is now up to researchers to avail themselves of the many uses and benefits of this technology.

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Table of Changes in the Short Papers and Their Frequencies

Writing:	#1	#2	#3
A word expanded to a larger clarifying concept	2/–	– –	– –
A completed idea expanded with coordination	2/–	1/–	– –
A change in subordination	1/–	– –	– –
A change in coordination	1/–	– –	– –
One word changed to another	4/1	5/2	3/–
A concept altered for clarification	2/–	6/2	1/–
A concept altered for economy	– –	1/0	–/many
Formatting or cosmetic alteration	1/3	2/1	3/1
A word added to indicate ordering of ideas	–/2	– –	1/–
A word deleted for economy	– –	4/1	– –
A word added for clarification	4/1	5/1	– –
A phrase added for clarification	0/4	–/1	1/–
A concept begun but changed to another	1/–	8/1	1/–
More information added (More than one sentence)	– –	1/1	1/–
Order of sentences or paragraphs reversed	– –	1/1	1/–
A change in definiteness	1/–	–/1	– –
Correction of parallelism	0/1	– –	– –
Correction of subject verb agreement	– –	–/1	– –
A change from active to passive	– –	1/–	– –

Of the two numbers in each column separated by slashes, the first denotes number of internal revisions and the second the number of external revisions.

Table of Changes in the Term Paper and Their Frequencies

Revision Number:	First	Second	Final
A word expanded to a larger clarifying concept	–	4	1
A change in coordination	2	2	–
One word changed to another	3	7	–
A concept altered for clarification	2	8	2
A concept altered for economy	3	6	–
Formatting or cosmetic alteration	2	3	3
A word added to indicate ordering of ideas	–	1	–
A word deleted for economy	3	2	–
A word added for clarification	1	3	2
A phrase added for clarification	2	4	–
More information added (One or more sentences.)	1	several	1
Order of sentences or paragraphs reversed	1	3	–
A change in register	1	–	–
Gender Neutralization	–	2	–
A topic sentence prefixed to a paragraph	–	2	–
A change in definiteness	1	–	–
Correction of parallelism	–	2	–
Correction of pluralization	1	–	1

Data were collected in external revision phase only.

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