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Among the activities which are a part of composing, one might think that revision is the easiest to study because it leaves a record. Actually, the surface record belies the complexity of revision. Researchers have sought to understand this complexity in two ways: by examining the effects of revision and by speculating on the causes of revision. The view of revision as a complex activity is recent. For many years teachers saw revision as copy-editing, a tidying-up activity aimed at eliminating surface errors in grammar, punctuation, spelling, and diction. The tidying-up view of revision presupposes the three-stage linear model of composing—consisting of prewriting, writing, and rewriting activities—articulated by Rohman and Wlecke in the mid-60's.[1] Revision was taught as something a writer did after completing a first draft.

Recent research on both the causes and effects of revision has discredited this simple view of composing. Researchers—such as Linda Flower and John R. Hayes[2]—have attempted to study the causes of revision by soliciting verbal protocols that provide a running account of a writer's conscious activities during composing. Evidence from protocols indicates that writers move back and forth among the various activities of composing, and that expert writers frequently review what they have written and make changes while in the midst of generating a text. Similarly, Nancy Sommers' study of the effects of revision strongly suggests that the linear model of composing is overly simplistic, if not wholly inaccurate—incapable of describing the composing processes of either inexperienced or experienced writers.[3]

Sommers also demonstrated that writers of different abilities make different kinds of revisions. She drew distinctions between the revisions of skilled and unskilled writers according to the length of their changes and the type of operation. For the latter Sommers used the same categories—

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deletion, addition, substitution, and rearrangement—that Chomsky used to group transformations. Other studies have attempted to gauge the effect of revision changes on the meaning of a text. The National Assessment of Educational Progress in its 1977 survey used subjective categories of meaning such as "organizational," "stylistic," "continuational," and "holistic" to classify revisions.[4] Several literary scholars have made efforts to classify revisions as well. For example, Wallace Hildick described the revision changes of nine well-known writers including Lawrence, Hardy, and James.[5] He posited six categories: (1) Tidying-up Changes ("correcting grammatical lapses," "refining punctuation," p. 13); (2) Roughening-up Changes ("loosening of a speech when it has been made too fluent for the character using it," p. 13); (3) Power Changes ("to achieve greater accuracy of expression . . . , or to achieve greater force of argument . . . , or to stamp a deeper impression on the reader's mind," p. 14); (4) Structural Alterations (sweeping changes); (5) Ideologically Determined Changes (such as Hardy's bowdlerizing changes in serialized versions of his novels); and (6) The Ragbag of Types (miscellaneous). Hildick admits that none of his categories is rigidly exclusive. Neither the National Assessment system nor the Hildick classifications can be applied reliably because most of the categories overlap. They do, nevertheless, show the need for a classification of the effects of revision changes as well as the operations involved.

The purpose of the present study is to present and apply a simple, yet robust, system for analyzing the effects of revision changes on meaning. We do not attempt to propose the definitive methodology for studying revision, only to add a research tool which can be used in combination with other research tools such as protocol analysis. Part I describes our taxonomy for analyzing revision. Part II reports two studies which used this taxonomy and discusses the implications of these investigations, suggesting directions for further research and pointing to limitations implicit in the concepts and methodology of the two studies reported.

The Influence of Revision on the Meaning of a Text

The taxonomy we developed is based on two distinctions. The first and more important distinction is between revisions that affect the meaning of the text and those that do not. Other students of revision have posited a similar distinction, separating copy-editing adjustments from changes which alter the content.[6] Such separation is not always easy. Changes that affect meaning and changes that do not affect meaning can take the same form. In most cases, for example, capitalization does not change meaning. But some capitalizations, such as the change from *the man is white* to *the man is White,* can change meaning.

The problem is to sort the changes which affect meaning from those which

leave meaning intact. An attempt at a full semantic representation, if it were even possible, would be far too cumbersome.[7] In research on how the content of texts is stored and recalled, psychologists have represented meaning in texts with propositions,[8] units borrowed from formal logic that contain one predicate term (a verb, adjective, adverb, or conjunction) and one or more other concepts related to that predicate.[9] In addition to the problem of representing meaning in the text itself, one faces the problem that speakers and writers rely upon listeners' and readers' abilities to make inferences. Consider the following short text with and without sentence (1A):

1. I just made it to the station on time.
1A. I got on the train.
2. I had to buy my ticket from the conductor.

Suppose sentence (1A) is omitted. If readers know that conductors sell tickets to boarded passengers who have not purchased tickets, then they understand that the narrator of this short text had to get on the train. Absent but understood propositions like sentence (1A) are referred to as "plausible inferences." Some researchers, such as Edward Crothers,[10] include plausible inferences when representing the concepts in a text. Researchers in artificial intelligence, who are trying to get computers to interpret natural language in the ways that humans do, also represent inferences.[11]

Yet we need to think of meaning not only as the concepts in the extant text, but also those concepts which can be reasonably inferred from it. Of course, inferences vary from reader to reader. Great literature admits many possible inferences, and how we should interpret literary works has led to an intense debate among literary critics. Our task here is a great deal more simple than the interpretation of a literary work. We have only to account for those inferences that the writer raises to the surface by adding explicit text or requires by deleting explicit text during revision. Most of these cases are obvious.

Our taxonomy of revision changes is based on *whether new information is brought to the text or whether old information is removed in such a way that it cannot be recovered through drawing inferences.* We call changes that do not bring new information to a text or remove old information *Surface Changes.* Surface Changes are represented on the left branch of Figure 1. *Meaning Changes,* represented on the right branch of Figure 1, involve the adding of new content or the deletion of existing content.

Surface Changes

Under Surface Changes are two subcategories, *Formal Changes* and *Meaning-Preserving Changes.* Formal Changes include most, but not all, conventional copy-editing operations. We divided Formal Changes into changes in *spelling; tense, number, and modality; abbreviations; punctuation;* and *format.*

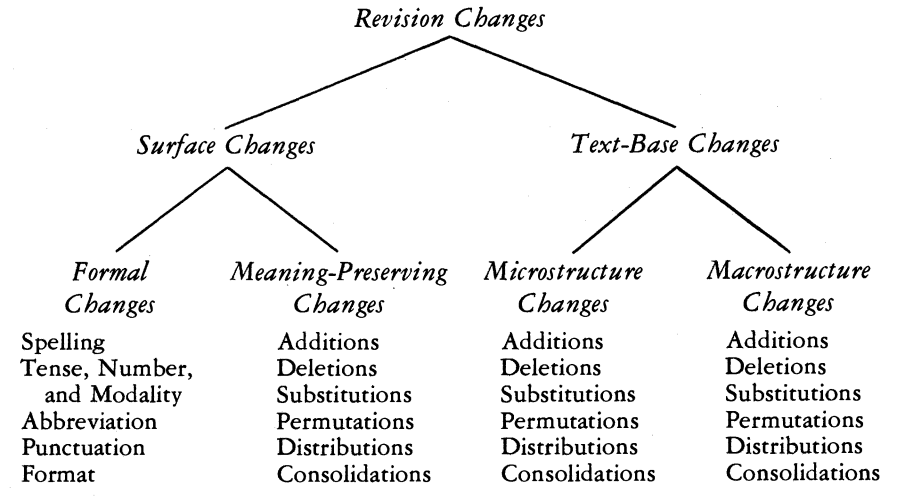

Figure 1. A Taxonomy of Revision Changes

The second subcategory, *Meaning-Preserving Changes,* includes changes that "paraphrase" the concepts in the text but do not alter them. *Additions* raise to the surface what can be inferred *(you pay two dollars => you pay a two dollar entrance fee). Deletions* do the opposite so that a reader is forced to infer what had been explicit *(several rustic looking restaurants => several rustic restaurants). Substitutions* trade words or longer units that represent the same concept *(out-of-the-way spots => out-of-the-way places). Permutations* involve rearrangements or rearrangements with substitutions *(springtime means to most people => springtime, to most people, means). Distributions* occur when material in one text segment is passed into more than one segment. A change where a writer revises what has been compressed into a single unit so that it falls into more than one unit is a distributional change *(I figured after walking so far the least it could do would be to provide a relaxing dinner since I was hungry. => I figured the least it owed me was a good meal. All that walking made me hungry.). Consolidations* do the opposite. Elements in two or more units are consolidated into one unit *(And there you find Hamilton's Pool. It has cool green water surrounded by 50-foot cliffs and lush vegetation. => And there you find Hamilton's Pool: cool green water surrounded by 50-foot cliffs and lush vegetation).* As the last example suggests, consolidations are the primary revision operation in sentence-combining exercises.

Meaning Changes

Meaning Changes constitute the second important class in our taxonomy. Many Meaning Changes turn out to be of small consequence for the overall text. A phrase is substituted, an example is added, or a sentence is reworked.

Other changes have more impact, at times even giving the entire essay a new direction. Hence, a system for classifying revision changes must also distinguish meaning changes which are simple adjustments or elaborations of existing text and changes that make more sweeping alterations.

Our problem was to find some systematic way of differentiating minor and major changes of meaning. We turned to recent work in text linguistics and cognitive psychology that has examined how readers comprehend a text phrase-by-phrase and, at the same time, derive some overall notion of what the text is about, usually spoken of as the *gist* or *topic* of that text. The American psychologist, Walter Kintsch, and the Dutch text linguist, Teun van Dijk, have developed a theoretical model that accounts for how readers process a text.[12] Their model describes meaning at two levels: a *microstructure* level, where all concepts in a text are included (even those that can be inferred), and a *macrostructure* level, which represents the "gist" of the text.[13] A macrostructure can be thought of as a series of labels for sections in a text. Essentially, a macrostructure is a summary of a text. A plot outline is one familiar example of a macrostructure. The difference between a summary and a macrostructure is that, in Kintsch and van Dijk's model, a macrostructure is formally abstracted from the propositions of a text using a series of rules.[14] We find macrostructure theory inadequate for its expressed purpose—providing a linguistic representation of gist—because it does not accommodate adequately either the reader's prior knowledge or the situational context in interpreting discourse.[15] The gist of a cordial salesman's lead-in ploy is not drawn from his literal remarks. We use our knowledge of the situational context to recognize the purpose underlying the salesman's cordiality.

We do find macrostructure theory useful for distinguishing major and minor revision changes. In our taxonomy, a *Macrostructure Change* is a major revision change. In other words, a *Macrostructure Change* would alter the summary of a text. Below are the first paragraphs from Drafts 1 and 2 of an experienced adult's essay. The change from Draft 1 to Draft 2 illustrates a Macrostructure Change.

Draft 1

> It's hard to think about places like Houston, San Antonio, or Dallas without thinking about endlessly sprouting suburbs, Taco Bells, expanding city limits, and mushrooming property values. Growth seems to be overtaking Texas at a breathtaking rate, often at the expense of the central city areas which helped to spawn that growth in the first place. The action often follows the growth outward—industry moves out to be close to the bedroom communities, restaurants and theaters follow on their heels, and before long there is nothing left in the inner city but vacancy signs.

Draft 2

> For cities all over America it's a life or death situation, and for many what happens in the 80's will decide their fate. The picture for many is not promising, in the face of massive spending cuts to budgets for social

> programs. Grants for urban renewal could slow to a trickle or stop. The city governments themselves may be unable to make up the difference and the proposed rebuilding they have planned may become an unfulfilled dream.

Even when considered out of context, the summaries of these two paragraphs are different. The first concerns the decline of inner-cities in Texas; the second concerns the decline of inner-cities across the nation. The second paragraph also considers the role of government assistance in a city's survival.

We found, however, that the most reliable way to separate Macro- and Microstructure Changes short of constructing summaries for entire texts is to determine if the concepts involved in a particular change affect the reading of other parts of the text. This particular essay describes the renovation of downtown Austin, a renovation which the writer points out was neither initiated nor supported by city, state, or federal agencies. The entire essay comments on the dilemma raised in the first paragraph. Although the writer never states her conclusion explicitly, clearly she means that cities that have depended on government support for renovation likely will further decay while those that can attract private investment may be able to retain some of their original beauty. That point, strongly enough suggested in Draft 2 to influence a reader's understanding of the rest of the essay, is nowhere even hinted at in Draft 1.

A *Microstructure Change,* in contrast, is a meaning change that would not affect a summary of a text. For both Micro- and Macrostructure changes, we used the same six operations (addition, deletion, substitution, permutation, distribution, and consolidation) identified under Meaning-Preserving Changes. Unlike Meaning-Preserving Changes, however, Meaning Changes affect the concepts in a text. The following change is an example of a Meaning Change, in this case a Microstructure Addition: *Barton Springs does not fit an outsider's image of Texas. It is an eighth-mile long unchlorinated pool in a natural limestone creekbed => Barton Springs does not fit an outsider's image of Texas. It is an eighth-mile long, unchlorinated pool in a natural limestone creekbed, fed by 27 million gallons of 68-degree water from the Edwards' Acquifer each day.*

Two Studies of Writers Revising

We tested our system until we were satisfied that it could be applied reliably, with two researchers independently reaching over 90% agreement on types of revisions. (Two earlier taxonomies that had additional categories were rejected for lack of reliability.) We then assigned a numerical code to each category to facilitate analysis of revisions. When a revision change spanned more than one sentence, each sentence was analyzed separately. For example, a long macrostructure addition containing seven sentences would have been noted seven times.

We collected examples of revisions from six inexperienced student writers, six advanced student writers, and six expert adult writers. Each student writer was enrolled in a writing class at the University of Texas. The six inexperienced students were recruited from a writing laboratory designed for students deficient in writing skills. The six advanced students were recruited from an elective, upper-division expository writing class, which typically attracts able and motivated students. Expert adults were recruited from professional writers living in Austin. All experts had journalistic experience; three had published fiction.

The procedures for gathering data were similar to those used by Lillian Bridwell.[16] Subjects were tested over a three-day span. On the first day, subjects were presented a writing topic that asked them to describe a place in Austin that an out-of-town audience would not be likely to know about. The writing situation specified that the description would be published in an out-of-town newspaper. Subjects were asked to think about the topic and to make notes if they wished. On day 2, writers wrote an essay on the topic they had been given the previous day. These writing samples were collected and photocopied, and the changes that the writers made while composing were analyzed as Stage 1 revisions. On day 3, the original first drafts were returned to the writers, who then wrote a second draft. When they had finished, both drafts were collected and analyzed. All changes (identifiable because pens with different color inks were used on different days) on the first draft made on day 3 and all differences between the first and second drafts were analyzed as Stage 2 revisions.[17] In-process revisions on the second draft were analyzed as Stage 3 revisions.

All revisions were analyzed using the taxonomy described on pages 402-404. Combined results for the major categories appear in Table 1.

Table 1

Frequencies of Combined Revision Changes per 1000 Words in Final Drafts for Three Groups of Writers

	Formal Changes	Meaning-Preserving Changes	Micro-Structure Changes	Macro-Structure Changes
Expert Adults	22.3	73.3	29.4	19.6
Advanced Students	50.4	163.9	44.8	23.1
Inexperienced Students	38.9	113.4	19.7	1.3

The results show certain differences in the way the three groups of writers revised their work. The expert adult writers turned out not to be most frequent revisers. The advanced students were the most frequent revisers of the three groups. An analysis of the changes showed that the expert writers made some type of change on the average of 144 times per 1000 words in the final draft, while the inexperienced students made a change 173 times per 1000 words and the advanced students 282 times per 1000 words. More revealing were the kinds of changes the different groups made.

The inexperienced writers' changes were overwhelmingly Surface Changes. Only 12% of the inexperienced writers' revisions were Meaning Changes. The advanced students' and the expert adults' changes, in contrast, were more evenly distributed. About 24% of the advanced students' changes and 34% of the expert adults' changes were Meaning Changes. In some respects, the advanced students revised more like the inexperienced writers, making Surface Changes about twice as often as the expert adults. But in Meaning Changes, the advanced students revised more like the expert adults, especially in Macrostructure Changes, where the frequencies of changes by advanced students (23.1 per 1000 words) and expert adults (19.6 per 1000 words) are similar. Total frequencies of revision operations per 1000 words in the final draft are listed in Table 2, page 408.

Besides the differences in frequencies of changes between the essays of the inexperienced students and those of the advanced students and the expert adults, noticeable differences occurred between the groups in the number of revisions made at each stage. Both the expert adults and the advanced students made more revisions of all kinds during the composing of the first draft (Stage 1) than did the inexperienced students. This difference was magnified in Meaning Changes, with the expert adults making on the average 15.4 such changes per 1000 words and the advanced students making 10.4 such changes per 1000 words. These frequencies can be compared with the inexperienced students' average of 3 Meaning Changes per 1000 words. The differences in Stage 1 revisions are probably attributable to different methods of composing. Flower and Hayes found that experts often stop to reread what they have written, making significant retrospective adjustments as they move forward in writing a text.[18] Reviewing of texts in progress also helps experts to generate additional content. Inexperienced writers typically do not stop to reread. If inexperienced writers revise during composing, they almost always limit their revision to correcting errors.[19]

Most revisions of all kinds occurred between the first and second drafts (Stage 2). The inexperienced students made predominantly Surface Changes (98 per 1000 words) at Stage 2, while rarely making Macrostructure Changes (1.3 per 1000 words). Their most frequent single changes were Meaning-Preserving Substitutions (32.2 per 1000 words), by and large a substitution of synonyms. Like the inexperienced students, the advanced students made many Surface Changes (101 per 1000 words). Advanced students made fre-

quent Meaning-Preserving Substitutions (29 per 1000 words), as well as frequent Meaning-Preserving Deletions (26.8 per 1000 words). Advanced students also made many Meaning Changes (55.6 per 1000 words) between the first and second drafts. Expert adults, on the other hand, made far fewer Surface Changes between drafts (28.7 per 1000 words), devoting their ener-

Table 2

Total Revision Changes per 1000 Words in Final Drafts for Three Groups of Writers (Stages 1, 2, and 3)

	Inexperienced Students	Advanced Students	Expert Adults
I. Surface Changes			
A. Formal Changes			
1. Spelling	22.0	18.7	14.5
2. Tense	4.8	8.8	2.3
3. Abbreviations	3.1	4.7	0
4. Punctuation	9.0	16.4	5.0
5. Paragraph	0	1.3	.5
6. Other Format	0	.5	0
B. Meaning-Preserving Changes			
1. Additions	22.9	20.6	17.9
2. Deletions	33.5	63.2	32.1
3. Substitutions	48.5	59.7	19.1
4. Permutations	4.7	12.0	4.0
5. Distributions	2.5	2.3	0
6. Consolidations	1.3	6.1	.2
II. Meaning Changes			
A. Microstructure Changes			
1. Additions	9.9	21.3	13.9
2. Deletions	4.3	11.2	9.2
3. Substitutions	3.0	5.0	3.7
4. Permutations	.4	3.4	1.7
5. Distributions	2.1	3.5	.7
6. Consolidations	0	.4	.2
B. Macrostructure Changes			
1. Additions	1.3	17.8	12.8
2. Deletions	0	.4	4.5
3. Substitutions	0	0	0
4. Permutations	0	0	1.3
5. Distributions	0	4.9	.2
6. Consolidations	0	0	.8

gies instead to reworking the content of their drafts (16.1 Macrostructure Changes per 1000 words). During and after the writing of the second draft (Stage 3), expert adults and advanced students turned their attention to Surface Changes, cleaning up their manuscripts after they had satisfactorily dealt with their subjects. By this point inexperienced students had largely quit revising.

We are hesitant to draw easy conclusions from these results. Revisions of experienced and inexperienced writers may not be comparable in the ways that our first study suggests. Some expert writers are able to develop a text in their minds and to perform revision operations mentally before committing a text to paper. This ability may account for why the expert adults made far fewer revisions than the advanced students. We decided to do a second study that would perhaps give us a better idea of what revision strategies to teach inexperienced writers. We made copies of the first drafts that three inexperienced writers had written, and we asked the expert adults to revise the three student essays as if they were their own. We then analyzed the changes the experts made, and we compared their changes to those which the inexperienced writers made in their second drafts. Again we found large differences between the revisions of the two groups. Among the skilled adults, 65% of the changes were Macrostructure Changes. In particular, the adults used three processes—addition, consolidation, and distribution. They condensed what the students had written and then either elaborated or added information to support the points the students apparently had wanted to make. Below is an example of how an expert rewrote a student draft:

Student Version

Our state capital is a beautiful structure that is very unique. When entering the city of Austin, it is a site that stands out amongst the skyrises that surround it. This building is known for its architecture, the craftsmanship inside the building and the history that it holds.

The architecture of the building is highly ornate and is said to be a duplicate of the State Capital in Washington, D.C. paying special attention to the rotunda ceiling that extends several thousand feet up.

Expert Version

The Capitol of Texas remains the most impressive building in Austin, even though bank skyscrapers and university towers have challenged its one time dominance of the skyline. The Capitol will never again be as prominent as the Nation's Capitol in Washington, where surrounding buildings have been kept in scale, but the richness of the structure itself has not been diminished. It remains a statement of the grandiose vision of the makers of modern Texas.

From a distance the Texas Capitol appears to be little more than another replica of the Nation's Capitol. Only at the edge of the grounds does the grandeur of the building become evident. The Confederate statues along the walk to the front steps mark another time from the age of golden glass banks—a time when Texas was a Southern and not a Sun

> Belt state, a time when Richard King still ran the King Ranch and Judge Roy Bean was the law west of the Pecos.

The expert writer—a journalist—told us that

> The story lacked information. It needed an angle. State capitols are normally uninteresting, so I used the Texas angle. Texans do things differently. The original had an organization, but no detail. The writer mentioned history, but said nothing about it. I had to work this in.

Other experts made similar comments. All wrote with a detached, yet broad, perspective about the subject the students had selected, and all added their background knowledge, often visual details, about that subject.

Discussion

The results of the two studies of revision tend to support the conclusions of the Sommers' study—that expert writers revise in ways different from inexperienced writers. What the present studies contribute is a method of describing through text analysis what Sommers learned through interviews. As is evident in Sommers' and Bridwell's studies, the only way of quantifying the significance of revision changes up to now has been by the length of change. The method proposed here, we believe, is sounder conceptually than the *ad hoc* methodology used in previous studies of revision changes, indicating that future research in the composing process can make additional applications of current work in text linguistics and text comprehension.

Our results, however, should not be viewed as a mandate to demand that inexperienced writers revise more. We found extreme diversity in the ways expert writers revise. One expert writer in the present study made almost no revisions; another started with an almost stream-of-consciousness text that she then converted to an organized essay in the second draft; another limited his major revisions to a single long insert; and another revised mostly by pruning. To supplement the two studies, we examined the actual revisions of practicing writers of various sorts—writers of fiction, journalists, persons in business and government, and academicians in several disciplines. Again we found considerable variation. For example, we observed a consulting engineer write memos without revising while he was in the process of extensively revising a proposal he had drafted. On another visit we watched him cut and tape, then pencil in headings for an environmental impact statement drafted in sections by several of his associates. Likewise, a colleague who is a fiction writer showed us the manuscript of a novel that he has spent several years revising and manuscripts of published short stories that have minimal revisions after the first paragraph.

The volume and types of revision changes are dependent upon a number of variables besides the skill of the writer. These variables might be called *situational variables* for composing. Included among situational variables are probably the following: the reason why the text is being written, the format,

the medium, the genre, the writer's familiarity with the writing task, the writer's familiarity with the subject, the writer's familiarity with the audience, the projected level of formality, and the length of the task and the projected text. So important are these variables that writing skill might be defined in part as the ability to respond to them. If researchers neglect situational variables in studying revision, their results are likely to be skewed. Differences in the difficulty of writing tasks in the 1977 round of the National Assessment of Educational Progress likely produced the anomalous finding that seventeen-year-olds revise less than thirteen-year-olds.[20]

Successful revision results not from the number of changes a writer makes but from the degree to which revision changes bring a text closer to fitting the demands of the situation. Revisions of inexperienced writers often do not improve their texts. Such writers tend to revise locally, ignoring the situational constraints. Sondra Perl observed that inexperienced writers' revisions often had a negative effect on quality.[21] The major implication of this study, as well as of Sommers' study, for teachers of writing is that revision cannot be separated from other aspects of composing, especially during that period when writers come to grips with the demands of the particular writing situation. Success in revision is intimately tied to a writer's planning and reviewing skills. Inadequate planning will force writers to write several drafts before they discover what it is that they have to say. Inadequate reviewing of extant working drafts often results from poor conception of the audience's needs, which prevents writers from revising their texts to suit their audiences's needs and wishes. Somehow we must teach our students to distance themselves from what they have written, to get them to *see it again,* then revise—much as our expert writers stood back and formed an impression of what they thought an inexperienced writer's text should say, and then realized that impression by substantially altering the original text.

Research will more than likely continue to consider both the causes and effects of revision. One limitation of revision studies has been the small number of subjects included, a limitation necessitated by the complexity of the analyses. In order for researchers on revision to analyze larger samples and, thus, be able to generalize in ways that we could not, better methods of recording revision changes need to be explored. If writers are taught to compose on computers, then complete records of all revisions, including the sequence of changes[22] and length of pauses,[23] can be accumulated and analyzed.

Another limitation in studies of both causes and effects of revision to date has been the artificiality of the writing situation. In the first study reported above, a common topic provided the stimulus for writing. Writers were required to write on consecutive days at specified times in unfamiliar surroundings. Just as in the NAEP study of revision, such artificiality probably influenced not only what the subjects wrote initially, but also the numbers and kinds of revisions they made. A more serious limitation of the present

studies is that they, like other effects studies, do not consider the most important question: what causes writers to revise?

Research using protocol analysis tries to address the question of why writers revise. Flower and Hayes' use of thinking-aloud protocols suggests that expert writers plan more extensively and analyze the rhetorical constraints more thoroughly than inexperienced writers.[24] What we learn from protocol analysis, however, is uncertain. Again the writing situation is artificial. Verbal protocols require writers to do two things at once—they must write and they must attempt to verbalize what they are thinking as they pause. Perhaps some subjects can be trained to do both tasks with facility, but many writers find that analyzing orally what they are doing as they write interferes with their normal composing processes, interrupting their trains of thought. Many activities in writing occur simultaneously—from unconscious processes such as ordering the words in a noun phrase to conscious processes ranging from spelling to planning and monitoring. A lot is going on and not all of it gets verbalized. In addition, what writers can verbalize about their composing processes probably is influenced by the nature of the writing task. Unskilled writers who seem bound by concerns about conventions when arguing for mass transit may show very different concerns when writing to a personal friend. The fact that the writing situation is unnatural forces the investigator to speculate about how to interpret the protocol and how to classify the individual's composing behavior.

Neither experimental studies of the causes nor studies of the effects of revision have been able to answer satisfactorily all the questions that they raise. Perhaps what we need now are more observational studies of writers revising in nonexperimental situations rather than more studies of student writers in contrived situations. In addition to studies of how situational variables influence revision, we need studies of how textual cues lead writers to revise their texts. In short, we need studies that employ more than one methodology, that examine the complexity of revision in a variety of texts across a variety of situations. Only when we understand the multidimensional nature of revision can we better teach revising as a rhetorical concern, bringing inexperienced writers to know revising as something other than a cleansing of errors.

Notes

1. D. Gordon Rohman and Albert O. Wlecke, *Pre-Writing: The Construction and Application of Models for Concept Formation in Writing,* U.S. Office of Education Cooperative Research Project No. 2174 (East Lansing, Mich.: Michigan State Univ., 1964).

2. For a description of protocol analysis methodology, see "Identifying the Organization of Writing Processes," in *Cognitive Processes in Writing: An Interdisciplinary Approach,* ed. Lee Gregg and Erwin Steinberg (Hillsdale, N.J.: Lawrence Erlbaum, 1980), pp. 3-30.

3. "Revision Strategies of Student Writers and Experienced Adult Writers," *College Composition and Communication,* 31 (December, 1980), 378-388.

4. F. Rivas, *Write/Rewrite: An Assessment of Revision Skills,* Writing Report No. 05-W-04 (Denver: National Assessment of Educational Progress, 1977).

5. *Word for Word: The Rewriting of Fiction* (London: Faber and Faber, 1965).

6. See, for example, Donald Murray, "Internal Revision: A Process of Discovery," in *Research on Composing: Points of Departure,* ed. Charles Cooper and Lee Odell (Urbana, Ill.: National Council of Teachers of English, 1978), pp. 85-103; Murray distinguishes on the basis of meaning between "internal" and "external" revisions.

7. For some idea of the complexity of a full semantic description, see Robert Montague, *Formal Philosophy,* ed. R. H. Tomason (New Haven, Conn.: Yale University Press, 1974). Even Montague grammar, one of the richest formal systems extant, makes little room for situational determinants of meaning.

8. For examples of research using a propositional analysis of meaning, see Walter Kintsch, *The Representation of Meaning in Memory* (Hillsdale, N.J.: Lawrence Erlbaum, 1974); Carl H. Frederiksen, "Representing Logical and Semantic Structures of Knowledge Acquired from Discourse," *Cognitive Psychology,* 7 (July, 1975), 371-458; Bonnie J. F. Meyer, *The Organization of Prose and Its Effect Upon Memory* (Amsterdam: North Holland, 1975).

9. Propositions are usually written with the predicate term first and in capital letters to make clear that they refer to concepts and not words. Concepts are thought of as minimal units of meaning. For example, *Helen likes the car* could be represented as (LIKE, HELEN, CAR).

10. *Paragraph Structure Inference* (Norwood, N.J.: Ablex, 1979).

11. See Roger C. Schank, *Conceptual Information Processing* (New York: American Elsevier, 1975); Roger C. Schank and R. P. Abelson, *Scripts, Plans, Goals, and Understanding: An Inquiry into Human Knowledge Structures* (Hillsdale, N.J.: Lawrence Erlbaum, 1977).

12. "Toward a Model of Text Comprehension and Production," *Psychological Review,* 85 (September, 1978), 363-394. Empirical tests of this model are reported in Walter Kintsch and Douglas Vipond, "Reading Comprehension and Readability in Educational Practice and Psychological Theory," in *Perspectives on Memory Research,* ed. L.-G. Nilsson (Hillsdale, N.J.: Lawrence Erlbaum, 1979) pp. 329-365; Douglas Vipond, "Micro- and Macroprocesses in Text Comprehension," *Journal of Verbal Learning and Verbal Behavior,* 19 (June, 1980), 276-296.

13. Van Dijk's most thorough elaboration of macrostructures is found in *Macrostructures: An Interdisciplinary Study of Global Structures in Discourse, Interaction, and Cognition* (Hillsdale, N.J.: Lawrence Erlbaum, 1980).

14. Although macrostructure theory focuses on the text itself, Kintsch and van Dijk do make some allowances for the reader's prior knowledge of the world of the text. Van Dijk sets out three rules for deriving macrostructures. (See *Macrostructures,* pp. 46-50.) The first and most general rule for forming macrostructures is *deletion.* Readers tend to remember propositions which are repeated later in the text or are important to the interpretation of other propositions. Thus propositions which are not necessary to interpret other propositions or which are only locally relevant are not represented in the macrostructure.

A second rule is *generalization,* in which a series of particulars can be grouped into a single proposition at a higher level of abstraction. Readers continually generalize from details which they do not normally associate. From the following sequence—

> Jeff brought a model airplane, Erin came with an adventure people set, and Garth carried in an electronic baseball game—

we might generalize the more abstract proposition *The children brought toys.*

A third rule is *construction,* in which a series of propositions depicts a conventional action or setting known to us. Consider the following sequence:

> The children watched Ian start to blow out the candles before his mother had finished lighting them. After the candles were relit, everyone cheered when Ian blew them out on the first try and stuck his hand in the cake.

For this sequence, we could construct the macroproposition, *Someone gave Ian a birthday party.* We make this construction because we recognize conventional elements of a birthday party: a cake, the lighting of candles, the blowing out of candles, and cheering.

15. Jerry L. Morgan and Manfred B. Sellner contend that "van Dijk's approach has the meaning of the whole to be considerably less than the sum of the parts." See "Discourse and Linguistic Theory," in *Theoretical Issues in Reading Comprehension,* eds. Rand J. Spiro, Bertram C. Bruce, and William F. Brewer (Hillsdale, N.J.: Lawrence Erlbaum, 1980), p. 195. They argue that the ability to construct a summary presupposes an understanding of that text.

16. "Revising Strategies in Twelfth Grade Students' Transactional Writing," *Research in the Teaching of English,* 14 (October, 1980), 201-203.

17. Bridwell did not directly compare first and second drafts, which may explain why our Stage 2 totals are proportionally much larger than hers. Bridwell's methodology, for example, would show that D. H. Lawrence, who rewrote his novels from the beginning rather than going back through them making changes, was an infrequent reviser.

18. "The Cognition of Discovery: Defining a Rhetorical Problem," *College Composition and Communication,* 31 (February, 1980), 21-32.

19. Sondra Perl, "The Composing Processes of Unskilled College Writers," *Research in the Teaching of English,* 13 (December, 1979), 317-336.

20. See Ellen W. Nold, "Revising," in *Writing: The Nature, Development, and Teaching of Written Composition,* ed. Marcia Farr Whiteman and Joseph Dominic (Hillsdale, N.J.: Lawrence Erlbaum, in press).

21. "Understanding Composing," *College Composition and Communication,* 31 (December, 1980), 363-369.

22. See Stuart K. Card, Thomas P. Moran, and Allen Newell, "Computer Text-Editing: An Information-Processing Analysis of a Routine Cognitive Skill," *Cognitive Psychology,* 12 (January, 1980), 32-74.

23. See Ann Matsuhashi, "Pausing and Planning: The Tempo of Written Discourse Production," *Research in the Teaching of English,* 15 (May, 1981), 113-134.

24. "The Cognition of Discovery."

Business Communication Matters

The Committee on Business Communication of the Conference on College Composition and Communication announces the publication of a new newsletter, *Business Communication Matters*, for teachers of business writing and communication. Funded by a grant from Wausau Insurance Companies, the newsletter is free to anyone teaching business communication in a college, university, or business. It provides information on research, lists of conferences of interest, announcements of job openings, discussions of issues in business communication, and brief articles and reports. To place your name on the mailing list of *Business Communication Matters* and receive a copy of the first (October 1981) issue, send a self-addressed, stamped envelope to the editor: Daniel Dieterich, English Department, Collins Building, University of Wisconsin-Stevens Point, Stevens Point, WI 54481.