# VISIBLE LANGUAGE

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*Special Issue*
PROMOTING PLAIN ENGLISH

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# General Information

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# Introduction: Promoting Plain English

The papers in this special issue address the problems of promoting "plain English" — English that reflects the interests of the reader and consumer rather than the legal, bureaucratic, or technological interests of the writer or of the organization the writer represents.

**Government's involvement.** Although seven states have so-called plain language laws governing consumer contracts and twenty-seven have laws which promote or require plain language in insurance policies, the Federal government's attention to the communication of business with the consumer has been fitful. In the 1970s various government regulatory agencies drafted regulations requiring "readable" patient package inserts (for various medicines and drugs) and warranties, but attention to such matters has languished in the 1980s. Bowen, Duffy, and Steinberg, of Carnegie-Mellon University, describe briefly the interest of the Federal government in plain language and the variety of plain language laws passed by seven states. They then outline a method of evaluating the existing plain language laws to determine which of them is most effective.

**The problems.** From his experience working as a consultant in business and government, Joesph M. Williams, of the University of Chicago, believes that at the level of sentence structure we know 90% of everything people who write need to know to write plain English. He sees the major problems as learning how to teach this information, getting people to use it, and persuading the highest levels of management that actively promoting clear communication should be their highest priority. Huckin and Curtin, of Carnegie-Mellon University, and Graham, of Software Architecture and Engineering, argue that in an attempt to provide useful guidelines for writers, proponents of plain English sometimes offer maxims that oversimplify and do not reflect the actual practices of good writers. They demonstrate by considering the maxim "Avoid whiz-deletions" (reduced relative clauses).

**Computers as aids in composing.** The growing use of computers for word processing has encouraged the development of programs that aid in composing and editing. One such program is IBM's EPISTLE, described by Lance A. Miller, of IBM's Watson Research Center. Another is the UNIX Writer's Workbench from AT&T's Bell Laboratories. At the conference at which most of these papers were delivered, Lawrence T. Frase of AT&T described Writer's Workbench; but he decided not to write a special paper for inclusion here

because he and others have written widely about that program. See, for example:

Lawrence T. Frase, Nina H. Macdonald, and Patricia S. Gingrich, "The UNIX™ Writer's Workbench Software: Philosophy; Rationale and Design; Results of a Field Study," *The Bell System Technical Journal* 62 (No. 6, Pt. 3; July-August 1983), 1883-1921.

Nina H. Macdonald, Lawrence T. Frase, Patricia S. Gingrich, and Stacey A. Keenan, "The Writer's Workbench: Computer Aids for Text Analysis," *IEE Transactions on Communication* Com-30 (No. 1; January 1982), 105-110.

Neither EPISTLE nor Writer's Workbench makes changes in a writer's text. Rather they analyze that text, search for and identify common grammatical and stylistic problems, and suggest possible improvements — all aids in considering and simplifying the writing.

**Case studies from industry.** Barry Jereb, Erwin R. Steinberg, and Reed Agnew discuss specific plain language programs in industry. Jereb, of Allen-Bradley, and Steinberg, of Carnegie-Mellon University, explain how the management of the Systems Division of Allen-Bradley, a "high tech" company which manufactures programmable controllers, and the Communications Design Center of Carnegie-Mellon University mounted a program to improve the language and design of Allen-Bradley documentation. The program included a workshop, a management study, a handbook for manual writers, and a quality control procedure. Agnew, of Agnew Moyer Smith, discusses the development of an integrated information system, often referred to as "the office of the future" — a system that links together the latest office technologies. The problem was to synthesize from a series of highly technical and very complicated reports a final report that would be understandable to a company's top-level management, who were going to be asked to approve the expenditures for the new system. Instead of starting with the text and adding the visuals, Agnew first developed a visual model and then wrote.

Most of the papers in this issue were given at a Seminar in Plain English held at Carnegie-Mellon University in March 1984, co-sponsored by that university and The Plain English Forum.

Erwin R. Steinberg

# Analyzing the Various Approaches of Plain Language Laws

Betsy A. Bowen, Thomas M. Duffy, and Erwin R. Steinberg
Carnegie-Mellon University, Pittsburgh

*Plain language laws, designed to ensure that consumers can understand and use the personal business contracts they sign, have recently become an important new kind of regulatory legislation. Seven states have passed laws to control the comprehensibility of consumer contracts; fifteen states have similar legislation pending. These plain language laws range from a simple statement of a general principle to extensive and explicit requirements. Although plain language laws have been in effect for over seven years, no comprehensive evaluation of their effectiveness has yet been done. We propose an evaluation of the plain language laws to determine the characteristics of language and design associated with greatest ease of use, and the design strategies of companies and designers which produce the most usable and comprehensible contracts. This analysis would enable us to identify the best model for plain language legislation. Such an evaluation of plain language laws would require two phases: an analysis of contracts and consumers' ability to use them, and an analysis of the design process which led to the contracts that are easiest to use.*

State and Federal governments enact substantial amounts of regulatory legislation to aid consumers or to correct apparent injustices for consumers. Much of this legislation — automobile safety regulations, for example, and environmental protection legislation — has produced real benefits. Unfortunately, however, there is a drawback to all regulatory legislation: it is expensive. The legislature spends time and effort to draft the laws. Industry similarly must spend time and effort to comply. This expense means that policy makers need to weigh carefully the costs and the benefits of legislation before they adopt it. When it is in place, policy makers need to review it to ensure that it is operating effectively, that it helps the consumer and does not unnecessarily penalize industry.

Recently plain language laws have become an important new kind of regulatory legislation. These laws were designed to put consumers on a more equal footing with industry when they sign personal business contracts. Traditionally, contracts put consumers at a disadvantage because such contracts were often filled with lengthy, complex sentences and unfamiliar terms which the consumers could not understand. Moreover, some of these contracts were written in small print with no index or headings to help the reader find information. Consumers, therefore, sought legal remedies through their legislatures.



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Simplifying consumer contracts benefits the consumer by enabling him or her to identify the rights, obligations, and remedies that the contract provides. Furthermore, simplification also benefits industry by increasing competition in the marketplace and increasing consumer trust and goodwill toward business and industry (PCCC 1983).

### The Federal Impetus

Plain language legislation grew out of the consumer movement which began in the 1960s. As consumers grew increasingly skeptical of government and big business, they began to demand contracts that they could read and understand (Clive and Russo 1981: 208). The so-called plain language movement grew in the 1970s and gained national attention in March 1978 when President Carter issued Executive Order 12044, designed "to make Federal regulations clearer, less burdensome, and more cost effective" (Carter a 1978: 561). It required that any regulation issued by Executive Agencies must be "as simple and clear as possible, written in plain English, and understandable to those who must comply with it" (Carter b 1978: 558). In his "Statement on Executive Order 12044" President Carter compared the orginal and a revised version of a regulation governing CB radio owners to provide an example of the kind of change the order was designed to bring about. The original read: ". . . applications, amendments thereto, and related statements shall be personally signed by the applicant, if the applicant is an individual." The revised version simply said: "If you are an individual, you must sign your own application personally" (Carter a 1978, 562). The two provisions mean the same thing, but the second is unquestionably clearer to most people.

There were two very visible responses to that order. First, the Internal Revenue Service extensively revised the income tax form 1040A to make it easier to use and understand. Second, the National Institute of Education contracted with the American Institutes for Research, the Document Design Center of Carnegie-Mellon University, and Siegel and Gale to provide assistance to government and industry in revising and developing plain language documents; to develop a university curriculum which provides instruction in the principles of document design for the user; and to conduct research in the area of plain language document preparation. Under this contract, a document design workshop for industry and government employees was developed, extensive assistance and consultation in the design of documents was provided to industry and government, and an undergraduate course and a graduate program were developed.[1]

There does not appear to have been a widespread response, however, to the Carter executive order, probably for a variety of reasons. First, neither the order itself nor the statement that the President issued with it set out any criteria for judging whether a document was written in "plain English." Statements in the order about the language to be used in government documents were very general. For example, Carter wrote that Executive Order 12044 "will direct that regulations be written in plain English. Government regulations are usually written by experts for experts. Your clear mandate will

be to translate regulations into language a small businessman — who must be his own expert — can understand (Carter a 1979: 561)."

Second, as a former regulation writer explained, the people who write government regulations do not recognize that they speak and write a special language that is foreign to the average citizen: "Those of us who live and work in Washington have our own patois, our own sort of bureaucratic cant. It is easy to use, and we use it every day. Some of us even love it. This is fine, I guess, as long as the only people with whom we attempt to communicate speak governmentese as fluently as do we. Bureaucrats, however, tend quickly to forget that 99% of the people don't speak governmentese . . ." (Jones 1980).

Third, the executive order covered only the regulations written by Executive Agencies — the Environmental Protection Agency, for example, and the various Federal departments such as Education and Transportation. It had no effect on regulations written by independent agencies like the Federal Trade Commission, the Federal Communication Commission, or the Occupational Safety and Health Administration. That meant that the order governed only a small portion of the regulations "a small businessman" — or any other citizen — has to deal with.

Fourth, President Carter's executive order did not have much time to have any effect on the Federal bureaucracy because three years after it was issued it was revoked by Section 10 of President Reagan's Executive Order 12291, issued in February 1981 (Reagan 1981: 130). Federal support for research into applications of plain English dwindled, as did interest in many government agencies in the use of plain English.

Finally, of course, President Carter's executive order had no impact on communication in business and industry — on such documents, for example, as warranties that came with mechanical items, patient package inserts that came with drugs, instruction manuals that came with unassembled toys or computers, or loan contracts from banks and lending companies. President Carter's interest in plain language and his remarks about it (some of them reported in the newspapers) did evoke some interest in the business community. A number of businesses, most notably Citibank, recognized the need for plain language contracts and the possible advertising advantages such consumer-oriented actions could have.

In the Reagan Administration, Secretary of Commerce Malcolm Baldridge has been active in trying to persuade businessmen of the cost effectiveness of plain English. He arranged for a meeting at the Department of Commerce to consider the usefulness of plain English in business and ways in which it could be promoted. He explained: "As far as the business community is concerned, the best way to discourage bad habits is to emphasize the profits that can result from simple language. The plain English programs of your companies prove this. Your well-written contracts, warranties, forms, insurance policies, and information brochures are helping you to serve customers better and improve productivity" (Baldridge 1983: 1).

Out of that meeting came the Plain English Forum, an organization of business people, academics, and other research people interested in promoting

plain English in business. The U. S. Department of Commerce has also published, through the U. S. Government Printing Office, *How Plain English Works for Business,* twelve case studies which "describe how some business organizations have scored successes by simplifying consumer documents [like] warranties, credit contracts, insurance policies, and product information booklets" (Office of Consumer Affairs 1984).

### State Laws

The greatest influence of the plain English movement, however, has been on the development of state legislation to regulate the clarity of consumer contracts. Twenty-eight states have passed legislation to control the readability and, therefore, the usability of life, property and casualty, and health insurance contracts. This legislation has focused primarily on controlling the word length and sentence length in the contracts, key variables in all readability formulas. Seven states — New York, Minnesota, Hawaii, West Virginia, New Jersey, Maine, and Connecticut — have passed legislation aimed at controlling the comprehensibility of consumer contracts. Another fifteen states have comprehensive legislation pending.

The plain language legislation in all these states has a common objective: to ensure that citizens in the state are able to understand the rights, obligations, and restrictions in any consumer contract they enter into. The only way, of course, to ensure that a contract is understandable is to test consumers' ability to understand and use it. States have been reluctant, however, to require such user-testing, since testing all revised documents this way would be both expensive and time-consuming. Instead, the legislators have searched for ways of specifying the characteristics of a document which will reflect ease of use and understanding.

There have been two primary issues in the attempt to legislate plain language criteria. First and most obviously, documents which meet the criteria must be easy to understand and use. That is, the criteria specified for evaluating documents must be a good substitute for testing of the document by actual users. Second, to encourage compliance by industry, the criteria must not impose an undue or unnecessary burden on developers of documents. The response to these requirements, and hence the nature of the plain language laws, has been very different in the seven states. Furthermore, the range and diversity of requirements will probably increase when others of the fifteen states with pending plain language legislation pass such legislation.

The 1978 New York law, the first plain language law, represents one extreme in plain language law drafting. It simply states that any contract it covers must be "written in a clear and coherent manner using words with common and everyday meanings, [and] appropriately divided and captioned by its various sections" (New York General Obligations 1978).

Thus "plain language" is defined only in general terms referring to vocabulary, writing style, and headings. The law, which provides no objective standards, thus reflects a view that plain language standards cannot be dictated. Producing a plain language document is a matter of orientation, of placing

oneself in the position of the intended reader. The particular characteristics of the plain language document will depend on the particular document and the particular designer — many "plain language" designs are possible. Many who hold this point of view believe that legislating objective criteria may result in compliance with the letter of the law, (i.e., the criteria), but may not result in compliance with the spirit of the law (i.e., usable documents).

The Connecticut law represents the other extreme. This plain language law, the most directive of the seven such laws, provides specific requirements for the length of words and sentences, the type size, the use of headings, acceptable terminology, and organization. It requires that the average number of words per paragraph be less then 75, the average number of words per sentence less than 22, and the average number of syllables per word less than 1.55. The law also requires that each section be captioned in at least ten-point type, that the body of the text be written in at least eight-point type, and that there be margins of at least one-half inch on all borders of the page. The law reflects the view that "plain language" can be defined objectively and that any document will be comprehensible if it meets specific requirements and the designer makes a good-faith effort to write a clearer contract. This legislation thus presumes that compliance with the intent of the law is easier to achieve if it specifies objective, measurable criteria.

Of the five other states that have passed plain language legislation, four — Minnesota, Maine, Hawaii, and West Virginia — have adopted the wording of the New York law verbatim. Minnesota and Maine have supplemented their laws with an optional review of revised documents by the state attorney general. Thus, in these two states, in contrast to the New York law, an official assessment of compliance can be made without litigation. New Jersey uses the general principle contained in New York's law, but adds a list of some of the features the attorney general may consider in reviewing a document.

### The need for evaluation

Although there have been plain language laws for over seven years and although laws are being considered in an increasing number of states, there has never been a comprehensive evaluation of the effectiveness of such legislation. Since the goal of plain-language legislation is to ensure that a citizen who enters into a consumer contract can readily determine what his or her rights and obligations are, the type of legislation which best meets those goals should be determined. (By "readily determine" we mean that the individual can read through the contract, pointing to and describing the rights and responsibilities that are essential in the agreement.) Thus policy makers need the answers to such questions as:

1. In general, has the plain language legislation actually aided the consumer? Are "simplified" contracts easier to use and understand? The answer will provide empirical evidence to help evaluate the criteria in the various plain language laws.

2. What characteristics of style and design provide the greatest ease of use and comprehension? That is, what features of language and of layout and design distinguish contracts that are easy to use from those that are difficult to use? The answer will provide guidance to writers and document designers as well as to evaluators of documents.[2]
3. What characterizes the document design strategies of the companies which produce the most usable and comprehensible contracts? What design strategies or organizational strategies distinguish the superb performers, from ordinary designers? The answer will give us a better understanding of the document design process, will provide guidance to document designers, and may help legislators develop effective and meaningful plain language laws.
4. What is the best model for plain language legislation? That is, what legislative requirements result in documents that are easy to use and understand with the least cost to industry? The answer will provide guidance to government policy makers.

These questions require some further discussion. One way of answering the first question would be to analyze the extent to which companies have attempted to comply with the laws in states with plain language legislation. That analysis would seek to answer two questions: "What percentage of companies within a state has attempted to meet the standards of that state's plain language laws?"; and "Does that proportion vary significantly from state to state?" That strategy, however, may not be appropriate for assessing this legislation for two reasons. First, it would require the difficult, perhaps impossible, task of identifying every version of each type of contract in each of the states so that the contracts analyzed would represent a true cross-section of those in use. Second, it ignores the more pressing question of whether or not the revised contracts are actually easier to read. Unless the answer to that question is "yes," the degree of compliance is unimportant.

Questions 2 and 4 also require some discussion. It might seem that once the characteristics of documents that are easiest to use have been identified, legislators could simply make those characteristics the criteria in their plain language laws. The assumption there is that document designers need objective standards to guide their simplification efforts. Indeed there is some evidence that even well-intentioned writers need specific guidelines to follow, in part because revisers are often so familiar with the material in the contract that they find it difficult to anticipate the problems that consumers may have. Even if writers can recognize certain problems, they may need guidelines to solve them.

The West Virginia plain language law itself is a good example of this difficulty. The law is designed to promote clear language but is itself hard to understand. It reads in part:

> A violation of the provisions of this section shall not render any agreement void or voidable: Provided, that if a consumer at the time of entering into a consumer transaction or anytime thereafter, requests of the other party

thereto that the agreement evidencing the consumer transaction be changed or written in a manner to conform with this section, and that request is refused, then a consumer shall have a cause of action to require a consumer agreement not in conformity with the provisions of this section to be reformed (West Virginia 1981).

No doubt the drafters intended the law to be as clear as possible, but they still had trouble producing a law that the average citizen could understand. Similarly, experts rewriting contracts and other documents may not know how to make the documents readable unless they have some clear guidelines to follow.

There are, however, two main drawbacks to precise standards. The first is that they are inflexible and cannot be adapted to suit different conditions. For example, when consumers are dealing with contracts they use often, they may be better able to understand longer sentences or paragraphs than when they are reading unfamiliar contracts. Strict numerical guidelines do not allow courts or document designers to take such factors into account.

The second drawback is that the criteria, while associated with consumers' ease of use, may not guarantee clear writing. Concentrating simply on satisfying the criteria may lead document designers to disregard, or even distort, the meaning of the text. Readability tests, which form the basis of these criteria, were designed to assess texts, not to guide writers in writing them. Thus document designers need to aim at presenting their meaning clearly as they write, and apply the readability formulas or other objective criteria only afterwards.

Recent research in the Navy confirms this opinion. Duffy and Kablance (1982) found that documents that had been revised in good faith, but only to satisfy a readability criterion, were no easier for people to use than the unrevised documents (See also Duffy 1985; and Duffy, Smith, and Post, in preparation).

In sum, then, legislators may not be able to ensure that contracts are easy to use by simply giving document designers specific standards to meet. Therefore, identifying the characteristics of good contracts, the goal of question 2, and developing a model for effective legislation, the goal of question 4, need to be addressed separately. Any evaluation, therefore, will require two phases: first, an analysis of contracts and consumers' ability to use them; and second, an analysis of the design process which led to the contracts that are easiest to use.

### Analysis of contracts and consumers' ability to use them

**Types of contracts.** The first phase might focus on three classes of consumer contracts: consumer installment credit, health insurance, and bank loans. We suggest these three kinds of contracts because: they are ones which almost all adults in our society enter into at some time; the restrictions and conditions in the contracts may have very serious implications for the consumer; the contracts vary considerably in complexity and length; and there are significant differences in the conditions and restrictions within each type of contract

which makes comparison shopping worthwhile. In addition, the three types of contracts represent three very different kinds of business: the small intrastate business involved in installment contracts; the large, but primarily intrastate, banking business; and the large, primarily interstate insurance company.

**States.** The comparison among states with plain language laws is especially important. Currently plain language laws range from a simple statement of a general principle, like the New York law, to extensive and explicit requirements, like the Connecticut law. Three of the states (Minnesota, Maine, and New Jersey) provide for optional administrative review of the contracts by the state attorney general. Thus, in those states, in contrast to New York, an official assessment of compliance can be made without litigation. This procedure is designed to minimize risks for businesses by letting them know whether or not contracts meet plain language standards before the contracts go into circulation. The differences in the laws will need to be addressed, therefore, by comparing contracts from states that represent the range of approaches to drafting plain language laws. We would suggest New York, Minnesota, New Jersey, and Connecticut.

**Socioeconomic status and education.** At least two groups of consumers should be used in testing comprehension: consumers from the lower economic levels who do not have a high school diploma, and consumers from the lower-middle economic level who have a high school diploma and perhaps some college education. The former group — the poor and poorly educated — are the primary intended beneficiaries of plain language legislation. They are least able to deal with the complexity of legal documents and the ones for whom the consequences of a broken contract are the greatest. Unfortunately, research on the functional literacy skills of many members of this group suggest that many documents cannot be adequately simplified for the average member of this group to understand them. For example, nationwide testing of the functional literacy skills (the ability to accomplish the ordinary reading requirements of life) showed that members of this socioeconomic group had difficulty answering questions using even basic consumer information like train schedules, information from health agencies, and directions for locating community resources (Carver 1974). Ultimately, therefore, some combination of literacy instruction for this group as well as legislation requiring document simplification may be necessary before plain language legislation will prove useful to disadvantaged consumers, the group most in need of such help.

**Comprehension.** To test consumers' comprehension of contracts, consumers should be asked to read the contracts and then locate and interpret specific information in them. The questions should follow the presentation of short scenarios (short cases) and should represent the kind of information consumers usually need to know about a contract. Experts from consumer affairs and legal services should help generate a set of scenarios for each type of contract. Evaluators should assess both the accuracy of the responses and the time required to arrive at an answer.

**Document characteristics.** Evaluators should analyze the characteristics of each of the contracts they examine. There are two reasons for this analysis: first, to determine which contracts meet the legal requirements in each of the states; and second, to determine which characteristics of language and visual design best distinguish contracts that are easy to understand from those that are difficult to understand. Some of the characteristics that should be considered, for example, are: the use of unfamiliar terms; the average number of syllables per word; the average number of words presented; the organization of information, including the use of headings; the use of examples; typeface and layout. Every contract in the sample should be rigorously evaluated according to all the guidelines given in the various plain language laws, including all the objective criteria given in the New Jersey and Connecticut laws, and by other features identified as important in the research literature on document design.

In addition, evaluators should obtain holistic scores for each of the contracts. (The Minnesota, Maine, and New Jersey laws provide for optional review of contracts by the attorney general). Such a review provides a holistic assessment of the contract, i.e., a rating of the contract's overall comprehensibility. Raters will be asked to give two holistic scores for each contract, one for the style (language and content), and another for the visual design.

In states which provide for a review, the attorney general could use either plain language experts to make the holistic judgment or simply use available personnel. To reflect these two different conditions, two different panels should make the holistic evaluations: a panel of experts in plain language and consumer affairs; and a group of college freshmen. Each panel should be given instructions on rating taken from the Minnesota law and provided with a range of sample documents. The rating scale should range from "very comprehensible" to "very difficult to comprehend," with the midpoint representing "legal acceptability" in the judgment of the panel.

The evaluators should then analyze all the assessments of the contracts (the holistic judgments and the scores according to the objective criteria), along with the results from the comprehension testing, using multi-dimensional scaling techniques to determine what features of the documents best characterize the most comprehensible contracts. The scores of each contract should then be aggregated as necessary to score the contract as complying or not complying with each of the plain language laws. Finally the evaluators should determine whether the contracts that meet the standards of a particular state were more comprehensible by actual consumer-testing than contracts below the standards.

**Document samples.** Only documents which have been revised to meet the plain language requirements should be sampled, perhaps 15 contracts of each type (installment, bank, and insurance), from each of the four states, for a total of 180 contracts.

**Consumer sample.** The entire sample of consumers can come from one geographic area since there is no need to match people to the states from which contracts were obtained. Demographics of the area should be used to identify

geographic locales having the two socioeconomic groups of interest (see Socioeconomic status and education, above). A sample of 500 or more should provide useful results.

*Analysis of design strategy for exemplary contracts*

It may well be that the critical factor in the design of comprehensible contracts rests in the expertise of the document designer and the approach to the design task rather than in any characteristics of the contract. We would in fact predict this to be the case (see, for example, Duffy 1981; and Duffy, Curran, and Sass 1983). Thus we see the analysis of the design process as a critical component of the project: what do good designers have in common that distinguishes them from less skillful designers?

Identifying approximately five of the most comprehensible contracts of each contract type and conducting preliminary interviews with the designers of these contrcts would be a useful first step in answering that question, as would conducting interviews with designers in several groups who developed contracts which received low scores in the comprehension testing. The interviews should determine first how the groups are managed and then how the groups are organized, the qualifications and duties of the members of the groups, the procedures they follow, etc.

A next step should be an analysis of the "problem-solving strategies" (Flower and Hayes 1977) of individual designers, that is, the way designers conceive of their task in writing a contract and the steps they take to carry out their intentions. Designing a contract is basically a problem-solving task, figuring out how to present particular information to the consumer. In analyzing the designers' problem-solving strategies, the researchers should pay particular attention to how designers formulate the problem, how that formulation changes as the task progresses, what constraints or obstacles the designers perceive, and what strategies they use to respond to these constraints. The best way to determine such matters is to ask the designers to think aloud while performing the design task. These "think aloud" protocols should be recorded, transcribed, and then analyzed to identify the problem-solving behavior. This protocol approach is widely used in the analysis of other problem solving behavior like composing a text or solving engineering problems and has been found to be a rich source of data for understanding that behavior (see, for example, Hayes and Flower 1980; Ericsson and Simon 1984).

Such analyses should provide the bases for organizing the document-design process and for training designers in how to approach document design.

1. For the undergraduate course, see Dixie Goswami, Janice R. Redish, Daniel B. Felker, and Alan Seigel, *Writing in the Professions,* Washington, D.C.: American Institutes of Research, with Seigel and Gale (1981). Two graduate programs are available at Carnegie-Mellon University: Master of Arts in Professional Writing, and Ph.D. in Rhetoric.

2. The term "document design" is awkward, but it has been adopted widely to include both the verbal and visual aspects of documents.

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# Plain English: The Remaining Problems

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*Those who must write clear, readable sentences now have access to about 90% of everything they need to know to write those sentences. That knowledge can be encapsulated in three principles: (1) Express crucial actions as verbs; (2) locate the participants of those actions in the subjects of the verbs; (3) arrange information in those sentences so that older, more familiar precedes newer, less familiar. But if some scholarly knowledge is available, other needed information is not. We know relatively little about the nature of form. More importantly, we knw relatively little about how best to teach the knowledge we do have. And most importantly, we know less yet about how to train those responsible for managing the prose of others. There is, though, one crucial piece of certain knowledge that takes precedent over all the rest: before we can train those in an organization how to write plain English, the highest levels of management must make it clear by their active participation in the program that clear communication is their highest priority.*

Not too long ago, this item appeared in the *New York Times* News of the Week in Review, at the end of a report on litigation over GM's X-cars and their brake problems:

> In a recent report, the General Accounting Office . . . found that public recall notices are difficult to understand, which may contribute to the poor consumer participation — about 50 percent — in recall programs. (March 6, 1983)

Given our level of national literacy, the GAO's concern is probably not misplaced. I suspect they had in mind recall letters such as this one, which I in fact received:

(1) A defect which involves the possible failure of a frame support plate
(2) may exist on your vehicle. This plate (front suspension pivot bar
(3) support plate) connects a portion of the front suspension to the
(4) vehicle frame, and its failure could affect vehicle directional
(5) control, particularly during heavy brake application. In addition,
(6) your vehicle may require adjustment service to the hood secondary
(7) catch system. The secondary catch may be misaligned so that the hood
(8) may not be adequately restrained to prevent hood fly-up in the event
(9) the primary latch is inadvertently left unengaged. Sudden hood fly-up
(10) beyond the secondary catch while driving could impair driver



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(11) visibility. In certain circumstances, occurrence of either of the
(12) above conditions could result in vehicle crash without prior warning.

While I found alarming the news of my possible "crash without prior warning," the quality of the text was only a little less so, since I could imagine someone less than entirely literate trying to get through it, discarding it, and increasing, however slightly, *my* chances of confronting that person's episode of acute hood flyup.

Now there is no mystery why this letter is so badly written. The remote causes have to do with the corporation's twin fears over its customers' anxiety and its own liability: the manufacturer wanted to cover itself against lawsuits, but not enough to risk alarming possible repeat buyers. The writers also probably had to deal with language mandated by the government and with the difficulty of writing documents by committee. To speculate whether its motives might also have included minimizing the costs of a massive recall is perhaps unnecessarily cynical.

The proximate cause of this obscurity, however, is also perfectly clear: The writers systematically, perhaps deliberately, constructed a document that violated three fundamental principles of clear sentences. In almost every instance, the writers expressed critical action not in verbs but in abstract nominalizations, deleted agency, and buried the most significant information in the middle of sentences. As a result, the text became abstract, impersonal, and cognitively demanding. Here is what I mean. On the left are the verbs in the passage; in the middle are the actions, on the right are all the actions expressed as verbs:

| | *Verbs* | *Actions as nouns* | *Actions as verbs* |
|---|---|---|---|
| (1) | involve | | |
| (1) | | failure | fail |
| (2) | may exist | | |
| (3) | connects | | connect |
| (4) | | failure | fail |
| (4) | could affect | | |
| (4) | | directional control | not steer |
| (5) | | brake application | brake |
| (6) | may require | | |
| (6) | | adjustment service | adjust |
| (7) | may be misaligned | | not align |
| (8) | may not be restrained | | not restrain |
| (8) | to prevent | | not prevent |
| (8) | | fly-up | fly up |
| (9) | is left unengaged | | not engage |
| (9) | | fly-up | fly up |
| (10) | | driving | drive |
| (10) | could impair | | |
| (11) | | visibility | not see |
| (11) | | occurrence | occur |

| | | | |
|---|---|---|---|
| (12) | could result | | |
| (12) | | crash | crash |
| (12) | | warning | not warn |

In almost every case, the writers expressed the potentially damaging part of their story in nominalizations and passives, and with three exceptions (*your vehicle,* twice; *driver visibility),* deleted all references to the cast of characters. If we merely undo those three operations — if we express crucial actions as verbs, make the verbs active, and restore the cast of characters in their subjects — the passage becomes not just more readable, but appropriately more threatening:

> Your car may have a defective part. If this part fails, you will not be able to steer, especially if you brake hard. We may also have misaligned the secondary catch on your hood. If you don't engage the primary latch, your hood could fly up. If the part fails or your hood flies up, you could crash.

To edit in this way requires a very slight level of skill and judgment. And having said that, you will understand why I was not pleased to read the sentence that concluded the *Times* article: "The agency has given a linguist five months and $23,000 to write an understandable form letter." Somewhere in the bureaucratic bowels of the Federal government there stirred an impulse toward a scientific, empirical, *data*-based argument that letters such as this one are less than entirely reader-friendly. It is an impulse by no means foolish, or even contemptible. But it is a great waste of the taxpayer's money. And it is a striking bit of evidence of how incompetent some are in their inability to read a text, recognize that it is marginally comprehensible, and to say so without needless statistical support. We do not need five *minutes* to rewrite this letter, much less $23,000. We do not need five months of testing to recognize that by applying almost mechanically a few simple principles of style, we have produced something entirely comprehensible.

In fact, I would like to make a claim that some of my more research-minded colleagues may find outrageous: At the level of sentence structure, we know about 90% of all we need to know to write plain English. And it does not include formulae by Flesch or Gunning or Dale-Chall or any of the legion of others who have reduced readability to numbers. For all *practical* purposes, we need only three simple principles of prose discourse:

(1) Express *crucial* actions as verb.
(2) Name in the subject of the verb one of the cast of characters involved in the action, the *agent* of the action, if possible.
(3) Put at the beginning of your sentence that information which links the sentence to what has gone before or which is relatively more familiar to your audience than anything else in the sentence; put at the end that information which is relatively more complex, less familiar, less predictable.

The first principle invites the second, because once you have arranged your information around specific verbs, you are more likely to make the subject of the verb one of the participants — usually the agent — in the action. And this second principle reflects the third, because the cast of characters is the most familiar component in any story. If they are put into the subject of the sentence, the newer information will by default fall out closer to the end.

I will simply assert — flatly — that any discourse that follows these three principles will be significantly more readable than discourse that does not. Such discourse may have other problems of style: unfamiliar vocabulary, interruptions, excessively multiplied clauses, confusing negatives. But I will simply assert again that these problems are less likely to appear in prose that meets the three criteria. Readability tests that measure word length, sentence length, etc., merely record the *symptoms* of overly complex prose. The *etiology* lies in the systematic dislocation of action away from verbs, agents away from subjects, and familiar information away from the beginning of the sentence.

Those who would demand numbers to verify their response are like a person lying in bed, shivering, vomiting, wracked by spasms of the gut who, when asked if he were sick, answered, "I don't know, I haven't taken my temperature yet."

In schematic terms, the principles can be collapsed into a hierarchical array:

| topic | comment |
|---|---|
| old | new |

| subject | verb | object |
|---|---|---|
| agent | action | — |

Figure 1.

Express familiar information in the Topic of the sentence (usually, but not always the subject). In these sentences, *style* is the topic, but in neither case the subject: *As for style, there is much to say. Style I know very little about.* Express newer, less familiar, more complex information in the Comment of the sentence, in that part of the sentence that follows the Topic. Use the Subject to name the Agent (or at least one of the cast of characters), and use the verb to express the crucial action involving that character. The rest of the sentence will for the most part take care of itself.

Now it is true that there are a good many other things about the nature of discourse about which we know very little. We do not know very much about how writers communicate their intentions. We know relatively little about how pre-existing knowledge influences how we read. We know relatively little about how the *reader's* intention in reading influences how he or she reads. We do not know the relative importance and interplay of the different components of discourse that contribute to a sense of form. In fact, we don't really know how we get from one sentence to the next, how we fill in what is not said. In fact, we are rather in the dark about the whole concept of coherence in dis-

course. But even if we do not know as much as we would like about these matters, we know enough to create documents more readable and usable than that automobile recall letter. And we should know enough not to have to test the revised one.

Yet even if we do know 90% of what we need to create readable, usable documents, we are, I think, ignorant of about 90% of what we need to know to teach, to communicate, to get people to learn and use this knowledge. For example, what is it that makes some among us genuinely unable to tell the difference between these sentences:

> This agreement may be terminated by either party without cause upon thirty days written notice to the other party. Further provided that such termination would not be effective to terminate any Advisory Agreement or to terminate any commitments made by the Bank as agent for an investor with termination of obligations under such latter Agreements or commitments to be terminated as provided in the Advisory Agreement and the commitment.
>
> Either party may terminate this agreement without cause 30 days after it notifies the other party in writing. However, if either party wishes to terminate the Advisory Agreement or any commitments made by the Bank as agent for an investor, the party must observe the provisions they contain.

In every one of our writing programs, some participants seem intrinsically unable to distinguish between clear and unclear writing, or if they can, unable to fashion a sentence, even with help, that improves substantially on a terrible example.

There are more complex issues. We all need the technical vocabulary, tone of voice, that makes us sound like one another's professional peers. We often disparage it, but to what degree is it in fact a psychologically or rhetorically effective device? With young professionals not yet thoroughly socialized into a field, it serves a perfectly apparent psychological purpose. This was perhaps best expressed by a very new lawyer in a writing program we had just completed. He said, without the slightest trace of irony, "We've just spent three years learning to sound like lawyers, and now you want us to sound like ordinary people."

Professional dialects serve a rhetorical purpose, despite the more general abuse they receive in the popular press. But what are the limits? How do we best approach the problem of what is essentially bi-dialectalism? Indeed, the research on the range of professional languages, the range of professional argumentation, is just beginning to become a substantial field.

And *when* do we teach all of this? The stereotypical argument at every level in the process of education is that the teachers at the prior level did not do their job, did not teach their students what *we* (at whatever level "we" might be) think they should be taught. Thus teachers of freshman English deplore high school education, faculty in advanced courses deplore freshman English, graduate schools deplore undergraduate education, and professionals regularly deplore the quality of graduates joining their ranks. We might conclude

that if those high school teachers had just done their job, this paper would be irrelevant.

In fact, there is an increasing body of evidence arguing for the proposition that one cannot learn complex activities like writing, problem solving, critical thinking, argumentation, etc., as generic skills. The skills of a good writer, problem solver, critical thinker, or teacher of rhetoric are so deeply enmeshed in a total understanding of the field itself, so tightly woven in and around sheer knowledge about a subject matter, that we cannot reasonably expect to graduate from almost any level students ready to behave in an entirely competent way at the next. The demands of simply learning a broad subject, of being socialized into the universe of discourse, of becoming part of that universe are so severe that we ought not be surprised when those graduates appear to be less than entirely competent. Thus a new doctor, a new lawyer, a new engineer will predictably suffer through a period while he or she is learning to sound like a doctor, lawyer, or engineer — or freshman at college, or student just starting to major in psychology, or new graduate student.

And this brings us to a yet more difficult problem. As I said, it is easy for any of us here to teach these issues. We all have a professional interest in writing and teaching writing. Many of us act as consultants to large organizations that perceive a need for our assistance. But however lucrative that perceived need may prove to be for us, we must acknowledge that ultimately those on the scene will have to assume the responsibility of passing on whatever we teach. In short, we are professionally obligated to make ourselves obsolete. We must be able to train people not merely to write well, but to train others how to write well, to train others how to manage the writing of those for whom they are responsible.

In this regard, the range of managerial styles we have to deal with is quite varied. It ranges from accepting a document from a subordinate, rewriting it to fit what the manager wants it to be, and sending it out without ever telling the subordinate what was done to the subordinate's document, much less why. Slightly more helpful are those who rewrite and at least send a copy of the rewrite to the original drafter, on the assumption perhaps that merely by privately comparing originals and revisions the drafter will eventually figure out what he should be doing. Only slightly more helpful are those who send the document back with advice like "tighten up," "be more organized," "clarify," etc. It may be useful advice, but it is about as helpful as a doctor telling that person lying in bed trembling and vomiting that he should "get better," "be healthier." Accurate advice, but not very useful.

More helpful are those who return a document, edited, with some specific comments about the reasons for the changes in that particular document: "I changed this sentence to make the FCC the subject because you said you were going to talk about new FCC policy in this section." It is not a great leap to, "Make whoever is most responsible for the actions you are describing the subject of your sentence." But it is a leap most managers are unable to make, because they simply have never had the occasion to study language, discourse,

or to articulate the generalizations that apply not just to *this* text to make it clearer, but to texts in general.

But that is the kind of managerial style that subordinates find most useful: Unless they are explicity instructed in principles of action general enough to rise above trivial issues but powerful enough to apply to a wide range of potential behavior, they will learn only by trial and error, or not at all. These are the principles we began with: actions as verbs, subjects as agents, old before new. They are general, powerful, and specific.

They are also the principles that those who are responsible for the writing of others must control. They must know them not as tacit knowledge, but as active, articulatable knowledge. And they must be able to connect them to their gut response to a text that prompts such responses as "I keep losing the thread of the argument here," "I just can't get through this stuff," "I keep having to skip back to the previous sentence." They have to be able to locate quickly *in the text* the cause of their response, to analyze it, and to explain it.

In short, *we* as professional educators, consultants, and writing teachers may control the abstract knowledge that underlies discourse. Indeed, we must. But if we are substantially to serve social and economic objectives we have to be able to pass that abstract knowledge on in a way that makes it seem relevant, useful, nonthreatening, concrete, even interesting and challenging.

Whatever else we may think we know or don't know about language and discourse, we know precious little about demystifying it for those who perhaps remember from their English classes only that bewilderment and despair attendant on diagramming a sentence more than 10 words long. Language study has too often been a terrifying experience for too many of us. Replacing that deep dislike with an informed and easy knowledge of how discourse works is no small task.

We have been reassured that one way toward that end is through the use of computers. We are told that programs such as *Writer's Workbench* or *Epistle* will analyze our prose for us, point out our possible weaknesses, and even teach a lesson on correcting them. From what I have seen of these programs, they are simultaneously too powerful and not powerful enough. A simple command gives us much more information than any reasonable person probably wants to know. We get a statistical profile of our passives, nominalizations, occurrences of *be, there, it,* etc. A statistical profile of my automobile letter would have told us that it was probably suitable for a college level audience. But I would think that the most modest education would allow one to come to that conclusion before it came up on the screen. We do not wait until we read a thermometer before we take an aspirin.

Certainly, such text editing programs may be useful for those who think they need a thermometer before they can tell whether they feel sick. There is an irony here: Such programs are attractive to those who are not skilled enough to work through a text quickly and efficiently. If they lack those skills, we must assume they lack the more sophisticated skills of understanding the powerful role of form on the way we process text. Given that more serious incompetence, how will the user use such programs? Surely not in the skilled

way competent editors would. Given our experience of how such rubrics have been used elsewhere in our lives, we should not be surprised to see managers using these programs in ways that rely essentially on getting the right numbers out of the statistical profile.

What I want to conclude with has been in my experience the single most crucial aspect of any successful program in improving the discourse in an organization. We can control and pass on all the knowledge, all the skills, all the theory any manager might need to pass it all on in turn to his or her subordinates. We can teach managers how to handle the writing of others, how to analyze, edit, or explain. But unless we have been successful in achieving a prior objective, none of this will prove very useful, or enduring — at least it has not in the experience of my colleagues and me. That prior objective is obtaining from the most senior levels of management not just approval for a concerted effort to improve the quality of discourse in the organization, but a commitment that communicates itself through every component of the organization. Every senior manager wishes that those under him or her communicated better. But not every senior manager is willing to commit the time and effort to a program in communication to achieve that end. In short, in my experience, it has not been the technology, the knowledge, the skills, or the teaching situation that has made the difference between successful and unsuccessful programs in teaching written communication. What has made the biggest difference has been from senior management a commitment of time, of visible presence, of articulate and continued support *over a sustained period of time.*

My colleagues and I are a fairly successful group of consultants. Clients invite us back. But I am increasingly convinced that it is not because of what we know or how we teach it. It's because we repeat and repeat again how important it is that every manager of the group we are working with makes it clear to the group, *by participating in the group,* that what we are doing is not just important, but must and will be done. In fact, if truth be told, if the managers simply articulated their determination to improve the quality of writing in their organization, consultants would probably be out of a job.

This, then, is the remaining problem in the plain English movement: not more knowledge about the structure of discourse (though that is very important); not more knowledge about how to teach it (though that is more important yet); not more technology in the form of ever-more detailed text-editing programs (though that is important, too). The remaining problem is convincing those with the authority that teaching clear written communication does not begin with those who do the communicating. It begins with those who bear the ultimate responsibility for it; it begins with those with the authority.

# Prescriptive Linguistics and Plain English: The Case of "Whiz-deletions"

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*The plain English movement is under considerable pressure to produce simple, easy-to-apply guidelines for writers. Often, however, such guidelines are not consistent with the actual practices of good writers and are therefore ineffective. As a case in point, this paper discusses the guideline "Avoid whiz-deletions," taken from a highly-acclaimed plain English handbook. It is shown that whiz-deletions, or reduced relative clauses, actually abound in good writing. They outnumber full relative clauses by a 4-to-1 margin in good standard prose and by an 8-to-1 margin in model plain English documents. Whiz-deletions are useful in helping to de-emphasize information, promote sentence rhythm, facilitate parsing, avoid ambiguity, and omit needless words. The maxim in its original form should be replaced by a more descriptively-accurate one that reflects these features. In general, the plain English movement should promote only those guidelines that are consistent with the practices of good writers. Furthermore, such guidelines should be formulated so as to direct the attention of novice writers to broader contextual factors, not just sentence-based ones.*

Prescriptive linguistics is the study of how language is used by good writers, its purpose being to devise rules-of-thumb which can help other writers. In this sense, although its methods of analysis are borrowed from descriptive linguistics, sociolinguistics, psycholinguistics, rhetoric, and other primarily theoretical fields, its orientation is basically pedagogical. The plain English movement, devoted to improving the readability of public documents, also has an important pedagogical function. In trying to persuade lawyers, bureaucrats, businessmen, and others to produce writing that is easily understood by the general public, it is under great pressure to provide rules-of-thumb that are both easy to apply and effective in making writing more comprehensible.

Unfortunately, research in prescriptive linguistics (and its related field, readability research) shows that there are very few rules-of-thumb that satisfy both of these criteria. In their analysis of noun compounding, for example, Kaufer and Steinberg (1984) show that a simple maxim like "Avoid noun compounds," though easy to apply, is so oversimplified that it does not reliably improve readability. On the other hand, their revised maxim, though effective if faithfully followed, is significantly more difficult to apply. This trade-off relationship can be seen in other recent studies as well, such as Selzer (1983),



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Huckin (1983), Moskovit (1983), Geisler, Kaufer, and Steinberg (1984), and Steinberg (1986).

In our view, there is no obvious way around this difficulty. It is important for the plain English movement, however, not to succumb to demands to produce oversimplified, ineffective prescriptions. No matter how easy a maxim may be to apply, if it does not result in better comprehension then it can serve no useful purpose. And what is worse, the hard-earned credibility of the movement will suffer. It is better, we feel, to produce accurate descriptions of what good, clear writing actually looks like. Though such descriptions may turn out to be quite complex, at least we will have a more accurate picture of what plain English is and will be able to go about devising appropriate methods for teaching it.

**Current practice in plain English pedagogy.**

To illustrate our contention that stand-alone prescriptions tend to be oversimplified and ineffective, we will focus our attention on a prescription drawn from *Guidelines for Document Designers* (henceforth *GDD),* the state-of-the-art handbook published by the American Institutes for Research. Written by five well-known experts in the field (Daniel Felker, Frances Pickering, Veda Charrow, Melissa Holland, and Janice Redish), *GDD* contains what we feel is the most complete and most representative set of plain English principles yet produced. As the authors state:

> We chose the document design principles in these guidelines for two reasons. First, experienced document designers widely agree that the principles in this book do influence the clarity of prose. Indeed, all of the principles we have selected are included in at least several writing and design manuals aimed at practitioners. Second, all of the principles in these guidelines have been examined in research studies to see how they affect the comprehension of information. (p. 1)

Based on research that is summarized in an earlier book by this same team *(Document Design: A Review of the Relevant Research,* 1980), *GDD* contains twenty-five maxims for writers of public documents. These maxims include principles for organizing text, for writing sentences, for formatting, and for using graphics. For each maxim, the research on which it is based is explicitly described. It is this feature that makes *GDD* stand out from other writing handbooks. While the maxims themselves are quite similar to those found in Strunk and White's *Elements of Style,* the *Harbrace College Handbook,* and many other writing handbooks, the citing of specific psycholinguistic and cognitive psychological studies makes *GDD's* treatment unique.

One of *GDD's* maxims is "Avoid whiz-deletions," which it describes as follows:

> In English, many subordinate clauses are introduced by the words "which is," "who were," "that are," etc. These "little words" help make the structure of the sentence clear to the reader — they make it easier for the reader to understand how the subordinate clause relates to the rest of the sentence.

> Removing these "little words" is called "whiz-deletion." "Whiz-deletion" can often make a sentence unclear or ambiguous; it can place a greater than necessary burden on the reader. Wherever possible, replace the missing "which is," "who was," etc. [*GDD*, p. 39]

*GDD* exemplifies this statement with these two sentences:

(1) a. The director wants the report *which was* written by the Home Office.
b. The director wants the report written by the Home Office.

In this example, deleting the relative pronoun and auxiliary verb produces — out of context — an ambiguous sentence. Instead of the meaning given in version 1a, it could mean "The director wants the report *to be* written by the Home Office." With this in mind, the authors of *GDD* say, "To avoid ambiguity and to reduce the burden on your readers, restore the missing relative pronoun plus copula verb *whenever possible*" [emphasis ours]. This statement amounts to a strong prescription: "never leave out a *which is, that are,* etc." The authors of *GDD* later qualify this prescription somewhat when they write: "It is not necessary to *always* restore the relative pronouns plus copula verb. If the whiz-deletion does not interfere with the clarity of the sentence and the reader's ease in reading it, you may leave the sentence as it is." But they clearly imply that such instances of "harmless" whiz-deletion are the exception, not the norm.

Noticing that the ambiguity of sentence (1b) results not from whiz-deletion alone but also from the presence of a main clause desiderative verb *(wants)* which can take either a sentential complement or a noun-phrase complement, we were curious to know how common such sentences actually are in real-world writing. Do they occur frequently enough to merit a maxim? It is possible that whiz-deletion leads to ambiguity in other kinds of sentences as well, but the other two example-sentences that *GDD* provides are not compelling ones.[1] The authors of *GDD* say only that "whiz-deletion can often make a sentence unclear or ambiguous"; they do not cite any evidence.

*GDD* does refer to psycholinguistic research, claiming that it gives "indirect" support for the maxim. But when we looked closely at this research, we found that it had very little relevance for whiz-deletion. For example, Fodor and Garrett (1967) and Foss and Lynch (1967) used sentences with double embeddings, as in "The pen (which) the author (whom) the editor liked used was new." Such sentences almost never occur in real life and, furthermore, do not contain whiz-constructions. Hakes and Cairns (1970) used sentences with only single embeddings, but these sentences did not contain whiz-constructions either. Hakes (1972) used sentences which had no relative pronouns at all, only complementizers (e.g., "The blind student felt (that) the material in the art course would be too difficult for him to understand."). Charrow and Charrow (1978) did study whiz-deletions, but — like all of the studies cited above with the exception of Fodor and Garrett — their experimental procedure used oral rather than written texts and thus did not measure readability.

**Survey of data.**

Given the fact that there is virtually no psycholinguistic evidence for or against the use of whiz-deletions, we thought it would be useful to consider a different kind of evidence — namely, the practices of good writers. Do good writers use whiz-deletions? And if so, why? In answering these questions, we first looked at samples of plain English, then we looked at samples of unsimplified writing.

Our samples of plain English were taken from *How Plain English Works for Business: Twelve Case Studies,* published by the U.S. Department of Commerce. We chose this collection because it is recently published (1984), because it contains writing samples that are considered models of plain English, and because it was edited by the same people who wrote *GDD* and devised the "Avoid whiz-deletions" maxim. For every sample of plain English in this book, we counted the total number of words, the number of whiz-deletions, and the number of "whiz-constructions" (i.e., full whiz-forms without deletion).

The first document we examined from this volume was a consumer promissory note from Citibank, approximately 550 words long. It contains 7 whiz-deletions and one whiz-construction. Some examples of each type are (▲ marks the deletion side and boldface marks the whiz construction):

(2) I understand that I must maintain property insurance on the property ▲ covered by the Security Agreement for its full insurable value.

(3) You can then demand immediate payment of the balance of this note, minus the part of the finance charge **which hasn't been** earned ▲ figured by the rule of 78.

The second document is a consumer information guide from JCPenney. It is approximately 770 words long, contains 3 whiz-deletions and one whiz-construction. Here are examples of each type:

(4) If you are fairly active, under age 35, and healthy, you can develop your own exercise program from guidelines ▲ given in this guide.

(5) Exercise cycles are one-wheeled stationary bicycles **that are** pedaled like a regular outdoor rolling bicycle.

There are 8 other samples of plain English in this collection of case studies. They, and the documents from Citibank and JCPenny, are listed in Table I along with the relevant data-counts. It is clear from these data that the guideline "Avoid whiz-deletions" is not observed in model samples of plain English.

When we looked at samples of writing from *GDD* itself, we found that it does not adhere to its own guideline. A random selection of 9 pages, totalling about 3000 words, revealed 11 whiz-deletions and only 2 whiz-constructions.

Broadening our survey, we looked at randomly-chosen samples of good but unsimplified writing from a variety of published sources. We examined technical writing (a memo, a business letter, two process reports, and an investigative report) from Kolin and Kolin's *Models for Technical Writing,* scholarly journals (e.g., *The New England Journal of Medicine, College Composition and Communication, Child Development, Memory and Cognition, Current History),*

advertisements for IBM, AT&T, Apple, Planned Parenthood, Sebastian International, and the Collector's Library (found in *Time, Esquire, Atlantic Monthly, Glamour,* and *Popular Computing),* popular magazines *(National Geographic, New Yorker, Psychology Today, Science 84, Sports Illustrated),* informational writing *(Encyclopedia Britannica,* a plain English brochure), journalism *(Washington Post, Wall Street Journal, Time),* and fiction from Isaac Asimov, Philip Roth, James Michener, Joyce Carol Oates, and John Updike. The data is summarized in Table II.

We can conclude from all this that good writing in general, whether it is labeled plain English or not, does not follow the prescription to "Avoid whiz-deletions." In fact, whiz-deletions are so heavily used that they can be considered, if anything, *a standard feature* of good writing, with whiz-constructions

| *Document type* | *total words* | *whiz-deletions* | *whiz-constructions* |
|---|---|---|---|
| St. Paul insurance policy | 2760 | 35 | 6 |
| Shell information sheet | 1000 | 7 | 0 |
| JCPenney information guide | 770 | 3 | 1 |
| Citibank consumer loan note | 550 | 7 | 1 |
| Pfizer healthcare ad | 520 | 0 | 0 |
| Shell ad | 450 | 2 | 0 |
| HOW homeowner's warranty | 380 | 4 | 0 |
| Roche's medication information | 330 | 1 | 0 |
| Insurance information brochure | 110 | 0 | 0 |
| Product safety notice | 100 | 2 | 0 |
| Aetna table of contents | 100 | 1 | 0 |
| | 7070 | 62 | 8 |

Table I. Data for model plain English documents.

| *Type of writing* | *total words* | *whiz-deletions* | *whiz-constructions* |
|---|---|---|---|
| Fiction | 18185 | 41 | 6 |
| Popular magazines | 18156 | 68 | 21 |
| Scholarly/academic | 18038 | 121 | 18 |
| Journalism | 15209 | 66 | 18 |
| Technical | 2345 | 6 | 9 |
| Advertisements | 2298 | 16 | 4 |
| Informational | 1612 | 7 | 0 |
| | 75843 | 325 | 76 |

Table II. Data from good, unsimplified writing.

being used only for special circumstances. The reasons for this widespread disregard for the maxim are discussed in the next section.

**Analysis of a sample.**

When we analyzed our corpus for individual instances of whiz-deletions and whiz-constructions, trying to understand why the former are so preferred, we found some interesting patterns. First of all — and contrary to the claim made in *GDD* — we found that whiz-deletion almost never made a sentence unclear or ambiguous. There was only one case of desiderative-verb ambiguity like that in (1b),[2] and only one or two cases of ambiguity of other types. In fact, it was more often the case that whiz-deletion actually *reduced* ambiguity. Secondly, we found that whiz-deletion serves the major rhetorical purpose of de-emphasizing one part of the sentence so that another part can be emphasized. At the same time it often promotes better sentence rhythm. It can help make complex sentences easier to parse and thus easier to understand. Finally, it makes writing more concise — certainly a desirable feature for any plain English document.

These points are illustrated below with examples taken from a consumer loan agreement in *How Plain English Works for Business* (see Figure 1). In this pioneering case Citibank decided to devise a simplified promissory note that would be understandable to ordinary borrowers, not just to corporate clients. There are 7 whiz-deletions and one whiz-construction in this form. We will look at each in the order in which they appear. (The underscoring in all cases is ours.)

- *"Amount ▲Financed"* (line 12).

This phrase is part of a formatted list of items. There are many reasons why a writer might prefer the whiz-deleted form rather than a longer form such as "Amount that is Financed" or "Amount that is being Financed." First of all, clarity: the meaning of the expression is perfectly clear from the context, especially given the "1 + 2 + 3" formula that follows it in parentheses. Secondly, ease of reference: as a compressed form, it gives the word "financed" more of an adjectival (descriptive) quality than it has in the unreduced form, where it is more of verb. Thus it works better as a name or even as a technical term, and can easily be used as such by a loan officer or customer. Third, economy of expression: it uses fewer words and thus fits better into the space provided. Finally, parallelism: as a phrasal construction rather than a clausal one, it is similar in form to the other items on the list.

- *"you will refund the unearned finance charge, ▲figured by the rule of 78"* (line 18).

A consumer reading this loan note is not likely to be very concerned with the exact method by which bankers figure out an unearned finance charge. Hence, although this information may need to be explicitly stated for legal reasons, it will be treated by most consumers as a mere formality. The important point, for them, is contained in the main clause — that the bank will refund the

## Consumer Loan Note

Date_____, 19____

(In this note, the words **I, me, mine** and **my** mean each and all of those who signed it. The words **you, your** and **yours** mean First National City Bank.)

**Terms of Repayment** To repay my loan, I promise to pay you _____ Dollars ($_____). I'll pay this sum at one of your branches in _____ uninterrupted _____ installments of $_____ each. Payments will be due _____, starting from the date the loan is made.

Here's the breakdown of my payments:

| | | |
|---|---|---|
| 1. Amount of the Loan | $_____ | |
| 2. Property Insurance Premium | $_____ | |
| 3. Filing Fee for Security Interest | $_____ | |
| 4. Amount Financed (1+2+3) | | $_____ |
| 5. **Finance Charge** | | $_____ |
| 6. Total of Payments (4+5) | | $_____ |

**Annual Percentage Rate**_____%

**Prepayment of Whole Note** Even though I needn't pay more than the fixed installments, I have the right to prepay the whole outstanding amount of this note at any time. If I do, or if this loan is refinanced—that is, replaced by a new note—you will refund the unearned **finance charge,** figured by the rule of 78—a commonly used formula for figuring rebates on installment loans. However, you can charge a minimum **finance charge** of $10.

**Late Charge** If I fall more than 10 days behind in paying an installment, I promise to pay a late charge of 5% of the overdue installment, but no more than $5. However, the sum total of late charges on all installments can't be more than 2% of the total of payments or $25, whichever is less.

**Security** To protect you if I default on this or any other debt to you, I give you what is known as a security interest in my ○ Motor Vehicle and/or _____ (see the Security Agreement I have given you for a full description of this property), ○ Stocks, ○ Bonds, ○ Savings Account (more fully described in the receipt you gave me today) **and** any account or other property of mine coming into your possession.

**Insurance** I understand I must maintain property insurance on the property covered by the Security Agreement for its full insurable value, but I can buy this insurance through a person of my own choosing.

**Default** I'll be in default:

1. If I don't pay an installment on time; or
2. If any other creditor tries by legal process to take any money of mine in your possession.

You can then demand immediate payment of the balance of this note, minus the part of the **finance charge** which hasn't been earned figured by the rule of 78. You will also have other legal rights, for instance, the right to repossess, sell and apply security to the payments under this note and any other debts I may then owe you.

**Irregular Payments** You can accept late payments or partial payments, even though marked "payment in full", without losing any of your rights under this note.

**Delay in Enforcement** You can delay enforcing any of your rights under this note without losing them.

**Collection Costs** If I'm in default under this note and you demand full payment, I agree to pay you interest on the unpaid balance at the rate of 1% per month, after an allowance for the unearned **finance charge.** If you have to sue me, I also agree to pay your attorney's fees equal to 15% of the amount due, and court costs. But if I defend and the court decides I am right, I understand that you will pay my reasonable attorney's fees and the court costs.

**Comakers** If I'm signing this note as a comaker, I agree to be equally responsible with the borrower. You don't have to notify me that this note hasn't been paid. You can change the terms of payment and release any security without notifying or releasing me from responsibility on this note.

**Copy Received** The borrower acknowledges receipt of a completely filled-in copy of this note.

| Signatures | Addresses |
|---|---|
| Borrower: _____ | _____ |
| Comaker: _____ | _____ |
| Comaker: _____ | _____ |
| Comaker: _____ | _____ |

unearned finance charge. By omitting *which is* from the relative clause underlined, the writer reduces the predicative force of the clause and effectively de-emphasizes it. This in turn allows more emphasis to be given to the main clause, where it belongs. And since the whiz-words *(which will be)* are quite predictable from the context, deleting them reduces wordiness without causing any ambiguity.

Furthermore, when readers (including the writer reading his or her own writing) subvocalize, they would find that this sentence has better sentence rhythm without the whiz-words. The only words likely to be given intonational prominence in this phrase are *figured* (secondary) and *78* (primary). The latter gets end-focus[3] and also nuclear stress[4]; the former carries less informational weight but would probably receive a rhythmic stress due to its position. The word *rule* is not likely to receive any stress at all, since *78,* with which it is closely linked, gets nuclear stress. Thus there are eight unstressed syllables in this phrase. If the full whiz-construction were used, there would be ten or eleven unstressed syllables. With only two stressed syllables in the phrase, this would simply be too much of an imbalance.

- *"I give you what is known as a security interest in my* 0 *Motor Vehicle and/or* _____ *(see the Security Agreement I have given you for a full description of this property),* ○ *Stocks,* ○ *Bonds,* ○ *Savings Account (▲ more fully described in the receipt you gave me today)* (lines 23-26).

Viewed in isolation, this might seem to be one of those rare cases where whiz-deletion creates ambiguity. The underlined relative clause, in principle, could be interpreted as modifying any of several possible referents: "Savings Account," "security interest," or "Motor Vehicle and/or . . . Stocks, Bonds, Savings Account." However, in actuality, there is very little possibility of such ambiguity arising. Immediately prior to reading this note, the consumer will have turned over to the bank the deeds to those properties that will be used by the bank as security, and received a receipt for them. Then, while reading the note, and just before encountering the relative clause, he or she will have put ticks in the circles referring to those properties. These properties, therefore, will be activated referents in the reader's mind, and will easily be associated with the relative clause. Hence there is no ambiguity.

But there will also be considerable variation from one consumer to another as to the number of circles checked. In some cases there may be only one; in others there may be two or more. If the writer wanted to use the full whiz-construction, he or she would thus have to use an awkward slash form of the auxiliary (". . .which is/are. . .") to cover both contingencies. By omitting the auxiliary verb altogether, i.e. by using whiz-deletion, the writer can gracefully avoid this problem. Furthermore, like the preceding case, this relative clause is of minor importance in this context and should be de-emphasized anyway. Reducing the length and syntactic complexity of the expression helps do that.

Figure 1. A revised consumer loan agreement from Citibank.

- *"I understand I must maintain property insurance on the property ▲ covered by the Security Agreement for its full insurable value"* (lines 27-28).

Here the situation is just the opposite of the preceding one. Using a full whiz-construction here, instead of reducing possible ambiguity, would actually increase it. The ambiguity arises from the role of the sentence-final prepositional phrase *(for its full insurable value)*. Does this phrase modify *must maintain property insurance* or does it modify *covered?* Psycholinguistic experiments show that readers who lack semantic knowledge and must rely more heavily on syntactic cues, i.e., nonspecialist readers, are likely to interpret the prepositional phrase (PP) as modifying the nearest predicate.[5] If *covered* were embedded in a full whiz-construction *(which is covered by . . .)*, it would be a full predicate and would cause many such readers to misinterpret the role of the modifier. Yet, according to our specialist informant, the PP is supposed to modify the earlier predicate, *maintain property insurance.* Whiz-deletion in this case serves to reduce the predicative force of the relative clause and thus make it more likely that the reader will correctly associate the PP with the earlier predicate.

Another way in which whiz-deletion promotes correct parsing in a case like this is by changing the phonological structure of the sentence, specifically, the location of likely breath-pauses. In the whiz-deleted version, the sentence is easily divided into three groups of roughly equal phonological length: *I únderstand I múst maintain próperty insurance / on the próperty covered by the Secúrity Agreement / for its fúll insúrable válue.* Not only is there a tripartite division here, but the middle breath-unit can easily be read with one less beat than the other two, as indicated, and is thus effectively subordinated. This makes it easier for the reader to see that the sentence-final PP and the main predicate go together. It also makes it easier for the reader to see that the main predicate and the final PP are the most important parts of this sentence. In effect the final PP is part of the predicate and shares its predicative force. Together they comprise the focal points of the sentence, whereas the intervening relative clause merely clarifies, for legal reasons, what property is being talked about. On the other hand if a full whiz-construction were used, the middle breath-unit would have more phonological weight than the other two breath-units (i.e., more syllables and just as many beats). This is contrary to the general principles of sentence-rhythm in English (Quirk et al: 1033-1052) which call for more weight to be given to end-units. Therefore many readers would try to rephrase the sentence as follows: */ understand I must maintain property insurance on the property // which is covered by the Security Agreement for its full insurable value.* This would be a nicely balanced rephrasing (19 syllables and 4 stresses followed by 21 syllables and 5 stresses). But it would induce many readers to interpret the final PP as attached to and thus modifying the relative clause, not the clause preceding it.

- *You can then demand immediate payment of the balance of this note, minus the part of the finance charge which hasn't been earned figured by the rule of* 78 (lines 33-34).

This is one instance in the text where a full whiz-construction has been used. The writer could have used whiz-deletion *(minus the part of the finance charge not earned figured by the rule of 78)* without much risk of ambiguity, or she could have used the same expression she used earlier in line 18 *(minus the unearned finance charge figured by the rule of 78)* and later in line 40 *(the unearned finance charge)*. But either of these forms would have taken emphasis away from the word *earned*. In the whiz-construction version this word receives full predication and phonological prominence (most readers would make a breath-pause right after this word, highlighting it and setting off the following phrase as a separate breath-unit; this will be discussed further below). This bestowing of emphasis could be accidental — merely a result of the writer attempting to use elegant variation. But elegant variation is not in keeping with the principles of plain English. Therefore, it seems more likely that the writer chose this form for a specific reason, that is, to deliberately give prominence to *earned*. In any event, whether done deliberately or not, the emphasis given to this word is certainly appropriate, for it has particular rhetorical value in this context. It occurs in the section defining default conditions and penalties. Since the bank is specifying its right to certain payments from the borrower, an antagonistic situation is depicted where a potential borrower (i.e., someone reading this note and deciding whether or not to sign it) would want some reassurance that the bank would not take money that it has not "earned." At the same time, by explicitly identifying part of the finance charge as having not been earned, the bank brings to mind the other part, that which has been earned. This is a subtle way of telling the potential customer that the bank will be working for him, not just taking his money.

- *You can then demand immediate payment of the balance of this note, minus the part of the finance charge which hasn't been earned* ▲ *figured by the rule of 78* (lines 33-34).

This phrase is identical to the earlier one in line 18. By now it can be seen as a formulaic expression, carrying a single holistic meaning. The principles of sentence intonation (Quirk et al.: 1033-1052) would dictate that *78* be given stress but not the other words in the phrase. This leaves nine unstressed syllables (versus the single stressed one). Using a whiz-construction would make the phrase even more unbalanced, with eleven unstressed syllables. Whiz-deletion, therefore, promotes sentence rhythm here even more than in the earlier cases.

Though not punctuated as such, this phrase is essentially a nonrestrictive relative, playing a parenthetical role in the sentence. If asked to read the sentence aloud, most readers, we believe, would pause briefly between *earned* and *figured*. (If an actual comma were inserted here, however, the phrase could be misinterpreted as modifying *the balance of this note.)* As in the earlier case, it is not the focal point of the sentence but just a formality, stipulating a

method of calculation. By using whiz-deletion, the writer de-emphasizes it and allows more emphasis to be given to the phrase preceding it.

Another reason for using whiz-deletion here is to avoid confusion and possible ambiguity. If a full whiz-construction had been used, there would be two *which-* clauses in a row, with the referent of one *which* being embedded within the other. "You can then demand immediate payment of the balance of this note, minus the part of the finance charge *which hasn't been earned which is figured by the rule of 78.*" The first *which* would refer to "the part of the finance charge," the second would refer to "the part of the finance charge which hasn't been earned." But many readers, we believe; would not be able to easily and quickly make this interpretation.

- *If you have to sue me, I also agree to pay your attorney's fees* ▲ *equal to 15% of the amount due, and court costs* (lines 40-41).

The writer could have used a full whiz-construction here ("I also agree to pay your attorney's fees *which will be equal to 15% of the amount due"),* but this would have highlighted the 15% figure and taken some emphasis away from the main clause. As in earlier examples where "the rule of 78" is a relatively minor detail, here the main point of the sentence is not the method of calculating the attorney's fees but rather the fact that it is the borrower who will have to pay them. Using whiz-deletion here not only helps downplay the relative clause but also saves words without any risk of ambiguity.

Rhythmic factors also play a role in favoring whiz-deletion here. This sentence occurs in a context (see Figure 1) where the focal information is carried by the words *have, sue, also, attorney, 15%, amount due,* and *court.* Of the other content words, *agree* and *pay* are "old" information repeated from the immediately preceding sentence; *fees* and *costs* are predictable after *attorney's* and *court* respectively (both are technical terms); and *equal* is virtually redundant from the context. Putting primary stresses on the focal words produces a nicely balanced rhythm (if read in context) without having to elide any unstressed vowels: *If you háve to súe me // I álso agree to pay your attórney's fees // equal to fifteén percént of the amòunt dúe // and coúrt costs.* The longest stretch of unstressed vowels in this sentence is . . . *fees // equal too* . . . Inserting whiz-words here would almost double the number of unstressed vowels in this sequence, and throw the sentence rhythm off. Some readers would perhaps try to compensate for this awkwardness by putting stress on *equal,* but this creates another kind of awkwardness, that of giving emphasis to a word that has little informational importance.

- *If you have to sue me, I also agree to pay your attorney's fees equal to 15% of the amount* ▲ *due, and court costs.* (lines 40-41).

This whiz-deletion occurs in the same construction as the one just discussed and was probably used for the same reasons. It de-emphasizes this part of the sentence in favor of the main clause, and it saves unnecessary words. Furthermore, *amount due* is essentially a technical term in this context (similar to *amount financed* in line 12) and is likely to be understood as a single lexical unit.

**Discussion.**

We have seen that whiz-deletions are used in this plain English document to de-emphasize information, to promote sentence rhythm, to facilitate parsing and avoid ambiguity, and to omit needless words. Whiz-deletion is used similarly in almost all of the 35 other well-written documents (plain English and non-plain English) we looked at. Clearly, it is seen by good writers as a very useful device, especially for de-emphasizing information and for creating graceful (and often useful) sentence rhythms. Furthermore, its use conforms to the standard handbook maxim of avoiding wordiness (even *GDD* has such a maxim: "Avoid unnecessary words"). Therefore, we must conclude that *GDD*'s prescription to avoid whiz-deletions is simply unjustified.

A more accurate approach, judging from the evidence that we have cited, would be to treat so-called whiz-deletion as the standard choice of good writers in most circumstances, with the full whiz-construction being reserved for special conditions. A revised maxim might then look like this:

"Use whiz-deletions except when:

(1) the word that follows the whiz needs emphasis, or
(2) the whiz-words help create better sentence rhythm, or
(3) the whiz-words are needed to avoid ambiguity (particularly following desiderative verbs)."

Our sample analysis has shown, however, that contextual factors (textual, rhetorical, other) play a major role in deciding what constitutes emphasis and what constitutes ambiguity. Anyone using this maxim, therefore, should look closely at each instance of usage and not just apply the maxim blindly.

**Conclusion.**

We wish to conclude this paper by raising — and trying to answer — the following question: Why did the authors of *GDD,* who are well-known experts in document design, make the mistake of devising the guideline they did? We think that it is the result, ironically, of the very strategy which sets their book apart from others — namely, a desire to ground their principles in rigorous, process-oriented empirical research. Certainly, such a move was badly needed. The problem is that it was simply not enough. The research they drew on in this particular section of the book comes almost exclusively from the sentence-oriented psycholinguistic tradition of the 1960s and 1970s. For the most part, such research examines only isolated sentences; it seldom considers the effect of context or of nonlinguistic factors on sentence comprehension. Since readers under normal circumstances rely heavily on context, on world knowledge, and on other broad-based linguistic and nonlinguistic variables in interpreting written documents, guidelines for writers based only on psycholinguistic research are bound to be deficient.

Though we have focused our attention on just one of the 25 guidelines in *GDD,* we could have selected a number of others instead, with similar findings. The guideline to "Use the active voice," for example, is violated frequently in the documents we looked at — including the ten plain English ones. Likewise,

the prescription to "Write short sentences" is often ignored, as are other prescriptions like "Avoid nouns created from verbs" and "Unstring noun strings." And not only do good writers often ignore these oversimplified maxims, there are many scholarly papers explaining *why* they ignore them.[6] Such explanations, like those put forth in this paper, consider various contextual and rhetorical factors involved in the use of these linguistic forms, not just syntactic factors.

The plain English movement is making important contributions to public communication. The twelve case studies in *How Plain English Works for Business* are a testimonial to the general concept of the movement — and to those writers and editors who make it work. In all of these cases, large corporations have found that adapting their documents to the needs and abilities of their audiences has paid large dividends. But what exactly have the writers of these documents done to achieve such ends? One thing they have not done, judging from our research, is to simply employ the kinds of writer's maxims that the plain English movement has come to be known for. Rather, they seem to have followed many of the practices that good writers in general have followed over the years. If the plain English movement is to fulfill its pedagogical function and teach novice writers how to write comprehensible prose for the general public, it should look more closely at these general principles that all good writers employ. Otherwise, it will be seen as not preaching what it practices.

1. *GDD* provides two other example sentences, but neither is a good illustration of the maxim.

(1') a. We are detailing methods of computing unit costs and requirements for cost detail *which should be* submitted to support your proposed hourly rates.

b. We are detailing methods of computing unit costs and requirements for cost detail submitted to support your proposed hourly rates.

(1") a. This policy does not pay benefits to Park Police *who have been* kicked by horses.

b. This policy does not pay benefits to Park Police kicked by horses.

Sentence 1' is not a legitimate example of whiz-deletion because the modal *should* is not a form of the verb *to be*. Sentence 1" illustrates whiz-deletion but the resulting sentence is not ambiguous. The simple present tense of the main clause verb is not restricted to any particular time-frame (i.e. it is a "general truth"), and thus the inferred tense of the subordinate clause that it governs in (1"b) would also be broad in scope. The two most likely candidates for this role would be the present perfect, as in 1"b, or the simple present, as in (1"a') "This policy does not pay benefits to Park Police *who are* kicked by horses." Most readers, we believe, would not interpret (1"a) and 1"a') as differing significantly in meaning.

2. This ambiguous sentence was found in plain English promotional literature: "We want forms and documents written to be understood by real people."

3. Quirk et al., pp. 937-942.

4. Chomsky and Halle, *The Sound Patterns of English*

5. E.g., Frazier, L., and Fodor, J. D. (1978), "The Sausage Machine: A New Two-Stage Parsing Model," *Cognition 6,* 291-325. Wanner, E. (1980) "The ATN and the Sausage Machine: Which one is Baloney?" *Cognition 8,* 209-225.
6. See, for example Kaufer and Steinberg (1984), McNeill (1966), Walpole (1979), Ohmann (1979).

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# Computers for Composition: A Stage Model Approach to Helping

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*This paper is concerned with how computers can assist text composition. It is a review of what has been or is being done — particularly in the EPISTLE project at the Yorktown IBM Watson Research Center — and it is also a preview of what could be done in the future. The discussion is centered around a stage model of composition adapted from computer programming. The model's psychological validity, although credible, is secondary to the rather natural way it appears to organize possible computer function supporting composition. Some stages of this model clearly require powerful language technologies, and the stronger interest is clearly in these. Nevertheless, a number of functions are identified for other stages, which functions do not require extensive linguistic capability to implement or enhance. Throughout the paper there is a deliberate bias towards "practical" writing — writing whose fruits are of unquestioned value and whose authors receive monies undetermined by word counts or reviewers' praise. The notion of this type of writing — most frequent by far — is that the composition meets a requirement of business or social commerce, whether it is an interagency status report, product documentation, a step in the process of attempting to free a client, or a worded advertising fantasy designed to attract cash customers. The paper concludes with some consideration of specialized audiences for the various computer functions as well as the roles educators might play in promoting (or obstructing) their development.*

## A STAGE MODEL OF COMPOSITION

In this paper "composition" means a cohesive body of text expressed primarily in full grammatical constructions, with at least one primary communication objective, and usually embodied as a recognizable writing genre (such as a user manual, memorandum, or obituary). A composition is also the desired end product of the process of composition. While there are many important comments and observations on this activity (e.g., Flower 1981; Flower & Hayes 1980; Mathews & Stevenson 1976), there is certainly room for additional research, particularly as concerns detailed cognitive models. The idea of a "software-design" model applied to composing is one attractive possible extension.

The flavor of the software-design stage model is to identify a variety of stages for programming activities and to propose various tools and environ-



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ments to support each stage as well as the overall task (e.g., Yourdan & Constantine 1979; Orr 1977; Miller 1978). Although the stages are expressed as a linear sequence, a considerable amount of iteration among various stages is presumed throughout. Similarly, while the end-product appears to be better when all of the stages are passed through, in order, the model never purports to describe more than what some people do some of the time. A simplified form of the model is shown in Figure 1.[1] This simplified software development stage-model can be adapted almost directly to the process of composing by substituting some terms, as shown in Figure 2.

In stage 1 the problem to be solved by an eventual composition is considered and elaborated into a set of requirements which must pay at least some heed to the three primary rhetorical factors of audience (and speaker), topic, and communication purpose (e.g., Mills 1952). The additional rhetorical factor of the nature of construction of the actual message is not an aspect of this stage but of the next (or later).[2]

In stage 2 the initial decisions made for audience, topic, and pragmatic objectives are to be taken together to determine two emerging textual features: (1) the selection of the appropriate genre-format, and (2) the initial choice of style.[3] The first notion, genre-format, combines the selection of a particular writing genre (usually domain and intent specific — a "missive," a "persuasive argument") with a conventional schema for sequencing and emphasizing the parts thereof (a "business letter," a "court of appeals brief"). The second notion of style choice is taken here narrowly to mean the "strategy for communicating information," and it can operate both as a selector of genre-formats and as an organizer of material within a particular format.

1. Functional requirements
2. High-level design
3. Detailed design
4. Coding
5. Testing
6. Installation
7. Modification

Figure 1. Software production stage model

1. Communication requirements
2. High-level plan
3. Detailed plan
4. Scribing
5. Critiquing
6. Release
7. Adaption

Figure 2. Text composition stage model

The detailed structuring of a composition in stage 3 involves considerable fleshing out and elaborating facts, arguments, and themes — though still in pre-discourse form. Here more than elsewhere the items from unorganized lists ("points to make," "ground to cover," "essential information") get transferred into a detailed sequence, and the possibilities and necessities of coherence begin to become known.

If the process of composition is likened to a drama, then the theatrical climax would occur in the 4th stage, *scribing*. Up to this point, the planning and evaluation for composition could be quite similar to that for painting, writing music, or choreographing. Here, the words used as symbols for concepts of communication in extra-linguistic fashion now become actual text; the illocutionary intent is now instantiated as actual locution, capable now of that most dreaded of readers' acts — being quoted! No longer can a word or phrase merely stand for the intended sense, but *le mot juste* must be found; government, binding, and overall predication must be accomplished, with due consideration to all of the complexities of movement, raising, coordination, and agreement — and this just for a single sentence! How fearsome the choice then as inter-sentential organization must be achieved: here the strong marker of discourse structure ("First of all, . . ."), there the repeated theme by hint of lexical collocation (". . . the accident . . . the damage . . ."), and now the eschewing of anaphoric "he" for cataphoric ". . . these three:" Level after level must coordinate and cohere, topic to sentence, sentence to paragraph, paragraph to chapter — and all to each and every word. No wonder is it then that the slightest hesitation, the merest stickiness of fit, the briefest delay of word-finding all can bring such feverish (or labored) activity to an instant (or grudging) halt — to reconsider the last word, the format appropriateness, or even the whole stage 1 approach.

Such examinations of text, whether planned or forced, bring the process, however momentarily, into the 5th stage, *of critiquing*. Included are issues as mundane as the number of 'r's in "embarrass" or as complex as whether the main point is really being made. This stage is but a springboard, mostly, for revisiting previous stages. In particular, the visiting of the scribing stage after critiquing is called revision.[4]

The 6th stage, *release,* identifies the point at which the text leaves its maker and has an opportunity for a life of its own. Publishing of the text is one of the strongest forms of release (in several of its meanings!) although in general this occurs just whenever the text is truly "given away".

The last, the 7th stage, *adaptation,* refers to the modification of a document to reflect new requirements, new information to be included (updates), or error correction. The adaptation of previously released text almost always involves a new release of some sort — printing, copyright, or even published "errata." However, this stage is not an important aspect for the present focus.[5]

*Stages to be discussed*

The last two stages, while still important aspects of the composition process, go very far afield from the present topic of personal computer aids to writers. It's quite likely that the emerging Expert Systems technology could, some day, be

applied to these aspects, but that speculation is outside of this paper. The other stages are discussed roughly in terms of the extent to which computers presently support them. Thus, the fourth stage of scribing is discussed first, then stage 5 critiquing, and then stages 1-3.

## COMPUTERS AND SCRIBING

Computers have had the most obvious impact in the scribing stage — the actual generation of text within some medium. Clearly, the most important role has been played by the word-processor, the first topic in this section. However, the role of formatters is also extremely important, and, finally, there are surely some number of yet unthought-of useful scribing aids.

### Word-processors

Computer word-processors — and, lately, electronic typewriters with similar features — have revolutionized the process of business and technical writing. Perhaps the most glowing praise concerns not the actual transcription of words, but their editing — movement of text elements from one part to another, global changes, the location and modification of particular targets, and any of a host of other similar specialized functions (e.g., Sekuler 1985). These text-modification activities are still considered to be part of the scribing stage — particularly since they involve the computer editor; however, the thinking and evaluations that usually precede them are said to be of the following stage, critiquing.

The impact of computer word-processing on commercial scribing is all the more remarkable when it is considered that the computer software has no real idea of what the words mean or what the text is about. The functions operate on the notion of "token" — character strings delineated by blanks (or perhaps other special characters) — and the notion of "line record", a single line of the edited file as wide as permitted by the editor at that time. However, the editing capability provided by this primitive token analysis is quite adequate for most functions, and many users are not even aware that the editors do not share their view of word or sentence.[6]

It is not only the professional writers who have been influenced by this word-processor aspect of computers. There is also abundant evidence that word processing is welcomed eagerly by students in college and elsewhere, as the word-processing capability is introduced. There is a serious question for many, so we are told, whether they could ever write with pencil and paper again!

Computers used for the scribing phase are really inseparable from the question of the features available on the computer editor, and this has been an area of great interest to researchers, both from the standpoint of designing better editors (Miller & Thomas 1977; Embley & Nagy 1981; Roberts 1980) and from the point of view of editing as a psychological task (e.g., Card et al. 1976). The very large number of computer editors that are available — even from a single manufacturer — is indicative of the extent to which this area of the relation between computers and composition is being explored — and exploited.

## Formatting

With pencil and paper and older typewriter technologies the act of scribing also — simultaneously — involved the act of deciding how to format the text on the page: whether to center, skip a line, indent, etc., for the grosser non-alphabetic manipulations; and, for the text itself, whether to capitalize, underline, change colors, or even change fonts. Thus, if a word was to be centered, capitalized, and underlined (to serve as a topic heading, for example), then these activities co-occurred with the actual generation of the characters of that word and the positioning of them on the paper.

Nowadays, with word-processors, you can defer the actual formatting until a later time by embedding special formatting codes in your text in special ways, and then sometime later sending your text file with these codes to a special formatting program to produce hard-copy or soft which has the text formatted according to your specifications; some of the formatting languages are SCRIBE, WATERLOO SCRIPT, and IBM SCRIPTVS. And, around the corner, are so-called WYSIWYG editors (pronounced "wiz-ee-wig" for "What You See Is What You Get") in which your typed formatting code is immediately executed, so that the text is formatted directly without a subsequent step. Nevertheless, since formatting was traditionally an integral part of the scribing process, and since formatting considerations still are very much a part of scribing, in terms of the requirement to embed formatting codes within the text being scribed, this activity is discussed here — and not, as it might well be, as part of the critiquing process.

Formatting technology has been around for a long time but is recently undergoing some important pervasive changes. Publishers are very near to agreeing to a standard for "marking up" documents in terms of classifying the contents of a particular body of text with certain "tags" preceding (and often ending) the text. This standard is being called Standard Generalized Markup Language or *SGML*. Thus, there are tags which identify the beginning of a document title, a footnote, a chapter heading, or an index. There are also tags which identify any arbitrary phrase, within any arbitrary document section, as, say, a definition, a citation, or simply something to be highlighted. For example, the reference to ". . . or *SGML* . . ." above (and here) was typed exactly as follows:

```
or :cit. SGML:ecit.
```

such that the acronym SGML was surrounded by two tags, each beginning with a":" and ending with a "." — the tag itself being "cit" for citation. Similarly, the first three numbered lines of Figure 1 were produced by the following set of formatting control tags embedded with the text:

```
:ol.
:li.Functional requirements
:li.High-level design
:li.Detailed design
```

The :ol. tag indicates that an ordered (numbered) list is to be started, and the :li. tag indicate "list-items" to be put one under another and numbered con-

secutively (see the IBM manual on the Generalized Markup Language, 1984).

These tags have two important advantages over first-generation formatting control words. First, they are nouns rather than verbs: they describe the nature of the text contained rather than specify what particular line-skipping, indenting, or other actions should take place. Thus, in the older IBM formatting language of SCRIPT, the control word .sk could be used to skip a line and start a new paragraph, without indentation; in the newer GML tag language, :p. is used instead. This symbol means that "the following is a new paragraph," but the actual interpretation is not specified by the author but by conventions observed at the local installation. In some situations, then, :p. could be interpreted as "skip a line and don't indent"; in another situation it could mean "skip and indent five spaces"; and in still a third — a publisher of children's stories, say — it could lead to that stylistic ballooning or enlarging of the first letter of the first new paragraph word. The author is therefore freed from having to think about ultimate formatting arrangements (see Misek-Falkoff 1983, for detailed discussion of these points).

A second advantage of the use of "noun" tags is that these descriptors can imply formatting manipulations far more numerous and complex than simply skipping a line and indenting. For example, ordered list items don't have to be numbered by the author; they are simply typed in with the :li. tag and can be re-ordered or otherwise manipulated, and the formatter will number them automatically. Similarly a large complex document with multiply embedded, and numbered, sections (e.g., "1.0 2.0 2.1, 2.11, 2.12, 2.121, 2.1211, . . .") can be outlined using certain heading tags which do not force the author to think about numbering or other matters at all;[7] when formatted, the headings are not only numbered correctly, but the text associated with the heading is also printed in the locally-preferred combinations of font-styles, font-sizes, and bold-face vs. plain.

The tags therefore provide means for freeing the user from thinking about how to format documents while generating the text, and there are many new schemes for simplifying the learning and use of such tags. The tags could also be considered to be structural landmarks in the text, and they might well assist authors by providing cues concerning the organization of the document. In fact, authors might even use tags — particularly heading tags — to outline a part of the document first and then fill in the section with text. As is discussed in the later section on planning, this idea is extended to provide for the computer to produce fully formed outlines for the author to follow, based upon the author's selection of a particular genre.

### Additional aids

There are extraordinary opportunities for clever programmers, on the one hand, and educators with a feeling for exploiting computer technology, on the other, to recognize and act on the possibilities for new computer function for the scribing process. Below are a list of a few ideas (which can be found in some existing software in some cases):

**Expanders.** These can make it easier for people to refer to long or complicated phrases or character expressions as they work along, via short strings: thus .ibm., when entered, might cause the system to expand and enter the string to be "International Business Machines Corporation."

**Phras-ers.** This is the idea of breaking text into smaller meaningful units. If a person entered several sentences at one time, the code could intercept the keyboard input, find the ends of sentences, and put each sentence on a separate line. This code might also break sentences into various kinds of phrases, using simple phrase-finding algorithms, such that the subject of a sentence was on one line, the verb elements on another, and the direct object information on a third. These types of text separations might help an author see non-felicitous constructions or word-choices, or it might help in evaluating sentence complexity.

**Revision marking.** When portions of a text have been changed in a session (or previously), the altered sections could be indicated by changes in displayed color, margin indicators, or italics, etc. This might well assist an author in picking up the thread of a paper being worked on, and it could provide a useful record of editing activities.

**On-line dictionaries.** Many authors interrupt their writing to look up a word, to check its meaning or to discover a synonym or other type of substitute. It would be very nice to be able to access a dictionary just by putting the cursor on a word in the text and pressing some function key to have the definition appear on the screen.

**On-line text/data retrieval.** How often it happens (at least to this author) that in the midst of writing something one realizes one needs a name, or some piece of data, or some other example text to look at (and copy). How nice it would be, then, to be able to open, say, another window on the screen, peruse various other files until one finds what one needs, and then — presto — push the right buttons and have that information transferred into one's working file.

**Speech input/output.** Perhaps continuous speech recognizers won't be available for some while yet, but even small vocabulary isolated word recognizers would be very useful as input devices for text-editing commands and formatting controls. On the output side, thinking how useful it is often to read one's paper out loud, or to have it read to one, a high quality voice synthesized speech reading of one's text might be very nice.

## COMPUTERS AND CRITIQUING

The second stage of composition that computers have entered extensively is that of critiquing, the stage following scribing. It is in this area, for the first time, that linguistic notions begin to be introduced into the computer software. While the degree of critiquing function that is now operational is quite broad, the possibilities are even greater, as indicated in the following section.

### The space of possible critiques

The act of critiquing involves the examination of something relative to a set of standards followed by a part of the findings. In order to appreciate the rather vast possibilities of critiquing for compositions, five distinctions can be made: (1) the examination text-unit, (2) the report text-unit, (3) the critique type, (4) the strength of the critique report, and (5) the linguistic perspective of the critique. The levels of text we find generally useful to identify are: character, morpheme, word, token, phrase, clause, sentence, paragraph, section and document. A morpheme might occur as a stand-alone syllable in the text if, for example, words were hyphenated at the ends of lines; a token may be a word alone or a word combined with punctuation or other non-alphabetical characters (e.g., "and/or"), or it may be a word combined with a special formatting code, like the markup tags (e.g., ":cit.SGML:ecit."); clauses are identified as such only when there is more than one of them in a sentence; a section is a major portion of a document — like chapters in a book — and a document is the entire composition, however long, whatever the genre.

The examination text-unit refers to the unit of text which is examined for the presence of some target. If the critique is that of spelling-checking, then the examination text-unit is a word; if the critique is to determine whether numbers were used (instead of spelling quantities out in words) the unit is a character.

The report text-unit is the unit at which the critique report is made, and this unit is either the same as the examination unit or else larger. An example of the latter instance is when a text is critiqued for low frequency words (examination-unit = word) and the results are summarized on a paragraph basis (report-unit = paragraph), e.g.: "This paragraphs contains the following low frequency words . . .." Situations in which the report text-unit is larger than the examination text-unit are called aggregate critiquing.

The third distinction, critique type, refers to the manner in which the critique is made, and the two options are isolated vs. relative. In an isolated critique a particular examination-unit is compared against a standard, and the judgment can be rendered without taking into account the characteristics of that unit relative to other units. Thus, checking for spelling errors, incorrect capitalization, overly-long sentences, etc., all involve an isolated critique. In contrast, a relative critique checks the characteristics of one text-unit (having certain features) against the characteristics of another text-unit (having different features); the logic of the comparison is along the lines of "if the first unit has an aspect X, then the second unit must have an aspect Y." Most ungrammaticalities, such as disagreement in number between subject and verb, involve such a relative type of critique.

The fourth distinction concerns critique strength for which there are also two possibilities: right-wrong vs. threshold. A right-wrong judgment is one in which one can say "Right!" or "Wrong!" without fear of contradiction (from experts), as in the case of the majority of grammatical errors. Thus, "two apple" and "He aren't" are just plain wrong. On the other hand questions of

style are not only matters of taste but also the province of the organizational enterprise authorizing the composition; one must be very careful in critiquing these things, since observations like "the sentence is very long" or "the structure is not parallel" aren't sufficient for strong criticism in themselves. Stylistic problems must typically needs be reported with some deference and sensitivity to the fact that the author and critiquer may not share the same standards. One means of systematically handling the problem of varying stylistic standards is to arrange to have each stylistic evaluation result in the computation of a single number whose value grows with the severity of that particular gaffe; this value can then be compared against the threshold for a particular enterprise, and, if it exceeds that threshold, a suitable commentary is provided.

The fifth factor, the linguistic perspective, invokes the system of semiotic theory (cf. Morris 1946), which identifies three levels of linguistic consideration: syntactic, semantic, and pragmatic.

Such a large multi-dimensional critique space is rather unwieldy in practice, especially since the development of language technologies is really in its infancy. Accordingly, we have organized the EPISTLE critiquing function into three types: word, grammar, and style. Word level critiquing now includes consideration of syntactic problems (misspellings) and someday will be extended to semantic problems (e.g., inappropriate word-choices — using "infer" where "imply is intended). Grammar critiquing focuses on sentence-level phenomena, and style can be discussed from the word-level up through the whole document.

### Word critiquing

The most prolific area of critiquing is that of words, especially for detecting errors in spelling. Recently, some linguistic competence has been introduced into the computer software, in the form of some knowledge about "words" — although this knowledge may be quite primitive and consist only of a list of character strings: anything found to be on the list is considered to be a word; anything not found on the list is a spelling "error." Despite the low level of linguistic knowledge about words possessed by computer spell-checkers, there are some remarkable successes, and the function delivered is surely valuable (e.g., Durham et. al. 1983; Pollock & Zamora 1984). The function has been augmented in other products, including IBM's PROOF product, to include detection of awkward phrases and the capability to suggest synonyms (e.g., Leerburger 1981; IBM 1983).

The most extensive dictionary capability function appears to be that provided by the IBM Yorktown Watson Research Center's experimental EPISTLE system, whose on-line dictionary provides strings of syntactic and semantic features, for use by the grammar component, for some 130K words (cf. Byrd 1983, 1984; Byrd and McCord 1985).[8] Perhaps half again as many words are recognizable by use of the extensive capability of this system to analyze an unknown word into and deduce its part of speech and other characteristics (so-called "inflectional and derivational morphology").

Word critiques which involve reporting of word problems at the sentence level include (1) incorrect spellings, (2) non-preferred spellings, (3) incorrect abbreviations, and (4) incorrect capitalization (e.g., "dr."). These four sentence-level critiques are also critiques which are triggered by the simple presence of the problem — occurrence-level targets. A sentence-level examination critique involving an aggregate-level report is (5) one which checks for repetitions of substantive words in the same sentence (e.g., "The cool light was cool on my face.").

Other possibilities for word-critiquing at the discourse level include five main classes: (1) observations on the relative frequency of word usage from various types of dictionary sources, (2) observations on tonal features of the words, (3) detection of hackneyed words or phrases, (4) detection of incorrect or inappropriate word usage, and (5) comments on relatively subtle changes in usage of words, particularly the same words, from one part of the text to another. The first two categories involve aggregate reports on the text, still at the sentence level of detection; the remaining three categories involve occurrence reporting at the sentence, sentence, and discourse levels, respectively. Categories (4) and (5), in particular, require much more extensive linguistic processing than the simple dictionary look-up of the first three.

The type of word-critiquing provided by (1) above would inform authors how many words in their composition came from "everyday" vocabularies, technical jargon lexicons, or — heaven forbid — special term glossaries. That of (2) would reflect the overall "tone" of the document in terms of such features as formal vs. informal, or colloquial/regional/slang, or neutral vs. evaluative, or friendly vs. unfriendly.[9] A report might indicate that the text, although quite informal overall, did contain several areas where excessively formal words were used. Category (3) involves the search for overused, cliche-type expressions which are more or less "fixed." For example, in the clause "We deem it advisable . . .," the key worn-out words are those in italics; one would hope to identify them no matter what variations of other words in and around them were made.[10] All three of these types of word critiquing are planned for the EPISTLE system.

While the first three types could be along quite well with relatively simple dictionaries and little further linguistic processing capability, the last two would require not only syntactic analysis of the text, but also very capable semantic processing. What is envisioned is the capability to provide the following types of diagnostics: "You probably meant to use the word <'infer'> here instead of <'imply'>" (class 4); "This word <WORD> simply doesn't make sense here" (class 4); "You are using the word <WORD> in two different senses in the same context" (class 5); or "Your use of the word <WORD> here implies one thing, but the use of the word <WORD> in the next sentence implies something very different" (class 5). Word usage critiquing of this type is well beyond the capability of any existing system.

## Grammar critiquing

The notion of grammaticality is almost entirely restricted to a sentence unit. One doesn't have "ungrammatical" words — only words that are misspelled, oddly spelled, or, morphologically speaking, strangely formed. Similarly, paragraphs are text sections that may be called contentless, poorly organized, or highly redundant, but they are not deemed to be grammatically incorrect. The major class of sentence ungrammaticalities is that involving agreement — agreement in number, person, gender, and case. While English is one of the least inflected of languages, there are still a number of opportunities for grammatical disagreements.[11]

The detection of failures of agreements and other ungrammaticalities in a sentence requires that the sentence be "parsed" according to the grammatical rules of the language, resulting in a description of the syntactic structure of the sentence. This description must not only tell about what modifies what in the sentence, but also about the grammatical roles played by different parts — e.g., the subject, the main verb, the direct object. Parsing quality can be judged in two ways, both related to the adequacy of the syntactic descriptions. First, the modification structure can be judged as to its accuracy, the most important aspect being "were the words in the sentence assigned the correct parts of speech?" For example, the sentence (1)

(1) Time flies like an arrow

can be understood quite easily in the sense of (2)

(2) This airplane flies like a rocket

fairly easily in the sense of (3)

(3) The fruit flies do like an apple when they can get it

or with some difficulty in the non-obvious but still acceptable sense of (4)

(4) Please time the athletes in the manner of an Olympic judge

In the sense of (2) the word "time" is used as a noun; in the sense of (3) it is used as an adjective; and in the sense of (4) it is used as an imperative verb. For this example all three readings are possible, and the "correct" one is decidable only from other information. In these cases of true constituent ambiguity the structural descriptions provided by the parser will differ greatly; the follow-on processes which use these descriptions — critiquing, for example — will also vary widely. Thus, without complete understanding of the whole text, it is possible to make a reasonable misunderstanding of a single sentence.

Other problems involve the notion of "attachment." For example, in (5)

(5) I saw the man in the street

the prepositional phrase PP "in the street" either could specify which man or it could refer to the location where the "seeing" action took place. Therefore, the PP could be attached to either the noun phrase, NP, or the verb phrase, VP; in this example either could be argued. The question, though, is the general trend of attachments over a large number of parses: what is the safest course, and what are the various consequences? The IBM EPISTLE grammar approach, in the first version called here EPISTLE-1,[12] was to attach PPs to higher-level VPs

rather than nearby NPs — unless other local information indicated otherwise (e.g., PPs with the preposition "of" were often attached to the immediately preceding NP). This approach, while not necessarily more correct in the long run than some other similar decision did have the consequence of "raising" these phrases in the parse tree, making them more easily examined. This kind of bias would lead to a certainly correct attachment of the PP for (6),

(6) I saw the man through the binoculars

a possibly correct attachment for (7)

(7) I saw the man with the binoculars

and a probably incorrect attachment for (8)

(8) I saw the man with the raincoat.

The second general way in which parser/grammars can be evaluated is by the accuracy with which they determine the grammatical function of various components of the sentence. Thus, an adequate parser in this sense would identify "John" as the "real" or so-called "deep" subject of (9) and (10) despite variations in the surface subject:

(9) John hit the ball

(10) The ball was hit by John

A functionally-accurate parser would also correctly identify the indirect objects in (11)-(14) as "him," "her," "whom," and "who" respectively:

(11) She gave him the book

(12) He gave the book to her

(13) To whom did she give the book?

(14) Who did he give the book to?

In addition to quality or accuracy, parsers can be judged also on their "robustness" in the face of ill-formed input text: does the parser wade through "noisy" errors and come up with something; or does it throw up its virtual hands and come to a screeching halt at the slightest difficulty? And, in particular, what does the parser do with sentence fragments? For these problems the original bottom-up EPISTLE-1 parser is also quite satisfactory, having several different strategies for handling — and surviving — problematic text, including unrecognized words, sentence fragments, sentence run-ons, ungrammaticalities, and the grammatically correct but troublesome instances of sentences with multiple legitimate (and illegitimate) parses (cf. Miller 1982a; Jensen & Heidorn 1982; Jensen et al. 1984). For the new top-down version of the EPISTLE parser now being implemented, called here EPISTLE-2,[13] there was initial concern that it would be quite difficult to use it for describing the partial and excess structures of sentence fragments and run-ons, respectively. However, it now appears that the same grammar can be used to accomplish these identifications with no re-parsing.[14]

Given that one has a parser, then — and there may be several available — the interesting question from the point of view of composition is the extent to which the parser can be used to supply grammaticality information about the

text to the author. So far as we know, the IBM EPISTLE-1 prototype is the only one providing such function, and it provides for detection of 27 specific classes of errors, shown in Figure 3.

While the performance of the grammar can be enhanced, there is really not that much more that can be added to this set of grammatical critiquing targets. The practical problems remaining concern: (1) improvement in grammar performance,[15] (2) extension of the grammar-checking capability to new text domains involving different sublanguages and grammatical conventions, and (3) development of grammar components for other languages.

### Style critiquing

In the critiquing of style we leave the firm safe shores of grammar absolute and push out to the seas of relativity: "This is perhaps awkward here"; "If your point is thus and so then it doesn't really come across"; "Do you really mean to say that?"; "Must you include this section?"; "I don't understand you here." Where there is more or less one single burning flame of grammatical correctness, there are hundreds of flickering candles of style, each attesting to the eternal truth of *"chacun a son gout"!*

Style is in the eye of the beholder; more precisely, style is the expression of an author's strategy for communicating information. For the texts of commerce, authors don't have to worry much about coming up with these strategies; their enterprise, their communication medium, and their field all act together to provide more or less explicit guides for style (as discussed in detail in the next section). Even more available is the capability to detect deviations from the "good" style of an author's place of business: either there's a "style handbook" lying around or else there's always an eager old hand who's quite willing to point out the numerous flaws of the stuff of the newcomer who has yet to learn the ropes about "how we write things around here."

Many people have initially denied the truth of this assertion, but, upon questioning, they all have had to concede that, yes, for every type of business or technical writing they did, they were either following the dictates of some crusty mental guide or else they could recall who or what was their source for good style when they had questions. For example, a business person will respond to a memorandum with a reply containing the same format, fields, and breadth of content; the quarterly sales report will be stylistically identical to that of the previous quarter; the notes to colleagues, the "instructions in my absence," the technical review, and the personnel appraisal all similarly will reflect thoroughly the accepted stylistics of that environment. Thus, if the first point made about style was variability, then the second point is quality control! Each enterprise sets the standards — as it sees fit — for controlling the form and conformity of each type of writing output. For better or worse, each contributor to the writing flow has to internalize these standards.

The contribution of computer software to this situation is the capability to provide each author a private forewarning of stylistic criticisms that might be delivered later from human agents. The computer critiques can be a much more agreeable situation, particularly when suggestions and explanations are

1. Subject-verb number disagreement ("The leaves falls")
2. Noun-premodifier number disagreement ("Each valves . . .")
3. Subject-complement number disagreement ("This is the books")
4. Subject-verb person disagreement ("I likes to eat")
5. Confusion of "it's" and "its" (It's nose is dirty")
6. Wrong pronoun in predicate nominative ("The right person is her")
7. Wrong pronoun in object position ("Between you and I, it's a cinch")
8. Wrong pronoun as indirect object ("I will give they the book")
9. Confusion of "who's" and "whose" ("Who's side are you on?"
10. Confusion of possessive 's and plural s ("Few pet's are lonely")
11. Confusion of semicolon and comma ("Please buy coffee; milk; and eggs")
12. Conjoined verb number disagreement ("The sand both glitters and choke")
13. Incorrect double modals ("'He should ought to go")
14. Existential "there" number disagreement ("There's five apples here")
15. Improper form of the infinitive ("He wants to won")
16. Improper form of the verb ("She broked my heart")
17. Missing obligatory commas ("He decided I think on the plan")
18. Missing obligatory hyphens ("I have a yet to be satisfied request")
19. Missing an obligatory question mark ("What is your name.")
20. Mismatching correlative conjunctions ("You are neither happy or sad")
21. Mismatch of the number of a noun phrase and its relative clause ("I saw the man who are here")
23. Sentence fragment or "non-sentence" ("Also my tires")
24. Unbalanced comma ("My manager, Mr. Hendrix told me about you")
25. Unmatched pronouns ("Him and I are going")
26. Use of wrong indefinite article ("I ate a apple and an pear")
27. Use of "of" for "have" ("I could of danced all night!")

Figure 3. Grammaticality critiques

given for each detected violation — as they are, with adjustable levels of detail, in the EPISTLE-1 system. For example, were a person to have typed the sentence (15)

(15) Between you and I, I am sure she will succeed.

the system, when asked to critique, would first underline the word "I" in red (the usual editing display is green text on a black background). If the person pressed the appropriate HELP button, a box within the text-editing screen would open up and a two-part (colored, reverse-video) message would appear saying: (1) Wrong pronoun in object position (prussian blue); (2) me (aqua marine; this strategy of (1) classifying the problem, and (2) suggesting something to do about it is followed for all three types of critiquing in the system). But then, a second press of the HELP button produces an extension of the message, a 20-60 word explanation of the tense classification; and a third press produces a detailed tutorial on the general topic involved, from half a page to

three full pages in length. Thus, the author can not only locate each problem but can obtain replacement suggestions and increasingly detailed explanatory information in every case.

If such critiquing can help the peace of mind of the writer — and actually promote better writing skills — this is certainly of benefit to the enterprise, from the point of view of the satisfaction and competence of its employees. But, setting personnel concerns aside, such capability can provide the enterprise even more direct and tangible benefits by assuring that its written output is of constant high quality, according to its own dictates. Thus, at least proposals won't get dismissed because of poor grammar or awkward style, a newspaper will avoid being a laughing-stock because of a misspelling or tortured expression, a publisher's reputation for quality won't be smirched by missed "the . . . the"s (at the end of one line and the beginning of the next), and a manufacturer can have confidence that his assembly instructions are readable.

Where there are only a few dozen grammatical error possibilities at most, the number of stylistic targets — per individual enterprise — can easily be in the hundreds, and each major commercial area (e.g., education, legal, manufacturing, etc.) may have thousands, with only a few of these overlapping other areas. For example, the stylistics of legal writing are considerably different from all other types, but within this area, the specifics will vary greatly from one state of the union to the next, and even from one federal government agency to the next.

The consequence of this great diversity of styles is that a system purporting to provide maximally useful stylistic critiques must have been customized to the major commercial area, to the major subdivisions within that area, to the requirements of individual enterprises within these subdivisions, and even to departments within enterprises. We would further hold that every individual user must have some control over the stylistic targets — either to turn them on or off or to adjust their level of sensitivity.

*EPISTLE-1 sentence-level style critiques*

Many of the prototype's critiques are of the threshold type, in that the "strength" of the problem is computed on an increasing numerical scale, and this strength is compared to some threshold value; when the strength exceeds the threshold, the critique is voiced; when the threshold is not exceeded the system can quite sensibly keep its "mouth shut." These critiques, as well as the ones that are based on the direct occurrence of a pattern of present/absent symptoms, are far from being simplistic, in that the context is examined carefully before criticism — the same construction might be quite acceptable in one context but simply awful in another; the style critiques attempt such sophisticated discrimination.[16]

Almost the sole information source for the stylistic computations is the annotated parse tree which is output by the grammar component. This tree details the syntactic structure of the surface sentence, assigning grammatical roles to some elements (e.g., subject, direct object), providing information on all of the inflectional aspects and giving the semantic features associated with

each text unit. The stylistic rules interrogate this tree, measuring it, counting aspects, comparing and contrasting, and develop the specific features needed for each critique target. Thus, the style component performs no additional general processing of the sentence or its parse-tree representation; measurements are obtained according to specific target descriptions directly from the tree.

The nature of the stylistic processing means that once the parse-tree has been obtained, the hard part is over; the rest derives from examination of that tree. The implication of this approach for obtaining new style targets is that it will be a relatively easy thing to accomplish — as long as the features that reveal the targets are derivable from the tree. Thus, we anticipate that it will be a relatively straight-forward matter for a specialist to implement new capabilities.

The source of most of the stylistic critique targets presently implemented is the general consensus that exists concerning "good" and "bad" style (see references in Miller 1982b). These will probably be of interest no matter what the details are of a particular enterprise or a user within that enterprise. However, each enterprise will have many specific "bad-style" targets, not included in the general set, and these will have to be custom developed. We estimate that perhaps 70% of an enterprise's special targets can be implemented to a reasonable degree by using information from a parse tree. The remainder (e.g., "Does each topic logically flow?", "Is it well organized?", "Is it informative and precise?") will be impossible to implement at the present time, because of two problems: (1) the critique requires complete semantic interpretation of the sentence, probably involving knowledge-based inferencing, and (2) the critique requires interpretation of large chunks of text, more than one sentence at a time — so-called discourse-level analyses. In Figure 4 are listed a sample of the 106 different style critiques presently implemented as EPISTLE-1 system function. Note that some punctuation errors are included; many such errors will rely on very extensive semantics for their detection and will not be achieved for some time.

1. Sentence too long (or paragraph, procedure step, or heading)
2. Sentence is not parallel
3. Too many nouns modifying the head noun
4. Too many consecutive prepositional phrases
5. Commas might be missing around non-restrictive modification
6. Preposition and participial are too far apart
7. Incomplete verb construction
8. Incorrect use of "like" as a subordinator
9. Incorrect use of comma as a complementizer
10. Possible excessive use of "and"
11. Incorrect comma between conjoined phrases
12. Possible excessive use of negation
13. Too many hedges/concessions
14. Overused phrase

Figure 4. A sample of EPISTLE-1 style critiques

The difficulty of writing these very general style critiques was compounded greatly by the requirement that the criticisms be reasonable over a wide variety of texts and authors, from college to the military, and from student to chief editor. We expect that it will be relatively easy to develop new critiques for a particular enterprise, especially one that is extremely "picky" and precise about its style criteria (such as a publisher).

*Aggregate Style Critiquing*

There are at present very few examples in EPISTLE-1 of this type of critique target, primarily because the others were more challenging and pressing to develop. We will include in EPISTLE-2, however, a number of aggregate critiques, summarized over larger text units of the document. For larger documents especially, we envision one form of the output of aggregate reports as being a kind of graph, with the horizontal axis marking off chapters, sections within each chapter, paragraphs within each section, etc. For one or more of these text units them, frequency or percentage information on the following kinds of targets could be provided (the list is meant to be illustrative and is not exhaustive of the reasonable possibilities):

- Information Density
  - Words
  - Sentences
  - Facts[17]
  - References[18]
  - Specialized document entities[19]
- Word Features
  - Tonal aspects (formal, colloquial, etc.)
  - Use of rare or archaic words
  - Use of jargon or technical terms
  - Use of abbreviations or acronyms
- Sentence Features
  - Type (declarative et al.)
  - Voice (active vs. passive)
  - Complexity (simple, compound, et al.)
  - Readability

*Discourse-level critiquing*

The real aspects one wants to check in a document have to do with how effective it is in achieving its goals. Sentence-level style and diction are important, of course, but they do not begin to assess the quality of the overall document. At the discourse-level one certainly is interested in at least the following: Specific content, organization, coherence, relevance to topic, information-value, clarity. None of these can be assessed by computer software at the present time. And one pales at the thought of how much science and art have yet to be invented to make computer critiquing of this kind possible.

There is one possibility, however, for making some headway sooner, if authors will agree to some extra work. The idea is to use the tagging approach, discussed in the section on scribing and formatting, for authors to annotate their running text in terms of the rhetorical functions it is intended to achieve. The following is an imagined list of what a few of these tags might be:

:kprop. Key proposition or argument to be supported

:prem. Premise or assumption

:contx. Background or context of discussion

:tstruc refid=T1. Topic structure to be introduced, e.g., a set of 6 items to be discussed in turn; an element of this structure may refer back to this by using the reference identifier "T1."

:next ref=T1. Next item in the list spelled out by the topic structure identified as "T1."

Were an enriched and more carefully developed set of such tags developed, the analysis capability of, say, EPISTLE-2, would make it much more feasible to evaluate the free text enclosed by the tags in terms of the criteria listed above. It is not at all clear, however, whether authors could be so analytical as to identify the rhetorical functions of each text segment, nor whether they would tolerate having to use tags even if they knew. The point is that a compromise such as this does move forward the functional capability to do discourse-level critiquing — to perhaps just a few years away rather than a decade or more.

*Format critiquing*

A final type of critiquing concerns how the words are arranged on the paper (or computer screen), relative to how they should be arranged according to the writing-genre employed and the local customs. For example, it may be the policy of an enterprise for the title page of all technical reports to have a security classification as a running bottom margin item, report title centered ⅓ down from the top, the author's name followed by two blank lines and the address, etc.

The format critiquer should verify that all these formatting standards are met, first by identifying what type of document is being written, and then by checking the document against each of the standards. Since authors may not identify the document as being a memo, a report, a letter, or whatever, the system will have to have the capability to infer the genre — either from the embedded tags (if the source file is submitted for critiquing) or from the arrangement of blank space on the page (if the formatted file is submitted).

There's not much help in this area yet, but the requirements are clear, and implementation really depends more on standardization of document types and tags than upon the invention of new algorithms.

## Commercially available systems

There are several commercially available systems which do provide some level of text-critiquing function. Perhaps the most well known of these is *Writer's Workbench,* which is marketed by Western Electric (cf. Cherry et al. 1983). The

program essentially comprises four functional components: proofreading (spelling, punctuation, wordy phrases), style analysis (sentence length listing, distribution of sentences by type and complexity, sentence voice), information (English tutorials), and utilities (personalized dictionaries, new style standards). An extensive review of this product's function and performance is provided in Seybold Report (Seybold 1984); this report also reviews imitations of Workbench, the EPISTLE-1 system, and a number of other similar products.

The advantages of these products is that they are available now at rather reasonable costs, and they usually can be run on a stand-alone personal computer. The disadvantages may be that the function provided is necessarily limited by the size and development of the underlying language technologies — (1) the dictionary and (2) the parser and grammar; in most cases the dictionary contains only a few hundred function words, and the "parsing" is pretty much probabilistic guesses at parts-of-speech and identification of phrases — but nothing like a detailed description of the hierarchical syntactic structures.

In addition to the above limitations, there is no provision in existing commercial systems for accomplishing any semantic processing or knowledge-checking. Such capabilities not only will probably require large storage (a megabyte does not seem unreasonable), but also this type of processing can be quite involved and can occupy large amounts of CPU time. Extensions of function into these areas will most likely await the availability of much much faster and larger personal computers.

## COMPUTERS AND THE REMAINING COMPOSITION STAGES

Whereas the previous discussions of scribing and critiquing have largely been focussed on actual software systems, the discussion of the remaining stages is largely speculative: systems to accomplish most of the described function have not yet been built. Nevertheless, the development of computer support for the first three stages would appear to be a somewhat easier task than, certainly, the development of large on-line dictionaries and parsers.

### Computers and communication requirements (stage 1)

The key problem in this stage is determining what goals the text should meet; before these goals are firmly established there should be, ideally, no consideration at all of how the goals are actually going to be met. This phase actually occurs with familiar regularity in large text projects, particularly commercial ones. Thus, a book publisher will go through this phase in considering development of new titles, reference publishers will do so in considering the merits of issuing a new collegiate or learner's dictionary or junior encyclopedia, and technical journal editors will do so in thinking of a special issue on a particular topic. In all of these cases there will be careful consideration of the communication goals, the expected audience, the potential delivery media, the specific content to be covered, the various contexts to be related to, and all sorts

of incidentals like who is it that has to be flattered by all this, and what are the possible details of schedule, pricing, resources, and follow-on needs.

But what of the lowly interoffice memo, a weekly paper in English Comp, or an outraged complaint letter? Is the communication requirements phase truly a useful aspect of these much more minor pieces? Since these all still have rich structure and pragmatics, the answer must be, yes. However, whereas the really big projects often have access to detailed guidelines for determining functional requirements, these are much less available for the genres in which the output is so much smaller and tidier. Ironically, it is these smaller genres, and not the larger, which have received some initial computerized support, albeit highly formulaic (cf. Schwartz and Bridwell 1984). One of these, WANDAH (Writing Aid and Author's Helper; cf. Von Blum and Cohen 1983), provides this component in the context of several other aids, including a text editor. An advantage of such programs is, of course, that one can begin to see the potential for true support of composition throughout the whole process. The difficulty is that these programs have no way of determining whether students' responses to their prompts are in any way reasonable — or even relevant.

Ideally, computer support of this phase would involve three aspects. First, the computer would present the would-be author with a set of "considerata" to reflect upon and respond to. These would be derived from, and ordered in accordance with, a detailed psychological model of this very early stage of composition. Second, the computer would assess the quality (detail, clarity, relevance, etc.) of the author's response to the "considerata"; were the quality insufficient, the computer could provide feedback (e.g., prompt, chide, fret, or bully). Third, and by far the most difficult, the computer could assess the product of later stages of composition in terms of how well they implemented the requirements; detection of incompleteness or contradiction could trigger bringing the author back to consider again the functional goals set forth way back when, to resolve the discrepancies. None of these three things is likely to happen for a while, since there's nowhere near the necessary and proven cognitive theory to support such work. Even if the theory were available, there's hardly a clue how to achieve implementations of this kind.

### Computers and high-level planning (stage 2)

In this stage the author leaves consideration of what should be achieved and ponders the how of it. For example, suppose the communication requirement is mainly to get back at some agent of commerce who refused to replace or credit a defective piece of merchandise. It's not at all certain that the communication action must involve a letter to someone in that enterprise; perhaps, instead, an ad should be taken in the *Times* decrying the action; or perhaps a telegram should be sent to a friendly and influential senator. The decision to be taken at this stage is to to develop a broad general approach to the problem, after considering a broad set of different approach concepts. If everything that one has thought about in this stage is but a slight shade off from one another, then likely one has not pondered long — nor "High" — enough.

If there is doubt about being able to support the prior stage with computers, there is at least as much uncertainty about it for this stage. What is really at stake here is the act of developing an effective overall plan of action from a set of goals. What is needed is a pragmatic handbook which gives details of procedure, and evidence of success, for the cornucopia of possible communication plans and approaches matched to goals. Were this guide available, it could most certainly be converted for on-line use. Less certain, of course, is the extent to which authors' communication requirements statements can be evaluated against subsequent plans to accomplish the stated goals.

Barring such a handbook, there's not very much that can be computer-implemented at this point except for very general open-loop guides. There are in fact several software packages of this sort which are inteded to help the writer develop a working plan which moves easily into the actual scribing task (see Seybold 1984; Schwartz and Bridwell 1984; Nancarrow, Ross, and Bridwell 1982; Dalgish 1984). Two limitations with these programs are that they are (1) very general and undifferentiated with respect to specific writing topics, and (2) they have no way of evaluating the students' input.

**Computers and detailed planning (stage 3)**

At this point the author has narrowed the possible approaches to a single major one and now must ponder the details: e.g., "A letter, surely, but how phrased? . . . and could I be sued for libel?" Since computer support of design has been adequately reviewed in the previous section, and since no one else seems to differentiate between high and detailed design, what is given here is a proposal for providing rather strong and closed-loop detailed design support in a manner which moves quite easily into the following stage of scribing (and even critiquing).

In the absence of data to the contrary, it is useful to presume that one of the key decisions of the high-level design was to decide upon the major type of communication genre to be employed. That is, you know roughly whether you have to write a report, a letter, a legal document, a journalistic article, or a fictional story. The essence of the present proposal is to have the computer provide you with a way to narrow down the broad set of choices that still remain until you have chosen a quite specific document genre, and then to be able to tell you all the details of the pragmatics of this document so that you can start adapting it to your particular needs.

The first key element is the detailed classification of genres within an area, organized in such a way that writers can find their way to a specific sub-genre which will meet their needs. Considerable thought was given to an approach towards classifying major genre areas to minimize overlap and to reflect human pragmatics strongly, and the choice was to partition major genre branches according to the major social institutions: law, medicine, education, military, the press, government, commerce, etc. Two of these branches, law and the press, were chosen to be developed, to get some feeling for the proposal.[20]

The first task was to develop a workable taxonomy of writing genres within each field, organized from the viewpoint of the demands on an author to write within a particular genre. About 250 sub-genres were decided upon for both law and journalism, and the first few levels for law are shown in Figure 5 (Halpern 1984a).

This taxonomy (and the one for Journalism as well) was developed and tested iteratively by repeated examination of (1) diverse textbooks and (2) many actual examples. The development of the finest genre distinctions, the sorting of these in the hierarchical tree, and the naming of the classification nodes themselves, all continued until new input was easily identified and caused no problem in classification. These sub-genres were also cross-classified in terms of their values for a number of independent dimensions relating to their rhetorical quality. A variety of different dimensions were considered, and those that were retained (1) had some face validity with respect to rhetoric and communication and (2) showed a reasonable variation in values across the several hundred sub-genres. The dimensions settled on for Law are shown in Figure 6 (Halpern and Miller 1984, 13-14).

With the taxonomy and the dimensional classification systems then, the first part of the proposal was accomplished: Authors, knowing that the communication objective required writing a legal (or journalistic) document, could find their way to an extremely specific sub-genre which could accomplish their purposes. The second step is to provide the computer support to assist the authors in understanding all aspects of this genre, and to provide the framework for moving easily into scribing from this stage for elements of the document, and then back again into detailed planning.

The means for supporting the second step was to permit an author to choose a sub-genre, be put into an editor showing the high-level skeleton of that genre, and then be able to inquire about three aspects of any part of that skeleton: (1) the sub-classification, (2) the writing conventions, and (3) the rhetorical functions. Figure 7 shows the top level structure of a dwelling lease, in which an author has asked for elaboration of the property aspect, and then, within that the facilities included (Halpern 1984b).

By positioning the cursor on a line and pressing the appropriate key, an author can accomplish the three functions desired, that of expanding the category into its next levels shown in the figure. To determine the rhetorical importance of asking about the garage, for example, the author would position the cursor on that line, and press the *Rhetorical Purpose?* key; in this example, there would be a short response pointing out that garages are often contracted for separately and are often a basis for dispute if not specified clearly, etc. Pressing the *Writing Convention?* key might produce information that the key aspects of the garage to be covered are (1) its deviation for "normal" size (perhaps can accommodate only compacts), (2) number of bays, (3) whether it opens on a street or in a private area, and (4) whether there is room for storage. If this aspect called for special formatting, use of capitalization, or other non-textual aspect, that would be presented also.

1. Legal argument / scholarship
   a. Motion / petition
   b. Brief / correspondence / opinion
2. Records
   a. Affidavit / bill of evidence
   b. Deposition / record / minutes
   c. . . .
3. Pleading, orders
   a. Summons / warrant / citation
   b. Decree / order / injunction
   c. . . .
4. Legal transactions
   a. Free form (contract, offer, convenant, will, . . .)
   b. Fixed form (bond, stock, offering, order, . . .)
   c. Non-common law
      1) Legislative (bill / statute / ordinance)
      2) Constitutional (amendment / referendum)
      3) Admin / executive (treaty / regulation)

Figure 5. Taxonomy of legal writing genres

1. Density of promissory statements
2. Density of opinions
3. Extent to which authority is cited
4. Relative mix of sentence types (declarative et al.)
5. Density of boilerplate language
6. Extent to which the form is prescribed
7. Density of terms of art
8. Density of abstraction
9. Characteristic expressions and terms of art

Figure 6. Dimensions of legal style

1. Document title
2. Date of this document
3. Parties
4. Description of property
   a. Address
   b. Facilities included
      1) Number of rooms
      2) Description of each room
      3) Whether garage is included
   c. Period of lease
6. . . . (and 16 additional sections)

Figure 7. Structure of a dwelling lease

The usefulness of this approach from the detailed design point of view is that authors can be helped to rapidly identify and learn about the sub-genre that will meet their communication goals. In addition, however, it is easy to see how an author can keep right on going into the scribing phase: having seen the lowest category level (e.g., "whether garage is included"), it would be quite easy for the author to simply generate appropriate text for that section, according to the rhetorical function and writing convention information supplied. Then, having written something, the critiquing phase can be called upon to use the detailed tags, and all the other associated information, to assess whether what was written was relevant, coherent, effective, etc. — all those impossible discourse-level aspects discussed previously.

While this approach has yet to be implemented and data on its utility obtained, still it does provide a constant high level of support for the composition process through most of its important phases. Whether this particular concept is the best or not is of little consequence relative to the possibility raised here of more effective computer support — and once again through the use of identification tags.

## AFTERWORD

After such a trek through the composition process, it is good to reach a vantage point and consider longer views. We shall take two, one looking at other audiences, and the other looking at the roles educators can play in this, their, new computer future.

### Specialized audiences

The intended audience for the various computer aids was never really discussed in the foregoing, although technical writers were surely a focus. But nothing said so far really precludes the traditional educational audiences that are briefly considered here.

**College.** A phenomenal upsurge of interest in composition, particularly computer-based, has occurred in the last few years. New sub-departments — even departments — of rhetoric are formed (or dusted off), linguists are added or adjoined to the English faculties, and there's tremendous interest in the other Pascal and things like operating systems, non-human editors, RAMs, and bytes. Of all of the educational areas, it is in the colleges and universities that there is the greatest interest in computers and composition, and perhaps the greatest capability to pay and staff such activities. Our experience in examining college compositions and attempting to run them through our EPISTLE-1 system suggests that such an interest may be well-motivated: there is certainly more, in the area of style and diction, for these students to learn than might have been expected. Clearly, there is considerable demand for particularly the critiquing capability, but considerable modifications will have to be made to existing technology to survive the hardships that some of the less well-trained students will place on the system.[21]

**9-12.** High school students may well be the most amenable to working with the guiding function concept described in the section on computers and detailed planning.

**K-8.** The underlying language technologies, if properly interfaced, could well provide exceptional opportunities for training the language newcomers in the basic skills of this craft. For example, were a large dictionary to be accessible in a variety of interesting ways, children could, greatly through self-discovery, learn that words are composed of parts (some fairly standard), that words which look different might sound alike (and vice versa), and that the meaning of words provides a rich set of connections among them (some positive, some negative, some generalizing, some specializing). Similarly, the hidden non-linear structure of a linear sentence could be revealed, showing parts of speech, phrases, and grammatical function, all changing as this or that part is changed by the student.

**Remedial.** The computer offers special promise for those needing extra assistance because their needs can so often be precisely determined and prepared for. A side benefit, but one which may well greatly increase the will to learn, is that the help, discovery, and mastery can occur in a private dialogue between student and terminal.

**ESL.** English is a second language for millions of people in this country, only a few of which are adequately enrolled in the school systems. The rest must make do with inadequate night training, books, and the help of friends, and, of course, their learning is slow, limiting their potential enculturation, assimilation, and opportunity for better employment. It may be that a number of the errors a non-English speaker makes can be predicted from the natural tongue (the remainder are developmental and also well known), and therefore specialized critiques can be developed in a rather straight forward manner. The potential benefits to this population, then, are enormous. The other aspect of ESL is that of foreigners, quite happily living in their own country, but with a need to write in English. Since poor English can be such a stigma, causing potential buyers to look elsewhere, the commercial possibilities associated with this opportunity are very great.

### Role of the educators

The last item of concern is the potential reaction of those who must ultimately midwife the computer technology of composition. When faced with the support capability discussed here, educators and other administrators can adopt a variety of positions, fairly well covered by the following four: (1) they can ignore the whole movement; (2) they can oppose it; (3) they can evaluate it; and (4) they can shape it.

The first position is unlikely to be a quiet one, what with students clamoring for word-processing and more, the school administration pushing for greater "productivity," and parents going on about higher quality education. The second position of actively opposing these trends, while certain to make the front

pages for a while, is much more dangerous if, as seems very likely, this capability is not going to go away, but grow rapidly stronger. Determined opposition may very likely leave one arguing at the backs of the retreating educational mass. The third position of testing the technology is certainly very constructive and absolutely necessary to some degree, if only to keep the salesmen's claims honest. The problems are that this is (1) awfully costly in terms of money, time, and personnel, and (2) it may well be quite premature, since the field is changing so radically. Only the very flexible and fleet of well-heeled foot can really succeed in this post.

The last position is one in which every one can participate, but is the least popular at this time. Nevertheless, the development of effective computer-based writing tools requires the melding of the two disciplines: the computer-linguist and the educator. Neither can hope to do a truly reasonable job without the other, but it is the computer developers that won't let a little thing like that stop them! What the educator can do, then, is to understand better the nature and limitations of the technology and then help the developer bend his wares towards those areas in which the most gain can be made.

One rather painless way an educator can provide useful stimulus is to think practically about what kind of specific writing function is needed most. These ideas can then serve as functional requirements to the computer linguist to design and build more effective and useful systems — sooner. To put it more succinctly: *Educators: Get involved, Now!*

1. A more complete model usually has a "problem formulation" stage preceding the first stage of functional requirements, an expansion of the fifth stage of testing into three stages ("unit test,", "system integration," and "system test"), and an addition of another stage somewhere after installation — "Maintenance").

2. Saying that such-and-such activity occurs in this or that stage is not an observational generalization. However there is substantial evidence, not easily dismissed, which suggests that design processes — whether of text or of programs — tend to have more desirable properties when, in fact, the activities and the stages are matched as described (e.g., Malhotra et al. 1980; Carroll et al. 1980). In this sense, then the model is a normative rather than a descriptive one.

3. In earlier polyglot times an additional decision would also be approached — that of the language to be chosen (e.g., French for matters of philosophy, German for technical subjects, etc.).

4. In theory there is no reason why the last word just entered on a page is not a revision rather than initial scribing: a word could have been chosen, passed to the motor apparatus for output, interrupted there by a higher process which was reviewing the text in parallel, and a new word substituted. An observer would have no way of knowing whether that word was the pristine "next" in an unreflected stream or the *n*th choice after *n-1* rejects.

5. In contrast, for programming, this stage is an important area for the development of specialized tools to help the program-modifiers learn about the foreign programs they have been asked to alter — since the modifier of a program is seldom the original author (cf. Miller 1978).

6. Consider the sentence "The plane stops in Dallas/Ft. Worth". Many word-processor users might well be suprised to learn that the fifth "word" (token) processed by the computer is Dallas/Ft.

7. In the IBM system, headings are indicated by the prefix letter "h", followed by an integer from 0 to 9; as the integer increases so does the fineness of subdivison. Thus, "h0" is for a major part of a document, "h1" for a chapter, "h2" for a major chapter subdivision, etc. The sequence of section numbers given in the text ("1.0 . . . 2.1211") could be produced by the following sequence of tags in the text: :h1. :h1. :h2. :h3. :h3. :h4. :h5.. The text associated with each level tag could be varied in font type, size, and boldness, according with the local formatter interpretation programs.

8. A very simple example is that of the word "past," for which the dictionary returns the following string of part of speech features: (past(ADJ) past(Noun Sing) past(Prep)). For other words, especially verbs, many other features and attributes are reported in addition to part-of-speech. The dictionary access method and structure are the responsibility of Roy Byrd, with assistance from Mary Neff, Martin Chodorow, and Barbara Kipfer (and, previously, from Barbara Snitzer and Lori Alperin).

9. Tone here refers to the "connotations of interpersonal attitudes" and is primarily a word-level phenomenon. While most dictionaries do not report these connotations (as a function of particular sense or context), there is certainly no reason that this type of information could not be added to on-line dictionaries.

10. Thus, one would want to flag all of the following for the same hackneyed aspect: "This council deems this action advisable," "Do you now deem that an advisable course?", "We have deemed this, and all other actions taken by the previous administration, as reprehensible and not advisable pursuant to the . . . " On the other hand one would probably not want to flag the following sentences in the same way: "We deem him honorable, whether or not his actions were advisable in the circumstances . . .," and "Most deemed it wise to go slow. We surely all believe in the most advisable courses of action." Detection of frazzle phrases under such variable circumstances requires the aid of a grammar analyzer in addition to the dictionary.

11. Grammar-checking in Russian, Latin, and Hungarian, for example, would be a very much richer field, given the large number of noun cases, declensions, and conjugations of these languages: German grammar-checking, while less complicated, still has four cases and three genders, thereby offering many opportunities for ungrammaticality — more than, say, Spanish.

12. This original EPISTLE grammar employed the NLP rule language and bottom-up parsing approach of George Heidorn (cf. Heidorn 1972). It has been implemented in LISP and, recently, in a varient of PL/I, and it could accurately be called a "syntactic grammar" in that almost no semantic information was used in obtaining reasonable parses for a wide coverage of English — something of a surprise to many of our colleagues. EPISTLE-1 was the first to demonstrate the feasbility of accomplishing quite sophisticated syntactic analysis and text-critiquing; its grammar was primarily the work of Karen Jensen. The parses of EPISTLE-1, while adequate for a variety of text critiques, were still "appropriate". For example, the structural descriptions were not always right, some grammatical roles were not identified (e.g., some indirect objects), and the syntactic association between discontinuous but related elements might not be recognized (e.g., in [14], the relation between "who" and "to"). In addition, while semantic features could

be added to the grammar rules, there were no general mechanisms to accomplish such things as sense selection, semantic-case assignments, knowledge-checking, quantification, and overall scoping.

13. The new EPISTLE-2 PROLOG version is designed to produce an "accurate" first parse ("rather than "approximate") to support a wider range of applications requiring more semantic interpretation — including document indexing, and mechanized translation. Semantic features and type hierarchies, grammatic slot-frames, and knowledge-checking are all employed to achieve correct sense-selection and case assignments integral to obtaining the "accurate" parse. A logical form can also be produced which represents the meaning of the sentence in predicate expression form. The semantic formalisms and PROLOG implementation are presently those of Michael McCord (cf. McCord, 1982, 1984, 1985), who also provided an extensive startup PROLOG grammar of English. With this beginning, Alexa McCray is developing a theoretically motivated system grammar, adapting McCord's interleaved syntactic/semantic approach to our requirements, ultimately to include handling of discourse-level phenomena.

14. Martin Chodorow is thanked for his insight into PROLOG and the grammar, and it appears that he has identified an elegant solution for the fragment and run-on problems.

15. The EPISTLE-1 grammar and critiquing function has been tested repeatedly on a set of 2K sentences and over a variety of texts, including business correspondence, student themes, and military manuals. Many sentences are given a reasonable parse, and most of the errors are detected — those that naturally occurred and those that were introduced specifically to test performance. On the other hand, a number of sentences received an incorrect parse, and the false-alarm rate (saying there's a grammar problem when the text is actually correct) is quite a bit higher than we wanted. Our plans for the EPISTLE-2 prototype are to create a testbed of 4-8K sentences (from perhaps a dozen genre types, mainly commercial), to develop automatic means for characterizing the features of a parse (comparing the latest parse of a sentence to that from the previous testing session, and to the "ideal" parse if available, and automatically classifying the nature of differences; this is the work of Mary Neff), and to classify the parse overall as perfect, acceptable for critiquing, or unacceptable, summary statistics will be provided for correctness (of the first, desired, parse), total number of parses, CPU time, and storage. Our goals are to develop an experimental system which provides at least acceptable parses for 98% of the sentences, detects 99% of the grammatical errors, has a false alarm error rate of less than 1%, and runs quickly and comfortably on an IBM PC-AT.

16. Yael Ravin has developed and implemented the style function.

17. A "fact" is either a proper name or a certain type of quantified noun phrase. Proper names are names of people, places, or things, and the latter two categories can get quite complicated. Quantified noun phrases include money amounts, physical dimensions, addresses, dates, phone numbers, etc.

18. References are explicit stylized pointers to other sections of the document and are of five types: (1) pointers to items in the reference bibliography (e.g., "McCord 1984"), (2) pointers to footnotes, (3) pointers to entities embedded in the text (e.g., formulae and examples), (4) pointers to non-textual entities (e.g., figures, tables, photos) and (5) pointers to structured text units (e.g., "see Appendix 1.2," "cf. Chapter 3;" a page-number reference may be considered such a pointer).

19. These are items other than straight text, to which reference is usually made in the text, such as footnotes, tables, formulae, etc. They also include other items to which no reference may be made but which are visually — and informationally — an important aspect of the document (e.g., company logo, printed telephone number, text border, dividing line between text and footnote, etc.) Repeating page elements, such as a running title or a security classification, are not considered as instances of this type.

20. In the summer of 1984 Joseph Janes and David Halpern of the School of Information Studies, Syracuse University, worked with the author to flesh out the detailed proposal for their respective fields of journalism and law. All details provided here are derived from that work program. The legal work was chosen for illustration (Halpern 1984a, b; Halpern and Miller 1984), but the journalistic work (Janes and Miller 1984) was as comprehensive and complete.

21. We find that students run words together, break words at other than hyphen points, leave out spaces between an end-of-sentence period and the first word of the next, capitalize in strange ways, omit obligatory punctuation, repeat words unintentionally, accidentally shift their hands on the keyboard while touch typing, introduce spurious characters (particularly when they hit a repeating key by mistake), skip lines randomly and do various other system-wrenching things, not even mentioning some of their peculiarities of syntactic structure.

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# Plain English on the Plant Floor

Barry Jereb
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*Product documentation such as user's guides and programming manuals are key components of the products they support. In 1982 the Allen-Bradley Company, Industrial Computer Group, recognized the need to redefine the way we prepared our manuals – for several reasons: to reduce complaints, to make our products safer and easier to use, and to increase sales. This case study shows how we identified problems with our manual writing, scheduling, and graphics. It shows how we solved these problems by using plain English and clear document design, and identifies the benefits we've gained from our new approach.*

At Allen-Bradley Company, Systems Division, we make computers for industrial applications. One way we support these computers is by writing manuals that accompany our products to customers' plants. For many industrial computer companies, writing manuals appears to be an afterthought. In the past two years, however, manuals have become a key component of the products at Allen-Bradley. This paper will show why we decided to improve our industrial computer documentation and what we did to improve it.

## Background

At Allen-Bradley the technical writing department was producing a variety of documentation to support our industrial computer systems. This documentation was used by audiences ranging from computer novices such as machinists and factory electricians to computer experts such as computer programmers and software engineers. These documents included installation manuals, maintenance manuals, programming manuals, user's guides, and technical data sheets.

We were unaware of the impact these documents were having on our customers until the Chilton Company completed a study for us in 1982. We had commissioned this study to learn more about the marketplace for our products. To our surprise, the study indicated that product documentation such as user's guides and reference manuals was the *second* most important factor in influencing customers to buy an industrial computer. It was outranked only by quality of product. Other factors, in order, included after-sales service, on-time delivery, knowlegeable salespeople, application assistance, and price.

The results of the study clearly indicated that improved documentation would give us a competitive edge. This discovery led naturally to our taking a closer look at our documentation to see if there were any other indications that our documents needed a change. We found several:



*Visible Language,* XX 2 (Spring 1986), pp. 219-225.
Author's address: Allen-Bradley, 747 Alpha Drive, Cleveland, OH 44143.

Figure 1. Allen-Bradley Company's old layout for manuals.



## Section 3
## ASSEMBLY AND INSTALLATION

**3.0 General** – This Section outlines rules and recommendations for planning, layout, assembly, and installation of the Mini-PLC-2 programmable controller. A working understanding of these guidelines, in advance of installation, is necessary in the interest of safety and minimum down-time.

**CAUTION:** To avoid equipment damage, read and understand this entire Manual before attempting to install or operate the Mini-PLC-2 controller.

A primary consideration in programmable controller installation and operation is safety. The guidelines in this Section are presented with consideration for the safety of the operator, of controlled equipment and of the controller itself. As such, these guidelines are intended to **supplement** all applicable codes and ordinances which govern wiring and installation practices. The persons installing the controller should be familiar with local codes **and** these guidelines.

Essential for installation of the Mini-PLC-2 programmable controller is a well-planned layout. Paragraph 3.1 outlines the various considerations necessary for planning a controller installation. This Paragraph also describes various devices which are commonly supplied by the user for a programmable controller.

Once the layout of the controller is planned, the installation of its components can be done. Procedures for controller mounting, assembly and connections are given in Paragraph 3.2.

**3.1 Recommendations for System Layout** – This Paragraph describes the general recommendations for layout of the controller system. These recommendations are the result of both product testing and Allen-Bradley's cumulative experience with solid-state industrial controls. As such, they provide useful guidelines for most Mini-PLC-2 installations.

Overall recommendations concerning user-supplied equipment and wiring are also given in this Paragraph. These recommendations are intended to aid in making the controller an integral part of the user's manufacturing facility. Necessarily some of the installation recommendations for user-supplied equipment are general in nature. Environmental conditions, the individual application, and local codes and ordinances dictate the specific types, layout, and wiring of user-supplied installation equipment.

Particular industrial environments may contain one or more conditions adverse to solid-state control. The user's plant may include other equipment which produces excessive heat or electrical noise. Line-voltage variations may also occur in some locations. There are various measures which may be taken to limit the effect of any of these conditions. These are described in Paragraph 3.1.6.

**3.1.1 Enclosure Considerations** – An enclosure is usually provided by the user for the Mini-PLC-2 controller.

The enclosure is the chief protection of the controller from atmospheric contaminants. These may include oils, moisture, conductive dust or particles, or any corrosive or otherwise harmful airborne substance. Standards established by the National Electrical Manufacturer's Association (NEMA) define enclosure types, based on the degree of protection an enclosure is designed to provide. [1] In general, an enclosure which conforms to the NEMA standard for Type 12 enclosures is preferred for solid-state control devices.

The enclosure should be mounted in a position which allows doors to be opened fully and allows access to wiring and components for testing or troubleshooting. Also important is the accessibility of an emergency disconnect device in the enclosure, as noted in Paragraph 3.1.3.

The Mini-PLC-2 programmable controller requires a minimum enclosure working depth of 8 inches. "Working depth" is defined as the distance from the front mounting surface of the back panel to the inside rear of the door.

In some cases, back panels may be fixed on, or very close to, the inside rear wall of the enclosure. In other cases, back panels are mounted on standoffs which decreases the working depth available. Door-mounted print pockets may also use up valuable space. When specifying an enclosure for the Mini-PLC-2 controller, carefully examine the vendor's data sheets for print-pocket and standoff measurements; then calculate the "working depth" available.

**3.1.1.1 Component Spacing** – Mini-PLC-2 controller components must be spaced sufficiently from other equipment and the enclosure walls to allow convection cooling.

Convection cooling draws a vertical column of air upward, over the controller module surfaces. To keep the controller modules within the specified temperature limits, this cooling air, drawn at the base of the controller must not exceed 60°C (140°F). Because the flow of air is in the vertical direction, the unobstructed vertical spacing above and below controller components is especially important.

Vertical spacing is application-dependent, based on these factors:

- Average number of controller inputs and outputs ON at any one time. I/O modules must dissipate more heat when I/O devices are in the energized (ON) state.
- Average current supplied by output terminals to output devices. The greater the current draw, the more heat is generated.
- Heat from other equipment in or near the controller enclosure.

Because applications vary widely with regard to these factors, the vertical spacing will also vary. For this reason, two possible cases are described:

- Typical Condition, in Paragraph 3.1.1.1.1.
- Worst-Case Condition, in Paragraph 3.1.1.1.2.

The various factors of controller environment and use in individual applications can be compared with these cases. This allows the installer to judge the amount of unobstructed space required for his controller.

Note that these recommended spacing allowances refer to "unobstructed" space. This implies that no other device which might impede or prevent a steady vertical air flow should occupy this space. However, wiring or plastic wire-

[1] National Electrical Manufacturer's Association
2101 L Street NW
Washington, D.C. 20037

Figure 2. Allen-Bradley Company's new layout for manuals.

Chapter
# 5
# Fundamental Programming and Editing

### 5.0 Chapter Objectives

In this chapter, you will read about the following:

- **program instructions.** These can examine or change the status of bits in the memory of the Controller. The status of these bits then determines the operation of your output devices. In this chapter you will learn what these instructions are, how to enter them, and when to use them.
- **program editing techniques.** These help to create and change the instructions that make up your program. In this chapter, you will first learn how to change a single instruction, then how to make changes within a rung, and, finally, how to change whole program rungs.

### 5.1 How to read this chapter

You should read this chapter from beginning to end at least once. The instructions and programming techniques are interwoven so that soon after you learn an instruction, you learn how to edit it. The examples that accompany the instructions and techniques assume that you are practicing them in the order that they are presented.

This chapter consists of seven sections, labeled A - G. Because you will be entering instructions with the Programmer, the chapter reads best if you do not stop in the middle of a section, but between sections.

**WARNING:** Do not use the application examples given with each instruction in your particular application. These examples are provided for instructional purposes only.

### Before You Start

If you have some experience with programmable controls, we recommend that you have a Controller operating as you read this chapter.

If this is the first time you have used a programmable controller, we recommend that you connect the optional input simulator to your operating Controller. See the PLC-4 Microtrol Input Simulator Product Data (publication 1773-902).

Customer complaints. We had received letters from some customers expressing their dissatisfaction with our documentation.

Legal problems. Because our computers control heavy equipment, an unclear manual could lead to misapplication of a product and could result in equipment damage, injuries to workers, and lawsuits. In addition, an unclear manual could keep customers from getting the system running and thus result in expensive production downtime.

Phone calls. We were forced to create a toll-free telephone center to answer questions about products, many of which should have been answered by our documentation. Staffing a phone center eight hours a day requires time, talent, and money.

Feedback from field. Our salemen and distributors began to demand better manuals. They wanted to learn about new products so that they could sell them faster. Having good documentation is especially important for international companies like Allen-Bradley; sometimes it is the only information source our international sales groups have.

On the basis of these factors we concluded that our own employees — and even worse, our customers — were dissatisfied with the quality of some of our documentation. Moreover, the Chilton study showed us that our documentation had been hurting us in the marketplace.

### Defining areas for improvement

To attack documentation drawbacks, we identified three general areas of our documentation that we had to improve: graphic design, document scheduling, and writing style.

*Graphic design*

The most evident problems in our documents were graphic. Largely because of a lack of communication between the company's technical writing groups, Allen-Bradley was using three different layouts for technical documentation. As a result, we weren't presenting a consistent corporate identity to our customers. And our page layouts were uninviting and difficult to read (Figure 1). Although this page is similar to layouts used throughout the industrial control industry, we believed that we could do much better.

In developing a new layout we had to remember two things: the constraints on our graphic arts department and our printing budget. We knew the new layout could not be artwork intensive; it had to be easy for our designers to learn and execute. Our printing budget limited our use of color and special paper.

Once we had developed several alternative formats, we took copies to the Customer Training Center and asked our customers to complete questionnaires about the format they preferred. We evaluated the comments and picked a format we thought would be a good starting point in improving our documentation. The new layout (Figure 2) proved to be much more inviting and easy to read than the old. Consider this comparison:

| *Old* | *New* |
| --- | --- |
| Two columns of justified text set in 9-point Univers. The small justified text was hard for some below-average readers to read, hard for our layout artists to correct, and hard for workers to read in a dimly lit factory. | One column of text, ragged right margin set in 11-point Schoolbook. These changes made the text easier for the reader and easier for our graphics department to work with. |
| The ½ inch page margins severely decreased the amount of white space on the page, making it uninviting and more difficult to read. | A 2½ inch left margin and limited line length to a maximum of 60 characters added helpful white space. |
| All headings were set in 9-point bold Univers. This gave all headings equal emphasis, thus making them all seem equally important. Located within the text columns, the heads were difficult to locate. | Major headings were set in 13-point bold Megaron and minor headings in 11-point bold Megaron, thus providing two levels of emphasis. Heads in the left margin make them easier to locate. |
| No color. | Chapter and section titles printed in blue. Coloring also made headings easier to spot. |
| Figures were often located several pages away from the text referring to them. Searching for figures after reading a figure reference was distracting and time-consuming. | Figures are dropped into the text where the references appear. This technique is especially important when showing someone what to enter into a computer and the display that should result. |

We thought the more readable format provided an excellent starting point for our new approach, and the design was one that we could continually improve.

*Document Scheduling*

We were badly understaffed. Frequently, for example, we had to complete documentation projects in half the time normally alloted. Our writers had difficulty writing good documents under such severe time constraints. To help solve this problem we educated our marketing and engineering departments about the following: the value of giving us advanced notification on documentation needs so that we could become involved earlier in product development, the value of hiring additional technical writers to support our products, and the costs of not allowing enough time for documentation to be done properly (i.e., phone calls, complaints, accidents). By winning their cooperation, we have increased our writing staff and schedule projects more realistically.

*Writing*

Our writers had excellent technical backgrounds, but they lacked formal training in technical writing and exposure to the latest techniques for developing documents. To meet this need, we did two things. First, we hired professional and technical writers who had completed writing programs. Adding these writers created a more balanced department. These new writers provided a fresh outlook on documentation while our established writers provided our new writers with technical insights.

Second, we enlisted the help of Carnegie-Mellon University's Communication Design Center, specifically Erwin Steinberg and G. H. Jones to do the following:

Develop a training program for our writers

Develop a publication style manual containing guidelines on style and design

Begin an on-going objective evaluation of our documents

Create a seal of approval that could be printed in manuals that lived up to the high standards prescribed by the style manual. The seal would indicate our interest in serving our customers better through easy-to-understand documentation.

In addition to creating the style guide, Allen-Bradley and Carnegie-Mellon developed a document called "Writing Guidelines for Vendors" (Figure 3). We give these guidelines to vendors and consultants who produce documentation for us. Vendors are required to follow these instructions to have their documentation accepted. The guidelines discuss techniques such as writing in the active voice and using personal pronouns. By specifying up front the way we want the material handled, we ensure that we get a well-written document.

**Document testing**

We now test our documents before they reach the field. We use two types of tests: the user test and the customer test. In the user test we take manuals to the Customer Training Center and test them with representative users of our products. We have these users learn how to use a product by following the manual. We encourage them to tell us where they're having problems and what they're feeling. In this way, customers "edit" the manual. This test shows us where we've omitted information, been unclear, and misleading. In some cases we detect problems with the design of the product before it gets into the field.

In the customer tests we send our products to customers for evaluation. With these products we include a test copy of the manual and a questionnaire (Figure 4). The questionnaire asks the customers to comment on different aspects on the manual such as technical accuracy and ease of use. From the users' answers, we can determine how well the manual has supported a product that has actually been used in a factory environment.

By running these tests, we assure quality of our documents before the wider range of our customers gets them. In this way, we avoid upsetting our custom-

## Beta Site Manual Questionnaire

**Introduction** Use this questionnaire to report on the quality of the manual.

1. How frequently did you have to flip back and forth between pages as you read this manual? (Place a check mark on the chart.)

```
|<----------|----------|----------|---------->|
Never        4 times    8 or more
             per chapter  times per
                          chapter
```

For which of the following reasons did you have to flip back and forth between pages?

_____ To refresh my memory.

_____ To find an illustration or table.

_____ Because information about a topic was scattered throughout the text.

_____ Because the headings were misleading.

_____ Because the information was poorly sequenced.

Please list those places you recall having to flip back and forth.

_____

_____

_____

_____

2. How often did you have to re-read passages? (Place a check mark on the chart.)

```
|<----------|----------|----------|---------->|
Never        4 times    8 or more
             per chapter  times per
                          chapter
```



# Allen-Bradley
# Writing Style Guidelines for Vendors

**How to Design and Write Manuals**

Allen-Bradley's technical writers design and write performance-oriented manuals to serve their users' needs. They write manuals with the users in mind to show them how to work with the product, not merely how the product works. Basically, our writers accomplish this by:

- helping the users picture themselves in the text
- choosing words that the users can understand
- writing clear, straightforward sentences
- organizing the text for the users

Following is a list of twelve guidelines with examples. We suggest that you follow these guidelines when writing your documents for our users.

**Help Users Picture Themselves in the Text**

**Guideline 1:** Address the reader directly.

**Original**

It is suggested that the wire should be connected to the terminal by the engineer when the switch-box assembly is completed.

**Revised**

We suggest that **you** connect the wire to the terminal when **you** finish assembling the switch-box.

**Original**

With operator commands entered from the keyboard, an operator can display the program directly on the CRT.

**Revised**

By entering commands on the keyboard, **you** can display the program directly on the CRT.

Figure 3. These "Writing Guidelines for Vendors" provide plain English Guidelines for consultants or vendors who produce documentation for Allen-Bradley Company.

ers with mistakes and omissions, and reduce the amount of manuals we must reprint due to errors.

## Persuading management

Our managers were well aware of the problems caused by inadequate documentation, but they did not always agree with the techniques we wanted to use for improvement. For example, they thought that using personal pronouns and the active voice in technical documents was improper because it removed that objective scientific tone associated with technical documents. To convince them plain English and effective design would work, we cited document design research that supported our techniques. With scientific backgrounds, they responded to the research tradition and began to accept our changes.

Now plain English and readable formats are the corporate standard for Allen-Bradley Company. In addition to pleasing our customers, the use of plain English and clear design is providing us with the following benefits:

Our phone center used to receive more than 50 calls about our products each day. We began shipping the first simplified manuals with a product over a year ago. Since then we have received an average of only two calls a month regarding the product and the manual.

It's hard to determine the amount of sales that were influenced directly by our documentation. Our sales are increasing. Our sales force is selling more systems because it can learn about them more quickly. Distributors report that the better the documentation, the less time they have to spend in the field teaching a customer about a product.

Because we are an international company, we must translate our manuals into Japanese, German, French, and many other languages. Clearer documents that use fewer words are easier for human translators to understand and less expensive for computers to translate (computer-assisted translations cost about 20 cents a word). In addition, a document printed in a foreign language such as Arabic or German requires 125% more space, so writing in plain English saves graphics time and space.

In the past two years technical writing at Allen-Bradley has come a long way, but implementing the plain English program wasn't easy. First, we had to convince management that plain Enlish would benefit our company. Second, we had to teach our writers how to use it. Third, we had to teach our graphic designers how to present it. Now, plain English is selling itself as a cost-effective way to communicate.

Figure 4. Customers evaluate Allen-Bradley manuals by completing this questionnaire.

# A Program for Improving Documentation

Erwin R. Steinberg
Carnegie-Mellon University, Pittsburgh

*The Communications Design Center of Carnegie-Mellon University undertook two projects for the Systems Division of Allen-Bradley: (1) A management study of the Allen-Bradley manual-writing process, which addressed problems with the content and presentation of information in manuals, training of technical writers, enforcement of document tracking and style guidelines, and needed critical documentation. (2) A Handbook for Manual Writers. The Center helps Allen-Bradley with quality control in the manual-writing process by assigning reviewers to sample sections of manuals in draft form, to comment on problems, and to suggest additions or revisions. Allen-Bradley manuals carry the seal of the Center to attest to the procedure established for drafting, testing, and editing those manuals (but not to the readability of any particular manual).*

When the Communications Design Center of Carnegie-Mellon University agreed to develop a program to improve the manuals at the Systems Division of Allen-Bradley, those of us on the project spent considerable time trying to understand the division's documentation problems. We talked with the manager of commercial services, the department responsible for producing the manuals, and with the supervisors of the technical writers. We toured the plant and learned what products they made and how the products worked. We talked with people in engineering, marketing, and training. Finally, we read: we read advertising pieces, sales brochures, product data sheets, and manuals — many manuals.

We read the manuals with two purposes in mind: to prepare a two-day workshop for the technical writers who wrote the manuals and to plan a *Handbook for Manual Writers* that we had agreed to write. At this stage, "we" were two members of Carnegie-Mellon University's Communications Design Center who were also members of the university's Department of English. By the time we were ready to give the workshop, we had added to our team two graduate students enrolled in our program for the M. A. in Professional Writing. One of the graduate students had already completed a year in the program and had taken my course in professional and technical writing; the other had completed a semester. During the two-day workshop, the graduate students attended some sessions and spent some of the time familiarizing themselves with manual-writing problems by talking with Systems Division personnel.



*Visible Language*, XX 2 (Spring 1986), pp. 226-232.
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### A workshop for manual writers

We began the workshop with a discussion of the Shannon and Weaver "Schematic diagram of a general communication system"[1] and the Lasswell formula (who, says what, in which channel, to whom, with what effect)[2]; and we worked hard at the concept of audience. Then, using examples from the manuals, we addressed problems that we had found in them: the importance of tailoring the manual to the needs of the users; the importance of the introductory section of the manual and of the introduction to each section; organization; the way style and usage affect tone and comprehension, including such matters as personal pronouns, direct address, word choice, wordiness and redundancy, active and passive voice; consistency of language; sentence and paragraph structure; and layout and design. We also discussed methods by which the technical writers obtained their technical information and the manual-writing process, from assignment to final approval.

### A management study

Before we could undertake writing the handbook, we were asked to do a management study of the manual-writing process. Our two graduate students spent several days at the Systems Division and then returned to write a report, the essence of which was:

I. Plain English and document design
   Problems with the content and presentation of information: Unclear language, insufficient examples, lack of glossary, lack of indexes, poorly designed table of contents, incomplete information, incorrect information, and lack of user-oriented logic in the organization of manuals
II. Management
   Lack of proper training: Technical training for writers, training for all staff on principles of audience analysis, and training for writers on how to apply principles of audience analysis.
   Lack of enforcement of Allen-Bradley document tracking and style guidelines.
   Lack of critical documentation: A text introducing the fundamentals of programmable controllers, hardware compatibility charts, pocket guides for use on the plant floor, and case studies with step-by-step descriptions of normal system configurations.

### A handbook for manual writers

We planned a handbook in five sections; planning, composing, designing, testing, and style and usage.

Chapter I. Planning the manual

1. Interviewing engineers, marketing and sales personnel, training center instructors, and customers
2. Learning to use the product
3. Analyzing the manual's prospective audience
4. Constructing a performance-oriented outline
5. Editing your first draft fromthe user's perspective
6. Conclusion

We adopted the terms "performance-oriented" and "topic-oriented" (the latter does not appear in the foregoing outline but does in the handbook) from the U. S. Army's Guidebook for the Development of Army Training Literature.[3] Here are the Army's definition of the two terms and accompanying examples:

> Topic-oriented writing focuses on the generalizations and concepts which constitute a body of knowledge — it tells "about" a subject area rather than elling "what to do" or "how to do it." (p. 6)
>
> **CBR: The Local Alarm**
>
> The individual suspecting or recognizing this attack will mask first and then give the alarm. The vocal alarm for chemical agent attack will be "SPRAY" for a spray attack, and "GAS" for an attack delivered by other means. The vocal warning is intended for those individuals in the immediate vicinity of the person recognizing the attack. The vocal alarm does not take the place of the sound alarm or the visual signal to alert a unit of a chemical attack. (p. 7)
>
> Performance-oriented writing focuses on the duties and tasks a user is expected to perform and the information he needs in order to perform these duties and tasks — it tells the user "what to do" and where possible, "how to do it." (p. 6)
>
> **CBR: The Local Alarm**
>
> How to Give the Local Alarm
>
> In case of Chemical attack, use these steps to give the local alarm:
>
> a. Put your mask on first;
> b. Give a vocal alarm — If spray attack, say "SPRAY"; for all other kinds, say "GAS";
> c. Give the sound alarm, visual signal, or both, as directed in your Unit SOP;
> d. Pass the warning to the Unit Commander as directed in your Unit SOP. (p. 9)

Chapter II. Composing the draft

1. Writing introductions
1.1. Writing general introductions
1.1.1. Purpose
1.1.2. Audience
1.1.3. Definitions of major terms
1.1.4. Related publications
1.1.5. Optional sections in the general introduction
1.2. Writing chapter introductions
2. Writing definitions
3. Writing descriptions
3.1. Physical descriptions
3.2. Process description for understanding
4. Writing procedures
4.1. How the correct choice makes a difference
4.2. Narrative format
4.3. Step-by-step list
4.4. Step-by-step visual aids
4.5. Action-response
4.5. Question list
4.7. Decision tables
4.8. Flowchart
4.9. Narrative Flowchart
5. Writing examples
5.1. Extended examples
5.2. Short examples
6. Conclusion

Chapter III. Designing the layout and graphics

1. Allen-Bradley Design Standards
2. Headings
3. Layout and use of white space
4. Graphics
4.1. Labels
4.2. Illustrations
4.3. Diagrams
4.4. Tables
4.5. Typographic highlights

We need not discuss Chapter IV, "Testing by user edits," because Barry Jereb has covered it in his section "Document testing." In Chapter V we dealt with the kinds of matters we considered in the workshop, discussed early in this paper, and in the vendor guidelines, a discussion of which follows.

### Style guidelines for vendors

As Jereb has already explained, vendors and consultants produce documentation for the Systems Division which frequently must be integrated with the division's documentation. Even if it used separately, Allen-Bradley wants to be sure that it is comprehensible. We produced, therefore, "Writing Style Guidelines for Vendors," the introduction and outline for which follows:

> Allen-Bradley's technical writers design and write performance-oriented manuals to serve their users' needs. They write manuals with the user in mind to show them how to work with the product, not merely how the product works. Basically, Allen-Bradley writers compose performance oriented manuals by: helping the users picture themselves in the text, choosing words that the users can understand, writing clear, straightforward sentences, and organizing the text for the user.
>
> Following is a list of twelve guidelines with examples. We suggest that you follow these guidelines to write your documents for our users.
>
> *Helping users picture themselves in the text*
>
> 1. Address the reader directly, by name, or by using a pronoun.
> 2. Write in the active voice.
> 3. Use action verbs rather than nouns made out of verbs when you can.
>
> *Choosing words that the users can understand*
>
> 4. Choose your words with care. Avoid jargon. Define or explain technical terms that you cannot change.
> 5. Don't rename for the sake of variety.
> 6. Don't use extra words.
>
> *Writing clear, easy-to-follow sentences*
>
> 7. Put the parts of each sentence into logical order.
> 8. Untangle convoluted sentences.
> 9. Use lists when you have several items to discuss. Check that all items in the list have similar grammatical constructions.
> 10. Rewrite multiple negatives as positive sentences when you can.
> 11. Avoid noun strings.
>
> *Organizing the text for the user*
>
> 12. Think of your user when organizing text.

Accompanying the first eleven guidelines are examples: first, poorly worded originals, and then suggested revisions. The last guideline reads:

> Think of your users when organizing text. Understand the needs of your users so you can position the users correctly in the text; describe how they use the product, not merely how the product works. Lay out and design information so users can read and use it easily. Provide meaningful headings so users can find information easily. Summarize information when appropriate so users can review important information.

And the guidelines conclude:

> Writing for users isn't easy. You need to think about what the users want to know and what they must know to do their job well. Think of what job the users will do, not what the product will do. This will help you gain a performance-orientation to writing. By following these guidelines, you will begin to compose manuals for the users. For more suggestions on how to write performance-oriented manuals directed to your users needs, ask to see Allen-Bradley's Publication Style Guide.

The technical writing supervisors are currently putting the finishing touches on the handbook to make sure it speaks to all the needs of the manual writers. When they have finished, Allen-Bradley will print the handbook and the supervisors will distribute it to their technical writers, run a workshop to instruct the writers in how to use it, and monitor the writing to be sure that the writers do use it.

### Quality control

To assist the Systems Division with quality control in the preparation of manuals, the Carnegie-Mellon Communications Design Center has been included in the manual-writing "loop." Graduate students sample sections of the drafts of new manuals and comment on any problems they find or suggest additions or revisions. The following form, which a graduate student fills out and attaches to each draft after sampling that draft, shows the kinds of things a reviewer looks for:

*CDC form for evaluation of technical manuals*

| | *Revision required* | | |
|---|---|---|---|
| *Area reviewed* | *Much* | *Some* | *None* |
| Definition of audience | | | |
| For manual | _____ | _____ | _____ |
| For chapter | _____ | _____ | _____ |
| Content | | | |
| Table of contents | _____ | _____ | _____ |
| Definition of caution, warnings, notes | _____ | _____ | _____ |
| Glossary | _____ | _____ | _____ |
| Index | _____ | _____ | _____ |
| Completeness | _____ | _____ | _____ |
| Accuracy | _____ | _____ | _____ |

| | | | |
|---|---|---|---|
| Organization | | | |
| Usage and style | | | |
| Passive voice | _____ | _____ | _____ |
| Wordiness | _____ | _____ | _____ |
| Undefined terms | _____ | _____ | _____ |
| Noun strings | _____ | _____ | _____ |
| Parallelism | _____ | _____ | _____ |
| Consistency | _____ | _____ | _____ |
| Jargon | _____ | _____ | _____ |
| Punctuation | _____ | _____ | _____ |
| Layout and graphics | | | |
| Graphics with text | _____ | _____ | _____ |
| Graphic labels | _____ | _____ | _____ |
| Graphic labels | _____ | _____ | _____ |
| Usefulness of graphics | _____ | _____ | _____ |
| Production | _____ | _____ | _____ |

**The Seal of the Communications Design Center**

To testify to the procedure, each new manual produced by Allen-Bradley's Systems Division will carry the seal of the Communications Design Center and the following statement:

> This seal means better documentation for you because this document has been written and tested according to guidelines developed by the Communications Design Center (CDC) of Carnegie-Mellon University (CMU) specifically for Allen-Bradley.
>
> The CDC periodically evaluates A-B's application of these guidelines; however, Allen-Bradley warrants that neither the CDC nor CMU nor any unit of the university in any way certifies the technical accuracy of the document. The CDC seal indicates solely that the CDC has approved the planning and testing of the organization, layout, and writing style of manuals and is evidence of Allen-Bradley's interest in serving its customers better through easy-to-understand documentation.

The seal thus attests to the procedure and not to the readability of any particular manual.

1. Claude E. Shannon and Warren Weaver, *The Mathematical Theory of Communication* (Urbana: University of Illinois Press, 1949), p. 5.

2. Harold D. Lasswell, "The Structure and Function of Communication in Society," in *The Communication of Ideas,* ed. Lyman Bryson (New York: Harper, 1948), p. 3.

3. Richard P. Kern, Thomas G. Sticht, Diana Welty, and Robert M. Hauke, *Guidebook for the Development of Army Training Literature* (Springfield, Va.: National Technical Information Service, U. S. Department of Commerce, 1975)

# Writing Backwards: The Use of Visual Models in Writing

G. Reed Agnew
Agnew Moyer Smith Inc., Pittsburgh

*The use of visual models in writing technical material can affect the order of the entire writing process — in effect, reversing it. A single case study is used to explain how a model is developed, what purposes it serves, and how it affects the writing process. A few tips on using visual models in writing are given.*

Most people would agree that it's good to amplify a piece of writing with visual devices such as diagrams or illustrations. Usually, the sequence of performing these tasks is to write first, then illustrate. Often this process results in visuals that merely embellish the text. Reversing the sequence of writing and illustrating can significantly improve a writer's ability to communicate concepts effectively, but will also change the writing process. Because using this technique essentially reverses the usual writing process, I call it Writing Backwards. A project completed by our office (Agnew Moyer Smith, Inc.) clearly illustrates the technique of writing backwards. This project dealt with the need to explain how an integrated information system would work and how it could be built.

*Planning an office of the future*

An integrated information system is sometimes referred to as "the office of the future." It is a system that links together the latest office technologies — word processors, computers, telephone services, video, audio visual, laser printers, intelligent copies, and typesetters. Once linked, the synergism of the total system profoundly changes the way office work is accomplished. Our client, Westinghouse corporate headquarters, was planning to build such a system.

To begin, the company had formed a task force composed of experts in each area of technology. Each member of the group researched available products and techniques within his or her own area and then completed a detailed report explaining a recommended approach. Together, in many meetings, the task force worked out many of the problems of connecting these often disparate technologies. The result of this initial effort was two thick binders full of technical papers, each paper explaining a specific area of technology. The binders were filled with complicated system diagrams and the text was riddled with unexplained technical jargon like asychronous, gateways, and COM.



*Visible Language*, XX 2 (Spring 1986), pp. 233-243.
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*The problem*

The problem was that, for the most part, these reports were only understandable by a technical person — and this wasn't the audience. The audience was the company's top-level managers who were going to be asked to approve the expenditures for the system, and middle managers whose departments were going to be the system users. For these audiences, it was important to show: How the system would work, what benefits it would offer, how much it would cost, and how it could be built. These questions had to be answered simply but without compromising technical integrity, and in a way which could be easily and quickly comprehended.

Our office was asked to solve this communications problem. The office was founded by graphic designers — visual thinkers, skilled in design, layout, typography, and the visual organization of publications. Yet the office is committed to the idea that designers cannot merely lay out and amplify writers' ideas and text — that visual and verbal thinking cannot be separated. Our goal is to integrate writing and design and to recruit other designers who are interested in dealing with communication problems — designers who are also writers. The make-up and attitudes of our office strongly influenced our approach to explaining the integrated information system. Here's what we did:

*A case study*

First, we read and reread the technical reports, writing notes, making queries, and checking other references while we tried to understand the system and its components. Next, we talked to selected task force members about their particular technical areas. We clarified misunderstandings and learned about their primary concerns and objectives. We also asked them about their perceptions of the audience's information needs and what areas seemed particularly confusing or unclear. Then, we went away and thought.

*Developing a visual model*

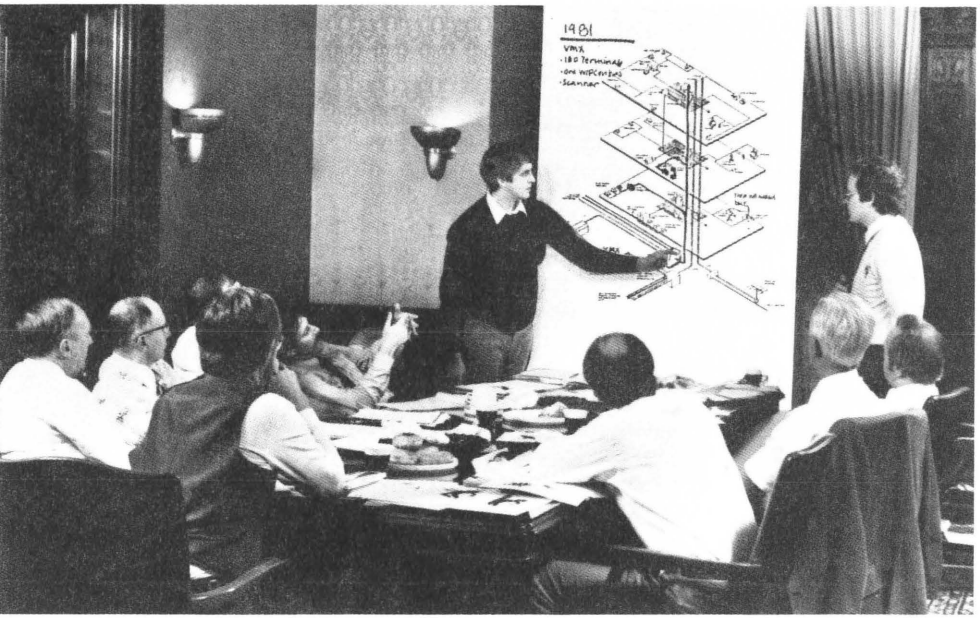
After we felt comfortable with the subject and information needs, our first productive task was to develop a visual model of the integrated system we thought they were trying to build. A visual model is a diagram, chart, illustration, or matrix that shows many parts of the subject simultaneously. Once constructed, a good model enables a viewer to comprehend a complete concept or idea all at once.

In this case, the model was an axonometric diagram which represented all the system's components in the context of three typical floors of an office building. We used this type of diagram because both task force members and their audience seemed confused about where equipment would be placed and how much impact the system would have on the physical arrangement of offices. We have also learned that readers naturally respond to and understand axonometric drawings with representations of real equipment more readily than they do to two-dimensional flow diagrams filled with arrows and abstract shapes like boxes and circles.

Our first presentation of this model to the task force was enlightening for everyone. "Yes," they said, "that is pretty close to representing the system we're trying to build." Then the various technical experts began to discuss the details of the model (Figure 1). To everyone's surprise, it became apparent that there were some holes in the system, some incompatibilities, unforeseen links, and unsolved problems. In the next few weeks, there were many meetings and in each one this visual model became the focal point of discussions. Copies of the model were used to collect and consolidate new information, to discuss changes, and to think through the construction sequence. It was the first time members of the task force had a device to communicate among themselves, to relate their separate technologies, and to consolidate their ideas. The result of these sessions was a revised diagram that everyone agreed was an accurate representation of the system. In addition, we color-coded a series of these diagrams to show how components would be added over a five-year period.

Once this task was completed, we were well on our way to developing a simplified report for the intended audience. Now we could explain the system, benefits, costs, and construction sequence in terms of the visual model. In effect our writing task now was to describe how the model worked — not to rewrite and edit the binders full of complex technical papers. Our writing task would be easier and we had a strong organizing principle to follow.

Figure 1. The visual model became the focal point for conducting task force discussions, for collecting new information, and resolving problems in the system design and construction plans.



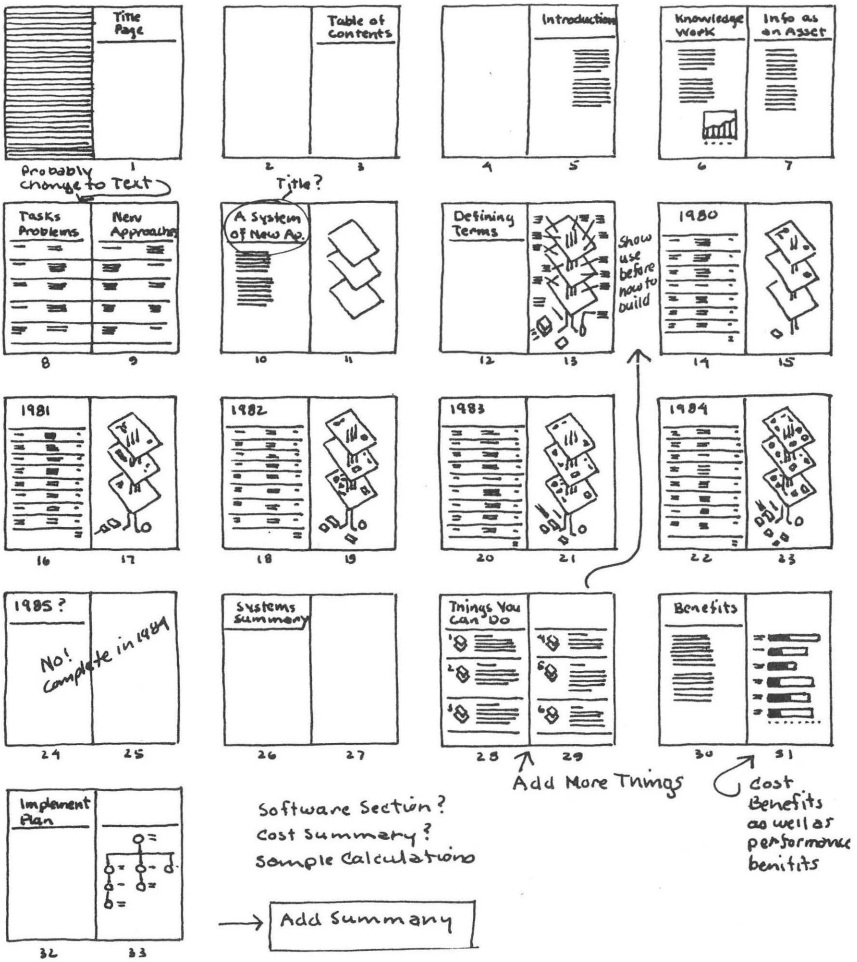



Figure 2. The visual outline was developed to plan the organization and content of the book. It became the guide for detailed writing.

*Creating a visual outline*

To begin writing, we created another kind of visual model — a model of the publication we envisioned. This model was much less refined than our system diagram, but was absolutely essential in planning how we would explain the system to our readers. We call this type of model a visual outline (Figure 2). It's simply a small sketch of two-page spreads with indications of what will be explained on each page or spread. It's a combination of an outline and a page

Figure 3. A series of pages similar to this two-page spread use the diagram to show how the system would be built over a 5-year period. The left-hand page of each spread contains a table explaining what new components were added and how much they cost.

# 1983

The most significant events in 1983 are the addition of a mainframe computer service to the network and the installation of a Private Automatic Branch Exchange (PABX).

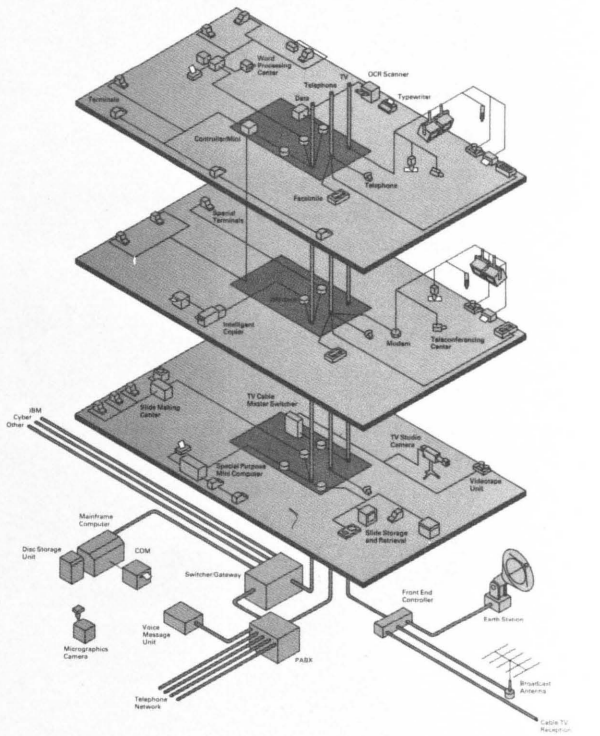
The mainframe computer will provide every terminal with powerful computing ability and access to central data storage. It will drastically reduce outside time-sharing costs.

The PABX will permit the conversion to non-Bell equipment, allowing a reduction of telephone equipment costs.

Although some additional equipment is still being added at this point, most costs reflect a use/maintenance mode of operation.

| Item | Description | Cost in Thousands of Dollars |
|---|---|---|
| Terminals | · Continue to add terminals at the rate of 15 per month — a total of 600 at the end of 1983<br>· Maintenance of existing terminals | 1,562 |
| Word Processing | · No additional equipment<br>· Lease, operating and maintenance costs for 3 new centers and 15 new people added in 1981 and 1982 | 600 |
| OCR Scanners | · No additional equipment<br>· Lease, operating and maintenance costs | 48 |
| Facsimile | · No additional equipment<br>· Lease, operating and maintenance costs | 25 |
| Teleconferencing | · No additional equipment<br>· Provide usage time for 3 existing centers<br>· Maintenance costs | 1,346 |
| Intelligent Copiers | · Add two more copiers to the system — total of 5<br>· Provides copier/printer output for entire network of equipment | 103 |
| Slide Storage and Retrieval | · Add an additional terminal and monitor<br>· Operation and maintenance | 42 |
| Slide Making | · Add two additional terminals<br>· Maintenance | 13 |
| Records Management | · No additional equipment<br>· Operation, maintenance, supplies | 45 |
| Voice Message | · No additional equipment<br>· Maintenance | 40 |
| Network | · No additional equipment<br>· Maintenance | 20 |
| Switcher Gateway Unit | · No additional equipment<br>· Maintenance | 50 |
| Mainframe Computer | · Add complete mainframe computer services including Central Processing Unit (CPU) and disc storage<br>· Lease and time costs | 621 |
| Computer Output on Microfilm (COM) | · Provide communication link from mainframe computer to COM equipment<br>· Provides computer output directly onto microfilm<br>· Saves space, eliminates paper | This study assumes use of existing facilities |
| PABX | · Add Private Automatic Branch Exchange (PABX)<br>· Connect to telephone cable<br>· Connect with Switcher Gateway<br>· Provides privately owned connection to Bell System<br>Permits installation of non-Bell equipment<br>· Provides linkage between data and telephone cables | 1,500 |
| Planning & Implementation Team | · Project management and direction<br>· Records management<br>· Technical coordination<br>· Training<br>· Systems analysis | 785 |
| Total for 1983 | | 6,788 |





# Using
# The Office Machine

Things you can do

When The Office Machine is completed in 1984, it will be able to help you perform innumerable tasks.

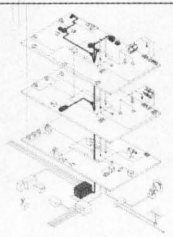
In some cases, it will help you perform tasks differently and save time. In other cases, it will enable you to do things which you could not do before.

As users become accustomed to the system, they will invent new uses. We expect the demand for special application packages to increase. The system's use is limited only by the imagination and creativity of the users.

The following five pages contain descriptions of office functions which this new system will help you with. They also indicate which system components are used to perform each function. There are many others, however, we hope this sampling will give you a better understanding of The Office Machine.



**Regular Typing and Copying**

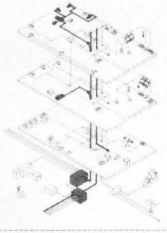


1 Prepare a draft report on a conventional typewriter using an OCR element.

2 Feed the draft into an OCR Scanner and send it to a word processing station for final editing and formatting.

3 Route the finished information to an intelligent copier for printing of finished copies.

**Dictation/Word Processing**



1 Call central dictation facility from office or remote phone.

2 Dictate message, letter, etc. and provide typing instructions.

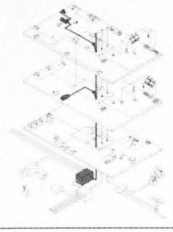
3 Dictation as translated into hard-copy draft at word processing center and sent to your office for review.

4 Mark up draft copy and return to word processing.

5 Word processing makes corrections and completes final draft.

6 Final draft can be sent to intelligent copier for multiple copies if necessary.

**Distribution List Mailings**



1 Prepare a letter on a word processing terminal.

2 Using the terminal, review the mailing list index and select an appropriate mailing list for distributing the letter.

3 Route the letter to an intelligent copier.

4 Instruct the word processor computer to route the mailing list to the intelligent copier.

5 Instruct the copier to make a copy of the letter for each person on the list.

6 The intelligent copier will print individual personalized letters (with address printed on back for self mailing, if desirable).

plan. We have found that outlining in this way helps to ensure proper page breaks, aids in planning the inclusion of visual material, allows us to assess space problems early, and ensures proper pacing of the presentation. We've found visual outlines to be much more useful than the traditional hierarchical outlining technique we all learned in school. In addition, visual outlines help the clients "see" their publication, and approve the concept and organization before detailed writing begins. In this project, the visual outline helped us plan how we would integrate text with our axonometric diagram. It showed where writing was needed to fully explain an idea and where the diagram could carry the full burden of communication.

*Writing the text*

At this point, we began writing the text. And it was easy because, for the most part, the text was interpreting and amplifying the visual model. It's much easier to write about a subject when you have a coherent, visible conception of it in front of you. The publication explained the complete system in only 32 pages. The amount of text was limited; information was often organized into matrices or tables instead of text to make it more accessible and inviting (Figures 3 and 4). The system diagram was easy to understand as well as visually engaging. Today, our client is using an integrated information system like the one described in this book.

---

*Writing the usual way*

The typical approach to most writing assignments usually follows this pattern: (1) *Interview and set criteria.* The writer interviews the client and establishes basic criteria about the purpose, audience, schedule, cost, and general approach to the assignment. (2) *Research and collect information.* A reference file will begin to develop. (3) *Organize and categorize.* Already some basic decisions which will affect writing are beginning to be made as information is sorted and eliminated. (4) *Outline.* The writer orders the information into a basic hierarchy using words and phrases to describe the content of each category. (5) *Write.* Now the writer "fleshes out" the outline and writes text supporting the order that has been established. (6) *Illustrate and visualize.* The writer reads through to see what points could be illustrated or where tables, graphs, or charts could be included to offer the reader some visual relief. (7) *Lay out.* Finally, the writer decides how the text and illustrations can be organized and arranged in pages.

*Writing backwards*

Agnew Moyer Smith, Inc. does not follow the traditional approach to writing. The first three steps are the same, but we reverse the last four steps. We begin

Figure 4. User scenarios were developed which describe step by step how 15 office tasks such as filing, document sharing, video conferencing, or electronic mail would be performed using the new system. Small diagrams use color to indicate which system components are used in each scenario.

with visualization, then we simultaneously complete layout and outlining (our visual outline), and finally we write. Our process is backwards.

We have found this to be an extremely useful technique — particularly with technical subjects or with subjects that are organizationally complex. Again and again, visual models have proven to be the bridge between our clients' inability to communicate knowledge clearly and our own ability to understand the ideas and concepts they want to convey. Discussion, change, and modification of models seems to be much easier and less threatening than rewriting or editing textual explanations. And once agreed to, models and visual outlines can readily become a strong organizing principle which the text can easily support.

Our office has used this process on a number of projects — each one requiring a different type of model. One project used a timeline model to unravel, organize, and explain the complex task of relocating families transferred from one company location to another. A well-structured, engaging, and easily read book organized around the timeline made a complex and potentially disruptive task easy. Other projects have used visual models to explain how animals behave, how inventory financing works, what components a manufacturer supplies to the mass transit market, how a project is structured within a matrix organization, and how an automated information retrieval system works. In all these examples, the model was created first. And in all cases, the existence of a model helped our clients clarify fuzzy ideas, eliminated the need for a lot of words, and provided a strong organizing principle for writing.

*Integrating text with visual models*

Although well-conceived visual models can assume a good share of the communications burden, it is still important to work hard on the clarity of the text, captions, and call-outs that accompany the model. We have found that the existence of a strong model affects writing style. Projects with strong visual models have less main text, and rely more on the supporting layers of text such as call-outs and captions. In addition, these supporting levels of text tend to be written in a terse, telegraphic style. Finally, incorporating visual models changes the traditional structure of pages. No longer will a page contain long columns of text which makes occasional references to remote supporting figures. Text and visuals must be fully integrated.

Although developing visual models early in the writing process is a useful and challenging approach to writing, it's not for everyone. Some people cannot think visually; they cannot represent a concept with even the crudest sketch. Still, many writers are perfectly capable of developing conceptual visual models. One does not have to have a background in illustrationor graphic design to use this approach.

*Tips on using visual models*

To conclude, I can offer a few tips on using visual models. The following techniques have proven useful in most of the projects we have completed.

Don't discard or put aside explanatory sketches. Rough diagrams drawn on the back of an envelope or a napkin during a discussion may contain the beginnings of a good idea for a visual model.

Look for metaphors and comparisons as clients explain ideas or concepts. These casual comparisons can lead to a strikingly clear visual concept.

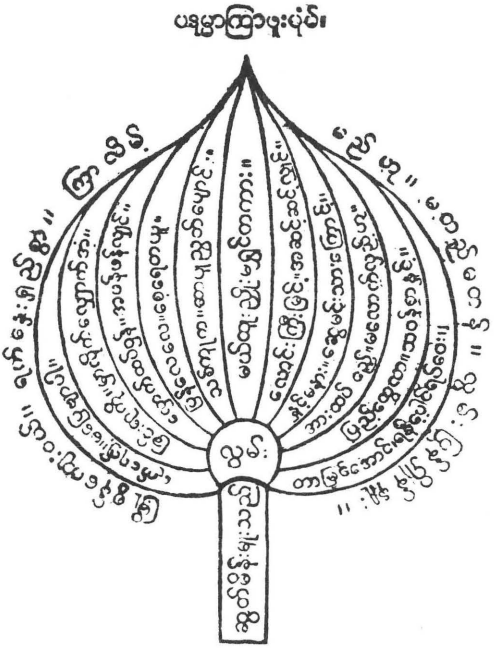
Don't worry about the artistic quality of your first sketches. If you have a good idea that truly helps explain a concept, you can find a designer or illustrator to work out the details later.

Remember your audience. Be sure your model is not too complex or technical for a lay audience, but don't oversimplify or talk down to a more knowledgeable reader.

Create models early in the process. That's when they do the most good for you and your client. They can be a valuable tool in learning a subject and resolving misunderstandings. Don't use models to simply embellish your text after it is completed.

Don't expect the model to replace clearly written, well-organized text. Models do not excuse poor writing.

The next time you're trying to explain something, don't plunge right into outlines, text and words. Pause for a while and think about how you might approach a visual explanation. It could be a rewarding experience.



## CORRECTIONS

Our last issue (volume XX number 1) contained several unfortunate errors in arrangement of illustrations:

Page 78. The captions for Figures 7 and 8 should be transposed.

Page 90. The captions for Figures 17 and 18 should be transposed.

Page 91. The illustration shown for Figure 19 is not Seiichi Niikuni, "River/Sand/Bank," as indicated. It is: Emmett Williams, "Mediation No. 2" (ca. 1958).

Page 120. The missing palm-leaf fan illustration for Figure 6 is shown at left.

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Joseph M. Williams is a professor in the departments of English and linguistics at the University of Chicago (Chicago, IL 60637). He has published books and articles on stylistics, the history of the English language, teaching composition, and social linguistics. His *Origins of the English Language* (Free Press, 1975) has been adopted as the text to accompany the recently produced Public Broadcasting System series on the English language. His book on style: *Style: Ten Lessons to Clarity and Grace,* 2nd edition (Scott Foresman, 1985) is widely used in advanced writing programs elsewhere. He has also consulted extensively with corporations, the Federal government, and major law firms,

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