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Readability in business and technical writing

Billie Lea

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READABILITY IN BUSINESS AND TECHNICAL WRITING

A Thesis
Presented to the
Faculty of
California State University
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
English Composition

by
Billie Lea
October 1985
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Approved by:

[Redacted]
Chair

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ABSTRACT

Readability, the new criterion for style in technical and business writing, is still imprecisely understood. Much research in cognitive psychology, education, and psycholinguistics has been performed in the name of readability, but usually the results of the research do not reach writers in business and technology. This thesis explores the concept of readability, examines the research, and relates it to business and technical writing. The thesis traces the history of readability theory and the ubiquitous readability guidelines; it offers an extended definition of the term; and finally, it attempts to assess the advances in readability research.

Any investigation of readability must begin with the formulas, for they gave rise to the common use of the term, as well as to early readability guidelines. But guidelines based on the formulas falsely assumed a causal relationship between factors measured by the formulas and readability; hence, their usefulness is questionable. The formulas were inadequate as the basis for readability guidelines for this and other reasons—among them, their failure to look beyond the written product to other points of the discourse triangle, namely, the writer and the reader. To remedy one area of weakness, the total eclipse of the reader,
researchers in cognitive psychology turned to a model of the reading process as the basis for new research.

While the empirical research reported in this thesis is somewhat limited in its usefulness since it equates readability with comprehensibility, it does offer writers some insight into how features of writing relate to reading comprehension.
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I. History of Readability Research

Readability has become the criterion for advice about style in technical and business writing. Textbooks stress the importance of readability and provide guidelines for achieving it. But what is "readability," and how sound are the guidelines based on early research in readability?

Historically, readability has been associated with formulas and textbooks. Invented after World War I, the formulas were designed to help elementary school teachers estimate the difficulty of reading materials (Selzer 71). Measuring readability became extremely popular, particularly in the 1950s when Rudolph Flesch and Robert Gunning developed formulas that were both inexpensive and easy to use (Selzer 71).

Soon researchers began trying to establish causal links between formulas and guidelines for writing. But based solely on sentence length and word difficulty, the formulas were inadequate. First, the formulas measure only a few variables (namely, sentence length and word difficulty) and these variables at best only correlate with readability -- they do not cause it. Second, the formulas focus exclusively on the written product, ignoring the reader and the rhetorical purpose of the writing. Revisions based on such guidelines frequently resulted in a more difficult text.
These guidelines were developed on the assumption that reducing sentence length and word difficulty would improve readability. Unfortunately, correlation was confused with causation. While simpler words and shorter sentences typify readable writing, they do not necessarily cause it. Simply shortening words and sentences alone no more improves true readability than lighting a match near a thermostat warms a room. Even though the temperature indicator rises and likewise the readability grade levels plummet, nothing of significance occurs. No true changes are effected. Working backward from the formulas to the causes of readable writing simply does not work.

This backward approach to teaching writing is analogous to what has been done for years with grammar. Since good grammar usually accompanies good writing, many have believed that knowledge of grammar causes good writing. But research since 1900 has proved the theory almost unequivocally false. Questions about the importance of teaching grammar to improve writing linger because any study of language -- including grammar -- influences thinking, hence writing. But teaching grammar to improve writing is as futile as shortening words and sentences to improve readability.

Though readability formulas as guidelines to writing may be generally discarded, they are not totally worthless.
They provide one useful principle of revision which shows measurable and replicable increases in readability:

Thoughtful manipulation of vocabulary can increase readability. Simplifying vocabulary produced the few positive effects achieved by Duffy and Kabance (734). This finding is consistent with Frederiksen's hypothesis that deep structure is essentially semantic, rather than syntactic (Marshall and Glock 13). Further, word knowledge is the single factor most highly correlated with reading comprehension scores on tests (Marshall and Glock 12).

"[T]he word or semantic variable is consistently more highly predictive than the sentence or syntactic variable" (Klare "Assessing Readability" 96).

We cannot, however, accept unequivocally that shortening words increases readability (Selzer 78). Shorter words increase readability only when they are more familiar to the reader. Readers, in fact, seem to prefer shorter words, as evidenced by their tendency to abbreviate long words once they become familiar. For instance, examination has become exam. But word length is not really the issue; the number of morphemes is probably more important. Siegel, Lambert, and Burkett suggest that technical writers attend to the number of morphemes in a word rather than concern themselves with word length (2).

Like the maxim to shorten words, the conventional advice to shorten sentences is also rooted in readability
formulas. However, none of the evidence shows that merely decreasing sentence length increases readability (Klare Measurement of Readability 122; Charrow and Charrow 1320). Sentence length is important because it is an aggregate of all other features of the writing (Bormuth 53). Shortening sentences, therefore, increases readability only when the writer makes other changes, as well.

In fact, shortening sentences to improve readability can have a negative effect. Some evidence shows that shortening sentences, even while effectively changing readability scores, nonetheless frequently results in greater comprehension difficulties (Marshall and Glock 54) (Bruce, Rubin, Starr 7). Editors often shorten sentences by deleting vital connectives (such as if, then, and that) and omitting necessary repetition (Irwin, Davis 126). But readers, particularly average and poor readers, depend on these connectives for comprehension (Marshall and Glock 38; Irwin "The Effects of Explicitness..." 528). In Marshall and Glock's study, the more skillful readers benefited less from the presence of such connectives, presumably because their greater intelligence allowed them to overcome textual hurdles (Marshall and Glock 39).

Instead of sentence length, E. D. Hirsch, Jr., sees clause length as the relevant factor in readability (108). No clause should exceed the capacity of short-term memory. Clauses exceeding this capacity are not very readable.
because the reader forgets some of the functional words before the clause ends (Hirsch 111). The reader is then forced to go through the reading process again (Hirsch 111).

But readability is more than word length, sentence length, or even clause length. Early researchers, probably entranced by the apparently objective, scientific evidence offered by formulas, jumped to hasty conclusions about the causes of readability. They misused the formulas, which were designed only to predict the readability of written documents, and they developed questionable guidelines for achieving readability.
II. Readability: An Extended Definition

Now commonly considered a goal of professional writing, readability is nonetheless not clearly understood. Definitions vary greatly, and they rarely -- if ever -- include a discussion of the assumptions underlying readability.

At times, readability refers to simple legibility and includes a consideration of type size and graphic display. More commonly, though, readability refers to reader comprehension: one text is "more readable" when its readers' comprehension is greater, as evidenced by tests measuring their recall of content. Here clarity is stressed; the cognitive elements of logic and organization are most important.

Sometimes readability refers to reader interest or ease of reading, as indicated by reduced reading time. When something is easy and interesting to read, it can be read quickly. Reader interest is often tied to affective elements in the text, such as an effective description, pleasing or arresting poetic devices, or even subliminal sexual references. Humor also can increase reader interest.

A consideration of affective elements, as well as of cognitive elements, is necessary for a complete definition of readability. Poetic devices which appeal
to the ear or to the eye increase readability by increasing the interest and pleasure of the reader. Writers must, of course, use such devices judiciously. In *In Style: An Anti-Textbook* Richard Lanham calls for "play" in language. Creativity and play in language increase readability because they lead to pleasure for the reader -- and, incidentally, for the writer as well.

Yet another way of looking at readability focuses on reader performance. Can readers of a text successfully perform a certain task? Sets of instructions are readable to the extent that they lead to successful performance; recall may not be necessary or even important.

Ernst Rothkopf contends that the only way to judge a document's effectiveness is to look at some external referent; one cannot look at the document itself (96). For instance, a textbook is effective only when it is successful in the classroom, and a technical document is effective only when it achieves its purpose.

Thomas Huckin's definition of readability is important because it stresses the importance of audience and purpose: "Writing is 'readable' to the extent that its meaning can be easily and quickly comprehended for an intended purpose by an intended reader operating under normal conditions of alertness, motivation, time-pressure, etc." (91).
For a document to be readable, it must be directed toward a particular audience. The writer's efforts regarding legibility, clarity, and reader interest must match up with the audience's needs. Further, the writer must keep the concern with readability consistent with the rhetorical purpose of the document.

Much of the advice to students on readability completely ignores rhetorical purpose. Often readability guidelines are predicated on the assumption that clarity is most important. In fact, diplomacy or even a certain amount of obscurity could be more important.

So readability must include all of the meanings above—legibility, clarity, reader interest, performance—and all are tied to audience and rhetorical purpose.

But a definition of readability is not complete without a discussion of the assumptions one subscribes to on accepting readability as a goal. One must accept, at least partially, a theory of style Louis T. Milic calls "rhetorical dualism" (67). This view implies that ideas exist "wordlessly" and that they can be expressed in a number of ways (67). When one revises a text to improve readability, one assumes--knowingly or unknowingly--that a change in surface features can improve readability without changing meaning. Such an assumption is inherent in any attempt to write or edit for readability.
One must also accept, at least conditionally, that a text can possess features which contribute to a general quality of readability. For pragmatic reasons, one must accept that readability can be partially "text-based" and that audiences of readers have certain general needs which can be met by texts. In fact, readers can never be isolated from writer or from context.

While I intend to accept conditionally these assumptions, I must note at the outset that "true" readability of a text can be assessed only in terms of a particular audience reading with a particular purpose under certain conditions. Further, any change in a text, for purposes of readability or otherwise, is in fact a change of meaning.

Accepting these assumptions for pragmatic reasons is not unusual. Often teachers accept the validity of primary trait scoring while, at the same time, reserving the right to evaluate papers holistically on the basis of the way features of text work together in a particular context for a particular purpose. One can also accept these assumptions and the principles of readability for their practical value.

These principles and features identified as contributing to readability can be regarded as primary traits, parts of the whole which are never equal to the whole. They can be useful, but they must never be seen
as absolutes. A final assessment of readability must always recognize a particular writer focusing on a particular audience with a particular purpose, reading at a particular time.
III. Advances in Readability Research

Interest in the concept of readability thrives, despite the false lead of early researchers who used the formulas to develop readability guidelines. Working with the formulas, these early researchers failed not only because the formulas measure correlative rather than causative factors, but also because the formulas focus exclusively on the written product, thereby ignoring reader, reading process, and the writer's rhetorical purpose. But research is now turning from the formulas and the written product to somewhat more fertile ground—the reading process.

While still ignoring rhetorical purpose and audience, researchers in cognitive psychology are now making some progress of interest to writers of business and technical documents. These researchers focus on the reading process; they define readability as reader comprehension, and they measure it as reader recall. This view of readability, although limited, addresses the area many writers of business and technical documents see as most important.

Both business and technical writing have long emphasized the plain style for its clarity, brevity, and objectivity. Business English courses have stressed correctness and grammar over composition and experimentation with language, assuming that good writing would flow from the infusion of grammar and editing skills. In a widely
circulated article defining technical writing, W. Earl Britton has written that technical writing's primary characteristic is its emphasis on clarity. "The reader must be given no choice of meanings" (10). Such control by the writer is, of course, impossible and not even desirable, yet many accept his dictum. In his article on style in technical writing, E. Dandridge has written that good technical writing is "stylistically simpler" than other writing (24). Further, Robert Hayes says technical writing is conservative and more the "slave of rule" than popular prose (4).

Ironically, this overriding concern with clarity and correctness may be one of the main causes of unreadable prose. Student writers in business and technology frequently miss out on the opportunity to experiment with language, to "play" with language creatively. Hence, they miss the opportunity to develop a range of styles, some of which are essential to truly "readable" prose. Unfortunately, very little research goes on in this area.

The almost universal acceptance of clarity/comprehension as a criterion for excellence makes the research in cognitive psychology important to those interested in business and technical writing. But perhaps of more value than research on clarity/comprehension, though, would be research on the affective elements of prose--more concern with sounds, images, and reading aloud.
prose—more concern with sounds, images, and reading aloud. Unfortunately, the long tradition in business and technology fosters the more pragmatic approach and hinders research and even experimentation in other areas.

But an enormous amount of research is directed toward readability as comprehension and clarity. The results of the research are not iconoclastic; to the contrary, this readability research provides empirical support for what we already "know" from rhetoric, composition research, and intuition. It does, however, offer new insights into the comprehension process, and it suggests some strategies for writers who wish to improve the comprehensibility of their prose.

Central to the readability research in cognitive psychology is Kintsch and Van Dijk's processing model of reading comprehension. It has gained broad acceptance and serves as the basis for much research of interest to writers. This processing model posits that two psychological constructs govern the reading process: long-term memory and short-term memory (Huckin 96).

Long-term memory is the repository of a large number of schemata formed on the basis of patterns of experience (Huckin 96). Every schema is made up of features which result from the individual's prior experience; hence, someone who has had much experience with a concept will have a richer schema for that concept (i.e., a schema with
more features) than will someone who has had less experience. These schemata guide the way we perceive and remember.

Short-term memory is our capacity for a precisely limited number of items, usually thought to be seven, plus/minus two. This capacity appears to be limited spatially rather than temporally: The number of items is important—not the number of seconds short-term memory operates (Hirsch 111). According to Huckin, "Short-term memory comes into play during the relatively automatic, linear processing of words and phrases" (96).

When viewed phenomenologically, comprehension appears to be very simple. But according to Kintsch and van Dijk, a number of operations occur: First, elements of the text become organized into a coherent whole; second, the full meaning is condensed into its gist; third, new texts are generated from the "memorial consequences" of the comprehension processes (363).

Writers are most interested in the first two operations and in research which might answer questions such as the following: How can elements of text be made prominent so that readers can more easily organize elements into a coherent whole? What devices of coherence or structure assist the reader in condensing meaning into its gist?

Such questions have fueled empirical research
examining the processes and mental operations which occur in the mind of the reader. As a result of this research, cognitive psychologists now generally agree on two basic areas relevant to readability: 1) Schema theory; 2) The concept of hierarchy and leading edge strategy.

Schema Theory

Cognitive psychologists see the human mind as capable of constructing abstract "generic" patterns on the basis of experience. They are in broad agreement that these patterns, or schemata, are stored in long-term memory and affect the way we view new information, hence the way we learn, understand, and comprehend from what we read. Defined by Kintsch, Mandel, and Kozminsky as "general knowledge structures that abstract the conventions and principles observed by any given culture in constructing particular types of text," the schemata direct all our conscious activities and form a semantic context which must be activated for comprehension to occur (547). Rather like archetypes, they comprise our "prior knowledge" and serve as a framework, making new information more meaningful and easier to assimilate. But what activates the schemata and brings them to a reader's conscious attention?

Schemata may be activated by explicit organizational plans. Classical rhetoric has already identified many kinds of forms that writers may use as schemata. Meyer's research indicates that informationally prominent plans are
perceived by the reader as important, thereby activating the schemata and facilitating comprehension (1977, 1980/81, 1982). Meyer contends that the presence of a visible plan in a piece of writing is crucial to comprehension, and she advocates the teaching of writing plans ("Reading Research..." 38). Her research shows that students who had instruction in identifying and using plans recalled nearly twice as much content, even a week after reading ("Reading Research..." 39).

Writers interested in readability must concern themselves even more with rhetorical patterns and the structure of discourse. They must make the patterns and structure more prominent, more "visible," in order to assist the reader in the comprehension process. As shown by Meyer, a reader's use of the author's top-level structure is the best predictor for recall of major details for all passages and for all recall conditions ("Use of Top-Level Structure..." 97). But often structure is hidden or implied, and readers—even those entertained or stimulated by a "readable" text—fail to remember the content.

To improve reader comprehension, then, writers must become more familiar with structural analysis. Francis Christensen uses the categories of coordination and subordination in his analysis of prose. But Will Pitkin sees these categories as "too loose" and suggests we view prose in terms of "discourse blocs" ("Discourse Blocs"
Pitkin has identified ten structural relationships based on function which seem useful to writers. If, indeed, explicit plans activate schemata, then writers who make such relationships and organizational plans more prominent aid their readers' comprehension and, thereby, improve readability.

Another way to activate schemata is to involve the reader by using an adaptation of a technique from classical rhetoric, narratio. This "scenario" principle urges writers to create stories and anecdotes to facilitate reader comprehension. Flower, Hayes, and Swarts learned from their reading protocol research that readers themselves frequently apply the "scenario" principle to decipher and restructure difficult written material (44). Writers who use the strategy assist readers in this deciphering/restructuring process. In addition, the scenario principle necessitates personal pronouns, which generally result in fewer nominalizations.

Schema theory relates to another principle of classical rhetoric: Audiences with prior knowledge of the subject require less orientation and fewer explanations from the writer. An audience not familiar with the subject requires that a writer quickly and effectively activate the schemata related to a certain piece of writing. For a lay audience, the technical writer must use familiar, non-technical concepts to evoke schemata which make inferences to
unfamiliar ones easier.

But some researchers in schema theory, namely Bransford and Johnson, contend that prior knowledge alone is not enough. Even readers with prior knowledge require that writers evoke the relevant schema. Bransford and Johnson's passage describing laundry procedures is generally incoherent, despite readers' prior knowledge because the writer neglected to evoke the relevant schemata (Bransford and Johnson, 717-26).

Images and analogies may activate schemata. Writers have long known how effective such devices are. Probably an analogy or an image evokes a schema, which carries with it numerous features. Common analogies are more effective because they evoke richer schemata, i.e., schemata with more features. A computer manual uses the image of a trash can to represent data which has been "disposed of," set aside, but which is still retrievable, as opposed to data destroyed by incineration. Another example is the "desk-top" analogy, which is used with some software programs to represent data in working memory, as opposed to that in relatively inaccessible files.

Simple formatting devices can make items of text more visually prominent and perhaps thereby evoke the relevant schemata. Huckin says that "semantic contexts (i.e., schemata) are activated whenever they are perceived by the reader as being important to comprehension" (94). Writers,
particularly those who use computers and word processors, have considerable control over printing conventions, such as headings, indentions, boldface, automatic centering, and underscoring, which can make certain items of text seem important. But such techniques must not be overused, or the effect will be lost. For example, writers who use "all caps" for emphasis must do so very sparingly because this convention causes a readability problem: all caps result in uniform word shapes and provide the reader with few cues for deciphering words.

Further, representations like pictures, drawings, graphs, flowcharts, and tables are often better than text at making certain kinds of relationships clear. Wason found that logic trees transmit conditional information -- exceptions, qualifications, etc. -- better than prose (548-9). Probably such representations are more effective than prose in evoking the relevant schemata. Writers must, then, become more familiar with these non-verbal, spatial approaches to conveying information.

Hierarchy and Leading Edge Strategy

Leading edge strategy posits that information is absorbed, stored, and recalled as a joint function of 1) height in the hierarchy, which is governed by long-term memory, and 2) recency of presentation, which is governed by short-term memory (Huckin 96).

The first function, height in the hierarchy, can be
understood in terms of how readers usually process a text. They give more attention to information which comes first and make more inferences about this high-level information. They attribute more importance to information staged high, and they expect structurally hidden information to be less important. Readers take longer to absorb high-level information, and they generally recall it better (Meyer "What Is Remembered From Prose..." 332). One explanation for this phenomenon is that the information first encountered is frequently referred to as readers progress through the text, assimilating new information with the old.

The second function, recency of presentation, relates to one of the secondary laws of association in psychology which states that recent impressions and recently formed associations have, other things being equal, an advantage for recall. As the capacity of short-term memory is exceeded, memory decay occurs, and the most recent item or proposition is the one most likely to be recalled.

Meyer supports this concept of hierarchy. She concluded that superordinate information high in the content structure of a passage is more likely to be recalled immediately after reading and is subject to less forgetting over time ("What Is Remembered From Prose..." 319). Meyer sees the organization of information in a passage as the most powerful variable related to recall, overpowering in its effectiveness even the impact of proleptic devices.
In addition, Paul Clements' research affirms that staging information high in the hierarchy positively affects reader recall (329). Clements suggests that writers view staging as a "default option," namely, the choice to be made unless some higher consideration overrides the rule, as when a writer deliberately violates some principle (328). Kieras, too, recommends that key points be placed high in the hierarchy of discourse, and he suggests that we have a linguistic convention calling for the theme of a passage to be stated first (13-28).

Relevant to this notion of hierarchy is Alexander Bain's precept that paragraphs have topic sentences. Although the writings of Arthur Stern (1976) and Richard Braddock (1974) have discredited the topic sentence, a growing body of evidence supports its use on the grounds of improved readability and comprehension (Gagne, Wiegand; Clements; Aulls; Irwin, Davis, 126). Even though topic sentences may be implied or non-existent in some writing, research shows that they are helpful to readers. Technical writing texts overwhelmingly endorse the use of topic sentences.

Relevant also is the research of Haviland and Clark (1977). They write about the social contract between speaker and listener which includes the maxim of antecedence. Speaker and listener agree that there should
be a point of antecedence which serves as the reference for succeeding information (Haviland and Clark 2). Such a reference, explicitly stated early in the discourse, should make comprehension and recall easier.

This levels effect has implications for certain kinds of writing, namely writing which is expository and stresses clarity over persuasion. Of course, persuasion is an important element in all writing, and it cannot be isolated or relegated to its own corner. At times, though, the conventions of business and technical documents dictate that the element of persuasion be subordinated to syntax and semantics. In those instances, clarity supersedes persuasion and makes research on the levels effect applicable.

The readability of routine requests and inquiries, action memos, periodic and progress reports, simple product descriptions, and so on, may be improved by the writer’s use of the levels effect. Key points of a text should be placed in superior positions, i.e., in topic sentences at the beginnings of paragraphs, in headings, subheadings, etc. Important details should be listed rather than subordinated because the listing approximates height in the hierarchy. Hence, the use of a deductive, rather than inductive, method of development should be more effective for readability in those instances when clarity and reader comprehension are most important.
Unfortunately, researchers in cognitive psychology fail to see that their bias toward readability as clarity, comprehension, and recall renders research on the levels effect invalid for writing which is primarily meant to persuade. Stating the conclusion in the topic sentence early in the paragraph does not always result in greater readability. Correspondence meant to argue or to persuade -- to sell a product or an idea, to convince someone to act, or to refuse a request while maintaining good will -- demands that writers use another strategy. They should begin with a point of agreement, a related issue, or a tactic of persuasion to prepare the reader. Like the periodic sentence, this approach builds to a climax, with its main point at the end. The reader is led, logically and methodically, phrase by phrase, to accept or to understand the writer's main point.

Conclusion

The principles of schema theory and the levels effect seem useful, particularly to writers of business and technical documents, but it is important to note again that 1) the term readability, as used in this research, refers primarily to clarity and comprehension; 2) the foregoing research fails to recognize how rhetorical purpose influences readability; 3) the research ignores audience and the reader's purpose. Hence, we must be careful applying the basic research in readability to on-the-job
writing.

The research in cognitive psychology generally equates readability with simple clarity and comprehensibility, as measured by reader recall. Yet the writer may not have simple clarity and expository prose as his main goals. Inciting anger at an injustice, implying blame, arousing suspicion, or casting doubt may be more important. Guidelines for readability as simple clarity will not work when the writer's purpose is other than the clear and straightforward communication of content.

Further research in readability must deal not only with the writer's rhetorical purpose but also with the reader 1) as a member of an ethnographic group or discourse community with certain needs and expectations, and 2) as an individual with a specific purpose for reading. We know that the reader's purpose bears heavily on recall and that there are several different reading styles derived from the reader's purpose: skimming, scanning, search reading, receptive reading, and critical reading.

But yet another area of consideration must be addressed. All of these empirical studies of readability depend on accurate measurement of reader comprehension for their validity. Yet different methods of assessment can bring different results. Some studies use a method of assessment based on Fillmore's case grammar. This seems, in fact, the soundest approach. Reader responses to
comprehension questions are broken down into propositions whose deep structure can be more accurately compared with the "correct" answer than can a paraphrase, which is judged by a rater as simply acceptable or unacceptable.

Other methods of assessing comprehension require exact recall of the text. In contrast, yet other methods use a "cued-recall" approach and provide the reader with a stimulus from the text. Still other methods offer readers a case study with some problem to be solved on the basis of information retained from reading.

But accurate assessment of recall is not the only problem. Another problem with judging recall is the amount of time allowed for reading. Recall scores depend crucially on reading times because readers who control their own reading times can generally recall about the same amount of information from a paragraph, regardless of its difficulty. Readers compensate for a hard text by increasing their processing time (Kintsch and Vipond 338).

In general, however, this readability research supports empirically what writers know intuitively and from the literature of rhetoric. It cannot, however, be embraced without reservation. The danger is that this research will be used to develop new readability guidelines, which will be no more valuable than the current morass of maxims about writing style. Those readability guidelines are couched in firm and convincing language, but they sometimes rest on shaky ground.


Christensen, Francis. "A Generative Rhetoric of the


Kintsch, W., Theodore S. Mandel, and Ely Kozminsky.


Meyer, Bonnie J. F. "Reading Research and the Composition Teacher: The Importance of Plans" CCC 33 (Feb 1982): 37-49.

Meyer, Bonnie J. F. "Use of Top-level Structure in Text: Key for Reading Comprehension of Ninth-Grade
Milic, Louis. "Theories of Style and Their Implications for the Teaching of Composition." CCC 16 (May 1965): 66-9; 126.


REVIEW OF THE LITERATURE


Readability formulas fail for the following reasons: 1) They fail to account for many factors related to text difficulty; 2) Their statistical bases are poorly supported mathematically and difficult to generalize; and 3) Their use is inappropriate in both of the contexts in which they seem most valuable, i.e., as guides for writers and as devices for matching children and texts.

These weaknesses in the formulas are magnified when writers use the formulas prescriptively and attempt to write "to the formula." Research cited in this article shows persuasively that writing "to the formula" frequently results in a text which is more difficult to read.

Authors Bruce, Rubin, and Starr list four conditions which must be adhered to for the readability formulas to have even limited validity. Formulas are "more or less appropriate" when 1) Material may be freely read (not timed or limited by external factors);
2) Text is honestly written, i.e., not written to a formula; 3) Higher-level text structures are irrelevant, i.e., when organizational material, information about intentions, goals, etc. need not be specifically taken into account; 4) Purpose in reading is irrelevant.

The authors conclude that the formulas probably do not ever improve on intuitive estimates of readability. The real factors which affect readability are the background knowledge of the reader relative to the knowledge presumed by the writer, the purpose of the reader relative to the purpose of the writer, and the purpose of the person who is presenting the text to the reader.


The authors propose general procedures for categorizing and weighing the components of the sentence while taking into consideration both meaning and grammatical structure. To develop the formula, the authors studied 1) experimental data on how children process syntactic structures, and 2) language and development studies of children's language, both oral and written.
Their formula, rooted in transformational grammar, measures factors of syntax and assigns to them degrees of difficulty intended to reflect what is and is not hard for young children to process. Botel, Dawkins and Granowsky recognize that their formula has several limitations: 1) A number of factors in syntax do not readily lend themselves to measurement; 2) Small degrees of differences in syntactic difficulty exist which cannot be rated on a scale without making the scale too cumbersome to be useful. For this reason, the authors have rated many items as equivalents when in fact some differences in their complexity clearly exist.

A passage's syntactic complexity rating is arrived at by averaging the ratings of the sentences within the passage. Each sentence is first assigned a complexity rating based on its sentence pattern and syntactic features. The most frequently used simple sentence patterns have a zero count. Zero count structures include simple interrogative sentences, exclamations, and imperatives as well as coordinate clauses joined by "and." These simple sentence patterns contain few adjectives, adverbs, or prepositional phrases.

One-count structures are still simple sentences, but the patterns are somewhat less frequently used, presumably by children. Differences between zero-count
structures and one-count structures seem minimal. Two-count structures include passive transformations, paired conjunctions, comparatives, and sentences with dependent clauses. Three-count structures include clauses used as subjects and absolutes.

The authors propose their formula as "a reliable and valid measure of complexity of syntactic structures" and contend that it should be useful in preparing and choosing reading materials.


Clark contends that technical writers show little concern for readability measures, citing as evidence a table of mean readability data of selected technical publications with readability scores of two to seven years past high school. Clark discusses three methods of assessing readability, the Dale-Chall method, the Fry graph, and the cloze method.


Clark and Haviland's discussion of the contract
between speaker and listener is important to a
discussion of readability because of their emphasis on
"communicative efficiency."

The primary convention of the social contract
between speaker and listener is Grice's "cooperative
principle," which entails four maxims: 1) Quantity--make your contribution no more and no less informative than is necessary; 2) Quality)--say only that which you both believe and have evidence for; 3) Relation--be relevant; 4) Manner--make your manner easy to understand by avoiding ambiguity, obscurity, and prolixity.

Haviland and Clark view their "given-new" contract as one aspect of Grice's more general cooperative principle; they define the given-new contract as the implicit agreement between speaker and listener about how information that is known and information that is novel will appear in sentences. Central to the given-new contract is the "maxim of antecedence," i.e. utterances should be constructed so that the listener has only one direct antecedent for any given information and that it is the intended antecedent. When the speaker violates the maxim of antecedence, the listener takes longer to comprehend the information for s/he must, in addition, turn to one of three procedures: bridging, addition, or restructuring.
Haviland and Clark predicted that violations of the maxim of antecedence would result in increased processing time. Their 1972 study, which tested readers' reaction times to 34 pairs of sentences, proved their hypothesis.


Clements' experiments provide strong empirical evidence that staging has a positive effect on what is recalled from reading. He proposes that writers view staging as a "default option," i.e. the choice to be made unless some higher consideration must take precedence to override the default, as when a writer deliberately violates the "rules."

This article provides an explanation of the theory behind staging: Grimes' analysis of discourse is summarized and the rules of staging are illustrated in enough detail so that readers could construct a staging hierarchy themselves. These rules of staging show how to determine, by means of linguistic analysis, which aspects of a message base have been given maximum prominence. Grimes assumes that writers can use this information to manipulate surface structure in order to maximize reader recall.
While affirming that staging information high does positively affect reader recall of that information, Clements anticipates and answers an objection to his interpretation of the study's results. Clements addresses the serial position effect, which some might offer as a rival explanation. The serial position effect would predict that information located at the beginning and end of a passage would be best remembered (due, respectively to primacy and recency) and information a little after the middle of a passage would be worst remembered.

Clements, however, took care in planning these experiments to develop a number of instances in which the prediction from a serial position hypothesis would run counter to the prediction from staging. Clements determined that staging rules can set up a passage to mimic the serial position effect and that they can, as well, destroy it. His strong conclusion is that staging influences reader recall and that it should be further studied.


The authors argue against the use of readability formulas as guides to writing because 1) the formulas
do not define the actual features of text which constitute readability, and 2) the formulas sometimes call for changes in text which result in more difficult reading.

A true measure of readability must include a number of subjective factors, namely those which constitute the skill of the writer who supposedly has created a coherent, well-formed text to which objective measurement may eventually be applied.

This article summarizes the research of several investigators. In addition, it is valuable because it attempts to identify the "Black Box" features of readability, i.e., those mostly unexplored features of writing which contribute to readability: explicitness of connection between clauses; the extra sentential, pragmatic factors of discourse and sentence topic and focus; the inference load placed on a reader; the epistemological status of statements; and finally, the appropriateness of vocabulary for a particular audience reading with limited background knowledge.


This text provides a basic discussion of the general nature of syntactic complexity; it describes how rules of language produce complex syntax and raises questions about reading difficulty. It attempts to
answer the question, What makes processing written syntax easy or difficult for children?

Dawkins suggests that our studies of readability should include consideration of writing that violates logical thought and orderly relationships, natural sequences, and clear references. A consideration of these faults, which result in hard reading, would improve our judgments of appropriate syntax.


While this article does not address the question of readability per se, it does discuss an issue central to readability, in particular, the efficient transmission of information.

DeBeaugrande suggests that the language experience of today's students is chiefly that of spoken discourse, which includes substantial mixtures of dialect. Because students are more familiar with spoken discourse, "informationally prominent" items should be placed in positions where natural intonational stress falls. In the typical English sentence, this stress falls somewhere in the predicate rather than in the subject.

DeBeaugrande believes that teachers can use grammar to awaken their students' awareness of how
information (old and new) is distributed in a sentence and how that distribution corresponds to natural intonational stress.


DeBeaugrande reports the inconclusive results of his experiment intended to determine which of five versions of a passage on rockets was the most successful 1) as judged by composition experts, and 2) as indicated by increased reader recall of the content.

DeBeaugrande revised the original rocket passage to bring it into conformation with five approaches to style (inversion, ornamentation, condensation, poor distribution, and deliberate "misleadingness") and hypothesized that the version rated most highly by the composition experts would be the version which elicited the greatest recall from readers. However, his hypothesis was not proved by the experiment.

First of all, composition experts (named in Footnote 2 of the article) did not agree on which version was superior. They fell basically into two camps: conciseness versus vividness. One group of experts expressed a preference for vividness, rating the version revised for ornamentation highest; another group expressed a preference for conciseness, rating the version revised for condensation highest. This
dichotomy could probably have been anticipated since deBeaugrande did not provide the composition experts with any sort of grading rubric or standard to be used in evaluating the passages.

Secondly, reader recall was nearly constant across all six versions of the passage. DeBeaugrande attempts to explain this perplexing result by suggesting 1) that students had enough prior knowledge of the content to overcome the obstacles, and 2) that poor style might be the kind of "communicative noise" that actually improves performance by increasing reader alertness.


Doherty discusses Hirsch’s position on readability and evaluates the research it is based on. Because the individual pieces of research which support Hirsch’s chain of reasoning are mutually inconsistent, they should not be considered complementary contributions to a general theory of memory. Doherty concludes that the central argument of The Philosophy of Composition is faulty.


Duffy and Kabance’s experiments offer no support
for the hypothesis that readability formulas can be used as the basis for simplifying texts. The authors revised a reading-to-do manual for Navy recruits, reducing its readability score by six grade levels, yet there was no significant increase in comprehension. Their experiments, based on George Klare's 1976 model, used large groups of low-motivated readers unfamiliar with the topics. Editing guidelines were derived from readability formulas and presumed that simplifying syntax and vocabulary would effect increases in comprehension.

In the face of strong evidence that a "readable writing approach" is ineffective, the authors suggest that comprehensibility might be better controlled through the use of the "transformer" concept described by MacDonald—Ross and Waller (1976).

Endicott, A. L. "A Proposed Scale for Syntactic Complexity."  

Endicott proposes a theoretical model which defines the units of syntactic complexity in psycholinguistic terms in an attempt to bring together three diverging branches of research: linguistic, psycholinguistic, and reading.

Endicott's scale is based on the co-meme unit, which has four subcategories: 1) The base co-meme refers to those morphemes expressed at a language
level that has one morpheme per word unit, e.g., "The house is large." 2) The syntactic co-meme refers to a syntactic operation by which sentences are combined or altered to achieve efficiency or variation of purpose beyond that achieved at a minimal unit of language, e.g., "The white house is large," which represents increased complexity. 3) The compression co-meme refers to the theoretical morphemic burden of deep structure that is compressed into surface structure through transformations, "The girl and the boy walked to the school," which represents increased complexity. 4) The morphemic co-meme refers to those expressed by base co-memes (e.g., in the word conductivity, conduct is the base co-meme, and -ive and -ity are two morphemic co-memes.) The point of reference for Endicott’s scale is the minimal level of language, which is defined as "a sentence which contains no optional transformations and which, barring tense morphemes, represents a one-morpheme-per-word level."


This essay details the results of a study intended
to, first, explore the kinds of "revisions" readers make in their attempts to understand a difficult functional document, and second, to suggest that readability formulas alone are an inadequate way to measure the effectiveness of much technical writing. They discovered that readers of difficult functional documents, such as Federal regulations, interpreted prose by organizing it around human agents and their actions and that expert government revisers seem to provide that human focus throughout their prose, not only in sentences but also in headings.

The scenario principle represents an advance in readability because it moves beyond formulas to the overall organization of the writing, which seems to be the most serious obstacle to document effectiveness and readability. While advocating the scenario principle, the authors stress that they do not discount the importance of revising for familiar words and shorter sentences -- they are suggesting a "companion" principle.


Frase explores the influence of paragraph organization on recall and the effects of conceptual
preinformation. He concludes that 1) knowing the
general structure of a passage aids recall and that
this advantage is most evident as learning progresses;
and 2) conceptual preinformation improved recall as
trials progressed. In this experiment, forty-two Bell
Lab employees read passages about chess organized
according to 1) concepts (chessmen), 2) attributes, and
3) rote (randomization).

Both concept and attribute organizational
approaches yielded substantially equal recall results.
The advantage of this preinformation was not
immediately evident but instead had a cumulative
effect, manifesting itself as more was learned. In
later learning, the informed group recalled 60% while
the uninformed group recalled 48%.

Gilliland, John. Readability. London: Hodder and

This text offers a general discussion of
readability, summarizing the major formulas and
providing a detailed discussion of methods of assessing
reader recall. It contains an annotated bibliography
of readability research prior to 1972.

Harber, J. R. "Syntactic Complexity: A Necessary
Ingredient in Predicting Readability." Journal of
The author discusses the problems with readability formulas and stresses the importance of syntactic complexity in any discussion of readability. She advocates the development of readability formulas which take syntactic complexity into account.


In this article, Haviland and Clark detail the results of three experiments proving their hypothesis that comprehension times for sentences with direct antecedents will be faster than comprehension times for sentences with only indirect antecedents and for those which require the restructuring of information.

According to Haviland and Clark, we divide declarative sentences into "given" and "new" information when we read. We view the given as a pointer to a direct antecedent in memory and search for it. When we find it, we attach the new information to it. If we cannot find a direct antecedent we do one of three things: 1) we form an inferential bridge from something we do know; 2) we view all the information as new; or 3) we try to restructure the information.

Hirsch discusses the decline in national literacy and the results of his research in evaluating writing. To arrive at non-arbitrary evaluation of writing, Hirsch based his experiments on actual audience effects. He found that audiences familiar with the content could read "good" writing more efficiently than "bad" writing. However, audiences unfamiliar with content were unaided by the attributes of "good" writing.

Hirsch concludes that one cannot base writing evaluations on audience effect, even though that is the only non-arbitrary principle that seems sensible. He says that reading skill is not a constant against which writing can be evaluated.


Hirsch attempts to isolate the psychological principles of readability and to identify the fundamental conflicts in the psychology of readability.

He begins with a discussion of word predictability, a feature of writing which speeds up the reader's processing time by decreasing uncertainty. Since a reader's reaction time increases linearly as the number of possible stimuli increase, any technique which reduces uncertainty will increase readability by
shortening processing time. Constraints on the reader’s attention increase word predictability, and they should be greater in the middle of discourse than at the beginning. The beginning, however, should be constraining because beginnings are more closely attended to and more firmly remembered than middles and ends.

Clause length, rather than sentence length, is the relevant factor in readability. If a clause requires a reader to exceed the capacity of short-term memory, then the clause will not be very readable because some of its functional words will have been forgotten before the clause ends, and the reader will have to go through the scanning-reviewing process again.

Short-term memory has a limited number of items, so it follows that there will also be a firm limit on number of grammatical structures. Reducing the number of hierarchical structures (grammatical depth) suspended in memory, thereby putting a lesser load on short-term memory will increase readability.

Readability is also enhanced when subclausal groupings and intra-sentence groupings have the semantic closure of complete sentences. When closure is rapid and stable, processing time and the burden on short-term memory are reduced.

Some further implications for readability can be
found in the concept of long-term memory. Here information is stored without syntax. Since meaning of the whole discourse is stored in nontemporal, non-linguistic form, the writer can assist the reader by repeating a small number of thematic tags which represent the remembered and expected holistic meaning. The writer can further assist the reader by proving retrospective and prospective links which express the semantic connections.

In conclusion, Hirsch states the fundamental conflict: Even if a writer wanted to achieve maximum readability at the expense of all other considerations, she would fail if she merely followed a simple formula. Instead the writer must make stylistic choices based upon intelligent compromises. The writer must choose between semantic adequacy and speed of closure. The writer cannot base revisions on a simple, direct connection between clause length and readability because the connection between short-term memory and readability is very complex.


Hirsch advocates efficiency as the goal of prose. Communicative efficiency, "the most efficient communication of any semantic intention, either
conformist or individualistic," becomes "relative" readability, i.e., relative to the semantic intentions of the writer.

Hirsch contends that efficiency in prose is entirely one-sided, unlike efficiency in oral speech which depends on both speaker and listener. He defends a "one-sided" goal of efficiency, i.e., relative readability, on the grounds of historical evolution and personal preference.


Huckin responds to the general dissatisfaction with readability formulas by discussing the experimental research in cognitive psychology. This approach to readability focuses not on the written product as the formulas do, but rather on the reading process, investigating the mind of the reader in an attempt to discover the various mental operations involved in comprehension of text. Huckin believes that this understanding of reading is crucial to providing sound advice about how to write. On the basis of empirical research into factors which caused comprehension and recall to improve, Huckin formulates eight tentative guidelines for the technical writer.
Huckin discusses four theoretical concepts that seem most useful to technical writers: 1) schema theory, 2) activated semantic contexts, 3) levels effect, and 4) leading edge strategy. These theoretical concepts provide a background against which to understand the following features of text: headings, topic sentences, and the grammatical subjects of sentences.

Huckin suggests that both readability formulas and principles derived from cognitive psychology should be used. The formulas are to be used after the fact, testing the product, and the principles are to be used in composition of the product.


On the basis of her study of the comprehension of college students and fifth graders, Irwin asserts that writers of textbooks should avoid implicit causal statements, particularly when the relationships are logically reversible. Causal relationships should be made explicit, even when the result is a longer sentence.

Irwin, Judith W. "The Effect of Linguistic Cohesion on Prose Comprehension." Journal of Reading Behavior XII, 52
This study suggests that cohesive ties be used as a new readability variable because an increase in the number of cohesive ties in a text has two positive effects: 1) it significantly improves readability as evidenced by reduced reading time, and 2) An increased number of cohesive ties has a positive effect on memory stability as measured by a delayed prompted recall task.


Irwin and Davis list the inadequacies of readability formulas: 1) Formulas do not examine the match between the conceptual background of the reader and the concept load of the text; 2) They do not examine the way new concepts are introduced; 3) They do not consider how motivational the materials are; and 4) They do not examine factors necessary for retention, such as organization and reinforcement.

As an alternative to readability formulas, the authors offer a checklist of thirty-six items based on currently accepted research in prose comprehension. Teachers use the checklist to evaluate the readability of a text by answering subjectively questions about the text's "understandability" and "learnability."

Irwin discusses the growing evidence that inferring connectives is more difficult than understanding them when they are expressed explicitly. She provides three teaching strategies which should improve students' comprehension of implicit connectives.


The results of Jones' study confirm her hypothesis that instructions containing the qualifying negative "except" would be less efficient, in terms of speed of performance, than would be the positive form of instruction.


The authors define readability, discuss traditional approaches, and consider new directions in research. They propose additional text and reader characteristics that determine reader ease and suggest that these characteristics be added to the existing
formulas: number of propositions, number of different arguments, number of inferences required to connect a text base, and number of long-term memory searches and reorganizations that are necessary in its construction.

Kintsch and Vipond outline the framework of a research program to investigate readability. While they see the research program as promising, they admit that the outcome of such a research program might well be that the concept of readability is "beyond salvation."


This article details the results of three experiments in which readers write summaries of stories which have paragraphs out of order. Readers summarize these stories remarkably well, particularly when the story is a well-structured one which corresponds to the reader's schema.

The subjects' reading and writing times support the argument that the macrostructure of a story is formed during reading, as part of the comprehension process, and not merely when one is asked to summarize the story. Subjects took significantly more time to read the scrambled stories but required no additional time to summarize them. Subjects reorder scrambled
stories while reading them so that the end product of comprehension is a macrostructure for the story that is not discriminately different from the macrostructure derived from a story read in normal order.


The authors see the reading process as governed by two psychological constructs: long-term memory and short-term (working) memory. Long-term memory is the repository of schemata, which promote comprehension in a number of ways. Short-term memory comes into play during the relatively automatic, linear processing of words and phrases.

Although comprehension appears to be a simple, unitary experience, it is in fact a multiplicity of overlapping processes, numerous interacting subprocesses that run off rapidly and with little interference until attention, consciousness, decisions, and memory become involved. Then the capacity limitations of the human system become apparent. Kintsch and Vipond’s processing model specifies three sets of operations. In the first, meaning elements are organized into a coherent whole. Then meaning is condensed into its "gist." Finally, new texts are generated from memory. These operations are
increasingly more active (rather than passive).

This processing model is important to readability. In the past, assessments of readability have been criticized because they failed to account for the organization of long texts. The present model assumes that comprehension is usually a fully automatic process, making low demands on resources. Sometimes, however, comprehension becomes blocked because the reader has to retrieve a referent no longer available in working memory. This is done almost consciously, requiring considerable processing resources. It is assumed that each one of these operations disrupts the automatic comprehension processes and adds to the difficulty of reading. But if the operations are not performed, the text will be incoherent to the reader.

Therefore, texts requiring many such operations that make high demands on resources should yield either increased reading times or low scores on comprehension tests. Thus, readability cannot be considered the property of the text alone; it is rather one of text-reader interactions. Yet some preliminary analyses (Kintsch and Vipond 1978) show that readability changes as a function of short-term memory and the size of input chunks. Fewer of these disruptive operations will have to be made by readers familiar with the writer's schema.
The author concludes that we may soon be able to replace the traditional concept of readability with the questions, "What is readable for whom and why?" and to design texts and teaching methods in such a way that they are suited to the cognitive processing models of particular target groups.


Klare provides a thorough discussion of readability, defining the term and discussing measurements of readability. He identifies five principles for "writing readably": 1) audience, 2) writer's purpose, 3) selection of words, 4) sentence construction, and 5) human interest. His annotated bibliography offers an historical review of readability from the '30s to the '60s.


While not addressing the issue of readability as such, Lanham does discuss the role of clarity. He advocates clarity, but he does not see it as the goal of prose. Instead he calls for a livelier style which embraces the poetic elements of sound and metaphor.

Lanham provides numerous examples which illustrate his approach to style. His guidelines constitute the "paramedic method" which he outlines in greater detail.
in two later texts, *Revising Prose* and *Revising Business Prose*.


On the basis of his study in which forty-eight adolescent learning disabled students served as subjects, Lindsey concludes that text organization and age level did not affect the recall of goal-relevant or incidental interactions. However, direction did have a positive effect on recall: the specific direction group had significantly higher comprehension.


Mandler and Johnson present an analysis of the underlying structure of simple stories and examine the implications of such structure for recall. They conclude that both children and adults are sensitive to the structure of stories and that retrieval is dependent on the schemata operating at the time of recall. The schemata used for retrieval are not necessarily the same ones used to guide encoding.

The authors recommend that an "index of explicitness" be added to readability formulas because their study shows that making content more explicit improves comprehension for average readers.

Two groups of students (community college and ivy league college) participated in this study designed to discover how certain aspects of text affected comprehension. Structural analysis was used to measure both free and probed recall. The two groups responded very differently. The ivy league students were truly fluent readers who were capable of discovering semantic structure, regardless of the degree of explicitness. The community college students, however, were less fluent and benefited from manipulations of text.


This study validates the common recommendation that students should use the author's organizational plan when recalling information read. For all passages and for all recall conditions, use of the author's top-level structure was the best predictor for recall
of major details. The text's top-level structure is a particularly effective retrieval strategy for relatively long retention intervals.

Meyer, Bonnie J. F. "Reading Research and the Composition Teacher: The Importance of Plans." CCC 33 (Feb 82): 37-49.

Meyer relates reading research to composition. She emphasizes that the presence of a visible plan for presenting content is crucial to comprehension and delineates three functions which plans have: 1) topical—they help a writer conceive and organize main ideas on a topic; 2) highlighting—they help the writer show how some ideas are of greater importance than others; 3) informing—they help the writer to present new knowledge while keeping readers aware of the old.

Meyer has gathered empirical evidence that five basic writing plans have specific kinds of impact on reading comprehension. She suggests that we inquire further whether one plan type is more or less effective than another for different communication goals. For instance, readers who identified and used the comparison plan remembered causal and comparative relationships but recalled few specific facts, names, historical events, etc. Readers who recognized and used the time-order plan remembered the specific facts very well but recalled less of the information that was
closely related to the comparative and causal logic in the text.

Meyer concludes that explicit instruction in identifying and using plans should be included in the curriculum for both reading and writing. Students who had instruction in identifying and using plans remembered nearly twice as much content, even a week after reading.


Meyer details the results of her experimental studies, concluding that information high (superordinate rather than subordinate) in the content structure of a passage is more likely to be recalled immediately after reading and is subject to less forgetting over time. Meyer sees the content structure or organization of information in a passage as the most powerful variable related to recall, overpowering in its effectiveness the impact of signaling.

Meyer discusses primacy and recency effects and summarizes much research. While the research on word lists clearly supports the primacy and recency effects, research on connected discourse has had conflicting
Meyer explains the conflict by citing the content structure variable and its influence.


Mitzner and Schramm analyzed 148 pieces of business correspondence using the Gunning Fog index. They conclude that the average reading level of the business correspondence (13.92) was higher than the average educational level of U. S. citizens.


Murdock attempts to explain the serial position curve of free recall on word lists. Essentially his data show that the serial position curve of free recall is characterized by a rather steep primacy effect (readers remember what they read first), followed by a horizontal asymptote extending from the primacy effect to an s-shaped recency effect, which shows high recall for items in the serial position.


Nystrand calls attention to some promising studies of readability, particularly those employing the cloze
technique. He sees the cloze technique as useful in determining 1) readability where readers are identified, and 2) comprehension where texts are known for their difficulty.

Since readers comprehend through prediction and reduction of uncertainty, writers of readable writing must suggest, hint, and constrain. The cloze procedure is useful in determining the amount of reader uncertainty, which can then be addressed by a writer's use of constraints. Nystrand discusses four types of constraints: 1) graphic, 2) syntactic, 3) semantic and lexical, and 4) contextual.


Rothkopf tests the bowed serial learning curve achieved by Deese and Kaufman (1957) which showed greatest recall for sentences occurring early in a passage and least recall for those in the middle. Rothkopf found that order of presentation of sentences within a paragraph had no significant effect on retention. Deese and Kaufman's experiments tested comprehension by free recall, but Rothkopf used stimulated recall. Rothkopf suggests that the different means of assessing recall might be responsible for the different results.
A secondary purpose of Rothkopf's experiment was to explore the possibility that the location of informative material within a sentence has some effect on retention. Here he found that the most difficult terms are best remembered when they appear near the end of the instructive sentence, and that correct recall becomes less likely when the difficult term is located at the beginning of the sentence. This relationship, however, does not hold for less difficult terms. In fact, the converse was true: retention diminished when the less difficult term was located at the end of the sentence.


Rothkopf contends that the effectiveness of an instructional document can only be determined by an external referent; one cannot look at the document itself to determine its effectiveness. One must look to some purpose that the document is intended to accomplish for a source of measurement.

The effectiveness of a document in accomplishing its goals is influenced by certain characteristics of the document. Rothkopf lists nine attributes related
to the instructional effectiveness of documents: completeness, accuracy, goal guidance, unrelated material (that which is not directly relevant to the purpose of the instructional document, i.e., a non-test item), lexicon, exposition, organization and sequence, grammatical structure, and grammatical complexity.


Selzer contends that much of the advice about achieving a readable technical style is misguided. No evidence shows that shortening sentences will make writing more comprehensible and the typical advice to use short words should be reexamined.

We need to consider other factors when we give advice about style, particularly the research of cognitive psychologists, psycholinguists, and discourse analysts on the factors which affect the readability of connected discourse. Selzer emphasizes recent studies of topic sentences, the given-new contract, and proposition density.

This manual was prepared by the Air Force Human Resources Lab, Lowry AFB, Colorado, for writers who wish to enhance the readability and comprehensibility of their work. It provides an historical overview of readability, a discussion of ways to increase readability, and suggestions for evaluating texts through non-analytic methods.


The authors found wide discrepancies among the various readability formulas. The formulas were fairly consistent individually, but there was no clear agreement among them regarding grade level. In one instance, the variance between two formulas was eight grade levels.


Vande Kopple details the results of his experiments testing "Functional Sentence Perspective" (FSP) as a way to answer a question critical to composition: Which portion of the sentence do readers focus on most intently and recall most accurately?
Vande Kopple's studies show that paragraphs consistent with FSP emerge as significantly more readable and memorable than their variants. Subjects judged them easier to read, performed better on them on all tests: oral, typing, and retention. Vande Kopple believes that more tests are necessary but that we now have "compelling evidence" that the theory accurately describes how information should be distributed in connected English sentences in order to assure most efficient and accurate reading and retention.

FSP theorists hypothesize that the sentence may be divided into parts, usually agreeing on the terms topic and comment. The topic is that portion of the sentence whose primary function is to express the old information, i.e., that which is relatively more accessible in prior sentences. The primary function of the comment is to express the new information, i.e., that which is not expressed, is difficult to derive from, or is relatively less accessible in prior sentences.


Winterowd introduces the term "accessibility" to designate what is sometimes referred to as readability, i.e., the relative ease with which a text can be read.

He attempts to provide the underlying theory and
pedagogical rationale for accessibility by discussing graphic display, listing, narratization, nominalization, and semantic closure.


Witte reports what changes subjects made in a text they revised so that it would be "easier to read and understand." In their revisions, subjects reduced syntactic complexity and shortened sentences. They strongly favored sentences in which the grammatical subject and the topical subject were identical and they eliminated or reduced similar semantic elements.


The authors conclude that while cohesive relationships may ultimately affect writing quality, there is no evidence to suggest that a large or small number of cohesive ties will positively affect writing quality.

Cohesion analysis appears to be a promising research tool, but questions about writing quality cannot be answered by analyzing cohesion. The quality or success of a text depends a great deal on factors outside the text itself. Witte and Faigley think that writing quality is in part defined as the "fit" of a particular text to its context, which includes such
factors as the writer's purpose, the discourse medium, and the audience's knowledge of and interest in the subject.