

COGNITIVE ASPECTS OF GENRE *

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Readers and writers communicate via a text with the aid of a number of general and specific conventions. In this paper the general conventions governing written communication are described, and their application to two important genres, stories and essays, is analyzed. Data from subjects talking out loud while reading is used to obtain information about the knowledge and strategies readers employ while reading simple texts. Reading times collected from other subjects reading the same texts silently is used as converging evidence for evaluating the talking-out-loud data. A number of similarities and differences in the processing of stories and essays are reviewed. Story readers have an essentially prospective orientation, generating predictions and looking ahead to what is coming up. In contrast, readers of essays approach the sentence-by-sentence processing more retrospectively, fitting the current sentence in with earlier information that had been explicitly presented in the text.

It takes many types of knowledge to be a skillful reader. Recently, we have been examining how knowledge of the conventions of writing affects the comprehension activities of college readers (Olson *et al.* 1980; Olson *et al.* in preparation). Communication of information via written text is a specialized activity, and it is hardly surprising that a considerable amount of special knowledge would have to be acquired in order to be either an effective writer or reader. Our research has focussed on the types of knowledge skilled readers use while reading simple texts. In this paper we will examine the knowledge readers possess for two types of texts, namely, simple stories and essays of the type found in elementary rhetoric texts. Our basic claim is that skilled readers possess knowledge about the forms of these texts and their principles of composition, and that they use this knowledge during the process of understanding. We will describe the kind of knowledge college readers possess, and illustrate how they use it while reading. We will draw our data from a series of studies we have conducted using a variety of texts and tasks.

The article will be organized as follows. First, we will provide a general conceptual background for the type of analysis we have developed for text processing. As

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part of this background we will spell out our ideas on how communication via written texts work. Second, we will briefly describe the two genres we have investigated, simple stories and academic essays, presenting a set of defining characteristics for each. Third, we will describe the various tasks we have used to study the knowledge and processing strategies employed by skilled readers. Fourth, we will present a sample of our findings for the two genres in question. Finally, we will discuss the more general issue of knowledge of genre conventions as a component of what the skilled reader must learn.

Conceptual background

Though we usually do not think of it in this way, communication via writing is a social process. Two people are interacting with each other, under the special condition that they are not at the same place at the same time. However, they are of necessity very much aware of each other. The effective writer must constantly have the reader in mind in order to produce a text that will have the desired effect. Similarly, the skilled reader must be aware of the author's intentions. Good writing represents a skillful selection and integration of material which, when combined with the reader's knowledge and strategies, leads to the outcome intended by the writer. Similarly, the reader, as part of what he or she needs to know in order to read the text, must understand both the writer's goals or intentions and the specific strategies used by the writer to select and arrange the material in the text. Both the writer and the reader understand that the text represents a specially selected and arranged set of propositions which will, in conjunction with the reader's knowledge, produce an approximation of the writer's intended message in the reader's mind.

In order to develop a model of how the writer and reader interact through a text, it is useful to consider some of the ways in which written communication differs from speech. While speech and writing have many similarities, and listeners and readers obviously employ many common processes and types of knowledge during comprehension, there are also some important differences that make the task of reading somewhat different. Many scholars have commented on these differences (e.g., Hirsch 1977; Pratt 1977; Ricoeur 1976; Schallert *et al.* 1977; Rubin 1980). Since there are many types of written and spoken communication (Rubin 1980), we need to be specific about what situations we are referring to. We will consider two prototypical situations: face-to-face conversation for spoken language and simple texts like stories or essays for written language. Table 1 lists some of the differences we have derived from the sources referred to above. Most of these are based on the fact that the composition of a text and its comprehension occur at different points in space and time. As a result, texts do not allow for interactional give and take and thus must be composed with deliberateness and care. A properly composed text is an organized, complete structure, worked out as a whole with an overall plan or purpose in mind. All of its parts serve some purpose. False starts, errors,

and other dysfluencies have been eliminated. Each sentence advances the text toward a point of closure, under the plan of the author. Relevant background information for the intended audience of the text is included if it cannot be inferred. The writer, if a good one, has taken some trouble to try to anticipate what the reader will need to know, and has included what would not be obvious. In short, the text must stand on its own. By the same token, because it is composed deliberately and carefully, it has a fluency not found in conversation. It is more formal. These many differences between speech and writing are major sources of difficulty for people learning to write (e.g., Hirsch 1977).

Let us now turn our attention to an analysis of the nature of written communication. As noted before, there are certainly many similarities between reading and listening, and a number of the points we will make will be common to both types of comprehension. However, with the differences in table 1 in mind, we will also note some aspects of text processing that differentiate it from listening. Fig. 1 presents a schematization of the situation. The starting point is the writer, who has in mind a complex network of propositions that represent the complete message that is to be communicated via the text. A major convention of linguistic communication is that much of the intended message is transmitted by implication. The writer expects the text to interact with the reader's interpretive skills and general knowledge to produce in the reader's mind something close to what is in the writer's

Table 1
Characteristics of writing compared to speech.

Characteristic	Description
1. Permanence	Writing persists through time, while speech is highly transient.
2. Detachment	Both the content and form of written language is divorced from the immediate context in space and time.
3. Absence of feedback	Writing is a one-way process, without feedback.
4. Nonspecificity	Writing is typically addressed to a general audience rather than a specific individual.
5. Tellability	The topic of the text deserves to have the trouble taken to write it up.
6. Organization	Written language is much more planned and organized than speech.
7. Formality	The language of writing tends to be more formal than speech.
8. Economy	Written language has less redundancy than spoken language.
9. Greater precision and detail	Written language can develop a topic in greater detail.
10. Greater complexity and abstractness of subject matter	Written language can develop more complex ideas.

mind. The writer's task is to select and organize a set of propositions to be included in the text that will be maximally effective in leading the reader to reconstruct the intended message. The reader's task, obviously, is to use the text to reconstruct the writer's intended message. According to this model, there are fewer propositions in the text than there are in either the writer's or the reader's immediate representation of the text.

How does the reader go beyond the text in constructing a representation of its intended message? This is one of the most basic issues in the psychology of reading comprehension. In essence, the reader engages in a species of problem solving. The object of reading is to understand the intended message of the writer. The reader uses the text as data from which to generate hypotheses about what the text is about. The data from the text are evaluated with respect to knowledge the reader brings to the situation. This knowledge helps the reader to structure the text, though many texts also have explicit guidance in them about their structure. Inferences and elaborations are drawn from the data in the text. While actually reading the reader generates predictions about both the content and the structure of what is yet to come in the text.

There are two general types of knowledge the reader uses to engage in these activities. The first is general knowledge about the nature of the world and the conceptualizations about the world that have been formed as a result of prior experience. Many scholars have developed theories about the role of knowledge in processing external inputs, and have introduced concepts like schemata, frames, scripts, and MOPS (Bartlett 1932; Piaget 1952; Minsky 1975; Schank and Abelson 1977; Rumelhart and Ortony 1977; Schank 1979). Though there are many differences in detail among these concepts, there is no question that concepts like these are needed to account for language processing. Research in both cognitive psychology (e.g., Bransford and Johnson 1973; Dooling and Christiaansen 1977; Bower *et al.* 1979) and in artificial intelligence (e.g., Winograd 1972; Schank and Abelson 1977) has conclusively demonstrated that general knowledge plays an important role in understanding even simple sentences and texts. Because we know so much about the world we can understand elliptic references to what we know.

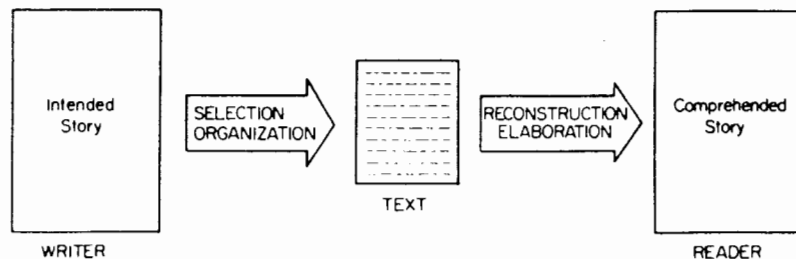


Fig. 1. Schematic representation of the writer's and reader's tasks in the writing situation.

The second type of knowledge used by the reader is about how textual transmission works. The writer selects and organizes propositions for inclusion in a text on the basis of what he thinks the reader knows and what his specific purposes are, in accordance with general principles of style and organization that apply to the genre. The reader understands that the text was composed through a series of deliberate choices on the writer's part, and the reader understands the conventions that governed these choices. Further, the reader assumes that the writer had the reader's task in mind during the composition, and was trying to make the reader's task (*i.e.*, comprehension) possible. The reader interprets the sentences of the text in accordance with these general beliefs about the writer-reader relationship. In essence, the task of the writer is to guide the reader through a plot, an argument, or some other discourse structure. The reader expects this guidance. Accordingly, we have chosen to call the overriding principle for written communication the Guidance Principle. Written communication is planned, one-way, and non-interactive in real time, and the writer's role is to provide an appropriately orchestrated set of clues about the intended message. The reader assumes the writer is acting in good faith in the role of guide. An effectively written text is one in which the reader is in fact guided toward the reconstruction of the intended message.

Principles of text composition

We now want to describe a set of principles of composition that appear to be understood by writers and readers of simple stories. These principles are intended to describe the general properties of simple texts of the kind we have studied in our laboratory. Specifically, we have examined simple stories and academic essays. For technical reasons, we have confined our attention to stories and essays that are no more than 60 sentences long. This means that all the stories we have looked at are drawn from the fables, folktales, and children's stories that are typically investigated by researchers interested in story processing. They all have a single focus or plot that is told from a single point of view. Similarly, the academic essays we have used were taken from books on rhetoric. They all attempt to prove a thesis, make a comparison, or otherwise illustrate a single point. We feel that many elements of our analysis will generalize to a wider range of texts and text types, and will return to this point at the end of this article.

The principles we are about to present are intended to capture the general conventions about the composition of simple texts that are part of what a knowledgeable writer and reader knows. Though we initially developed principles like these for the specific genres of stories and essays, we found enough commonality to be able to construct this more general list. Later we will illustrate how these general principles apply to each of these two genres. Our central claim in this paper is that knowledge of these principles plays a role in comprehension. Presumably it also plays a role in composition, though we are only just beginning work on the writer.

It is likely that the principles about to be described also play a role in learning the specific conventions of a new genre, a situation we have not examined at all.

The principles have been developed on the basis of two broad classes of evidence. First, we surveyed the literature on story and essay writing, examining the advice given to writers about how to put a text together. We have also read monographs on the structure of various prose forms. Second, we have collected several kinds of data for both stories and essays. Some subjects read these texts sentence-by-sentence and talked out loud, stating any inferences, elaborations, predictions, interconnections, or other comments they felt compelled to make. Since the texts we used included both good and bad ones, we obtained much useful information about what readers expect in stories and essays and how this affects their processing. Other subjects read these same texts sentence-by-sentence on a computer screen and we timed their silent reading. We have also collected recall data and ratings of propositional importance for each text. All of these tasks will be described in more detail later.

Prior to presenting the list of principles it is necessary to make explicit a distinction that was implicit in our earlier discussion. A text has both an underlying structure and a surface structure. The underlying structure is an abstract representation of the information contained both implicitly and explicitly in the text. Each text type or genre has a set of principles describing acceptable underlying structures. For example, for simple stories, grammars of the type described by Rumelhart (1975, 1978), Thorndyke (1977), and Mandler and Johnson (1977) are best viewed as descriptions of possible underlying structures (Johnson and Mandler 1980, have specifically developed this view). Later we will describe possible underlying structures for academic essays.

The underlying structure of a text is an abstract description of its essential form. The surface structure represents one embodiment of the underlying structure. The writer has many options in transforming an underlying structure into a surface text. In fact, a given underlying structure can be transformed into many different surface texts. These surface texts can vary in a number of ways. First, they can vary in the way in which propositions are made explicit. The underlying structure is much more complete than the surface structure. Thus, different surface forms can vary in which propositions are selected. Among the factors that influence the selection are the writer's assessment of what the reader knows and the writer's purpose in writing the text. Second, the order of elements in the surface structure can vary. While the underlying structure of a text may have a specific causal, temporal, or logical order, the writer can choose to present the propositions of the text in any order at all, as long as the underlying order can be reconstructed from the text. Third, specific versions of a text can vary in style, that is, in the selection of particular words, phrases, and sentence structures designed to create specific effects. Fourth, certain texts permit variation in other factors. For instance, stories can vary in the point of view of the implied narrator. Scholes and Kellogg (1966) differentiate *narrative* from *drama* by noting that the former consists of both a story and a story-teller, while

the latter consists only of a story. The story-teller can be one of the characters in the story, narrating in either first or third-person, or he can be omniscient and uninvolved.

Let us now examine the set of principles shown in table 2. Many of them are self-explanatory, so we will provide only a cursory description here. Keep in mind that they apply specifically to simple texts of the type we have been studying. Later we will discuss how they translate into the two genres we have been investigating, simple stories and academic essays.

The first two principles, *Purpose* and *Balance of novel and familiar elements*, are quite general, and apply to most forms of communication. Books on writing repeatedly point out how important it is for the writer to have a clear purpose in mind, and how often poor writing is characterized by the absence of a clear purpose (e.g., Shaughnessy 1977). According to *Balance of novel and familiar elements*, even though the writer may be following a highly stereotyped formula, there will be unique elements. But the newness must be blended with familiar elements. A text works by building the new upon the foundation of the old. Later we will demonstrate the importance of these general principles for the comprehension of simple texts.

The principles of underlying organization describe the expectations a reader has about overall structure. The writer is trying to embody the underlying structure in an effective surface text. The reader is mainly trying to reconstruct the underlying structure. The principle of *Focus* is definitional for the simple texts we are considering. *Overall plan* states in an elementary way the essence of what we mean by underlying structure. The reader expects all of the elements of a text to fit into a coherent general framework, each element having its place in an overall plan and the entire plan having a closed or optimal structure. The principle of *Conventional world* has two parts. First, it is expected that the world of the text will be similar to the world we know. Even within highly stylized narrative genres like science fiction or highly abstract essays there are still strong expectations of some degree of correspondence to the world we know from experience. However, it is also expected that there will be systematic, conventional departures from the world of our experience. For instance, the world of stories is an idealized world, or in Thornley's words, "an artistically disciplined representation of life" (1976: 59). Thus, it is expected that stories will have characters who are stereotyped or larger than life, and that the sequence of events will often be highly improbable, with too many coincidences. Unlike the real world, the conflict in a story builds rapidly and clearly, and is totally resolved at the end. In short, the world of stories is a conventional world, similar to the real world in many important ways but also quite different from it. Similarly, with essays, a lot of abstraction and idealization is involved in putting together an argument or defending some general thesis. Yet it is essential that there be correspondences to the real world, or else the argument will be devoid of meaning.

The principles of surface organization characterize the conventions that govern

Table 2
Conventions of composition for simple texts.

Convention	Description
1. Purpose	The writer has one or more specific purposes in mind.
2. Balance of novel and familiar elements	The text contains a balance of familiar and novel elements.
A. Familiarity	The text makes contact with things the reader knows about.
B. Novelty	The text contains new or distinctive elements.
3. Underlying organization	The text is based on an underlying structure that is appropriate and well-formed for the particular genre.
A. Focus	There is one main line of development.
B. Overall plan	There is an overall plan that provides a well-formed organization for the propositions of the text.
(i) Coherence	Each individual proposition fits in a well-ordered way into the general plan.
(ii) Completeness	The overall organization has a closed or optimal structure.
C. Conventional world	The text is based on a world that is similar but not identical to the real world.
4. Surface organization	The writer has a surface plan for presenting the surface propositions of the text.
A. Omniscience	At any point in the text the writer knows where it is going.
B. Audience	The text is written with an audience in mind.
C. Scaffolding	The writer presents enough supporting material in the text so that the reader has sufficient background to be able to reconstruct propositions where necessary.
D. Segmentation	The text is organized into surface chunks.
E. Connectivity	The writer provides sufficient textual information so that the reader can make all the necessary inferential connections among the elements of the text.
F. Economy	Everything that is presented has a purpose within the surface plan.
G. Orderly flow	The sequence of segments and propositions in the surface of the text is principled.
H. Language	There are conventions for the surface language of each genre.
(i) Signalling	Appropriate surface signals will be used to mark transitions, etc.
(ii) Level	Appropriate levels of language will be used.
I. Genre-specific conventions	In addition to the general conventions listed above particular genres will often have specific text conventions governing the surface form.

the transformation of the underlying structure into an actual text. As can be seen from table 2, there are a number of general principles of surface structure but there are also idiosyncratic ones that apply to particular genres. The present discussion will focus on the common ones. Some idiosyncratic ones will be mentioned later when we discuss the particular genres we have investigated. The principle of *Omniscience* is a central one. The text is being presented by someone (*i.e.*, the writer) who knows where it is going, how it will end. Therefore the reader is able to assume that each element of the surface structure that appears is part of an orchestrated plan. This has enormous implications for comprehension, as we will see later. It is the heart of the Guidance Principle. *Audience* characterizes the author's deliberateness in directing the text toward some specific group of readers who have particular characteristics. *Scaffolding* indicates that the writer is aware of the reader's need to have a superstructure constructed around which the elements of the text can be assembled. *Segmentation* states that the text will be written through a series of discrete surface chunks. *Connectivity* is closely related to *Scaffolding*, in that it is expected that all the links between the elements of a surface structure are constructable, either from direct evidence provided in the text or from a combination of surface hints and prior knowledge. Closely linked to this, however, is the principle of *Economy*, which states that there is a contrasting pressure to make the surface form as economical as possible. This leads the reader to assume that everything encountered in the surface text is there for a reason. This does not mean that everything is of equal importance, or will be equally well remembered. But each element has a purpose in the unfolding text. It is there for a reason, albeit perhaps a transient one. *Orderly flow*, along with *Connectivity*, are at the heart of the text processing theory developed by Kintsch (Kintsch and Vipond 1978; Kintsch and van Dijk 1978; Miller and Kintsch 1980). Each element of the surface text must be integratable into the developing network of propositions that represents the meaning of the text. The existence of well-known limits in immediate memory and attention suggest that propositions that cannot be immediately integrated will increase processing difficulty. Kintsch's model is an explicit embodiment of these principles. Finally, *Language* indicates that there are specific conventions governing the type of language that is appropriate for performing various functions within a genre. For instance, the events of a story are expected to be told through specific, concrete events and characters, while background information is given in more generic language. The argument in an essay unfolds through an appropriate blend of abstract and concrete language. We will see later that our evidence indicates that readers are quite sensitive to shifts of language in a text.

Simple stories and essays

Let us now turn our attention to the two genres we have been investigating in our research. In this section we will describe the properties of these genres, and will

relate them to the general principles of composition described earlier in table 2. As we shall see in the next section, college readers use knowledge of the properties of these genres during the process of understanding. In particular, they know something about the types of underlying structures allowable for the genre and in addition something about the conventions for transforming an allowable underlying structure into an acceptable surface text. Knowing these things, they are able to work backwards from the elements of the surface text they are presented to a representation of the underlying structure conveyed by the text. Clearly, strategies based on this kind of knowledge will go astray on those occasions when a text is ill-formed in either its surface or its underlying structure.

Stories

The fables, folktales, and children's stories that have been investigated intensively by cognitive psychologists in the past few years have a simple and straightforward structure. Fig. 2 presents in highly schematic form the basic pattern of the underlying structure of these stories. There is a network of background information, called the Exposition, and the core of the story (the Narration) consisting of Complication and Resolution. In essence, a story consists of a problem or complication which gets resolved by the intentional actions of one or more central characters. Of course, even in simple stories there are many ways in which the simple schema shown in fig. 2 can be made more complex. Further, there are constraints on what kinds of complications and resolutions will produce acceptable stories (Brewer and Lichtenstein 1980; Wilensky 1980; Olson in prep.). But the general pattern of complication and resolution is at the heart of the types of simple stories we and others have investigated.

The conventions of composition for simple texts can be translated quite directly for these stories. The purpose of such stories is typically to amuse or entertain, though of course many are also used to instruct. These stories achieve a balance between the familiar and the novel by following certain stereotypic patterns of plot development with familiar character types, but doing so with particular novel twists or surprises of detail. Later we will see quite clearly the consequences of this for

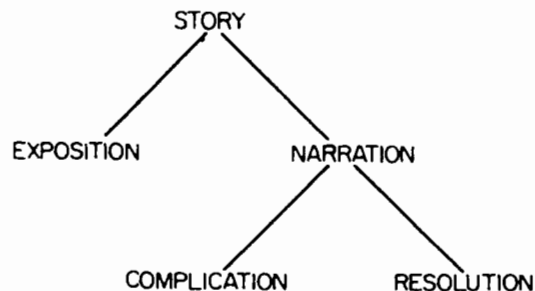


Fig. 2. The major elements of story structure.

processing. At the level of underlying structure the story follows a basic plan of conflict and conflict resolution, with a number of acceptable forms of complication allowed within this general framework. The reader expects all of the elements of the story to fit into a coherent general framework, each element having its place in an overall plan and the entire plan having a clear resolution. The episodes of a story must be causally connected, but only those causally connected episodes in which conflict is created and resolved can be a story.

The principles of surface organization characterize the way in which an underlying story gets told. In this regard, the principle of *Omniscience* is a central one. The story is being told by someone who knows how it will end, and therefore the reader assumes that each element that appears is part of an orchestrated plan. This is the heart of the Guidance Principle. The *Scaffolding* principle asserts that everything needed to make the story understandable will either be apparent on the basis of general knowledge or will be provided by the writer. In stories, this information is frequently in the form of background or setting information. There are many conventions for presenting background information. A recent monograph by Sternberg (1978) describes and illustrates many of these. In very simple stories, the background is usually presented at the beginning. However, there is the well-known convention of *in medias res*, where the story begins in the midst of specific actions and the necessary background is woven into the development of the plot. Sternberg describes other techniques as well. Though we have not investigated this directly, we could guess that the placing of background information in locations other than the beginning could complicate the task for the reader, though the writer can do much to minimize the difficulty by the way in which the information is introduced.

Segmentation for a story means that it is told through a series of discrete units, in particular, through specific scenes or episodes that are separated in space or time. This is a property that narratives and dramas share. The conventional organization of a play into scenes is a good illustration of the point.

Orderly flow and *Connectivity* are fundamental principles of text processing. Each element of the surface structure must be integratable into the developing network of propositions that represents the underlying story. *Economy* is an extremely important principle for stories. Readers expect that everything in a story is there for a reason. If a small detail is mentioned, especially in isolation from other details, readers expect it may be important. Of course, in stories such as murder mysteries, attention to small details may be elevated because of conventions associated with this specific genre. But we have seen much evidence in our research of readers paying special attention to details even where they are ultimately irrelevant. There is no conflict between this and the fact that details tend not to be well-remembered (Thorndyke 1977; Mandler and Johnson 1977; Meyer 1975). Some details may seem important when they are first encountered in the story and may receive special attention even if they are not central to the final representation. As a result, importance defined as a proposition's location in the hierarchy of a theory of story structure (e.g., Thorndyke 1977) may not covary with reading times in the same way that recall does (but see, e.g., Cirilo and Foss 1980).

Readers have specific expectations about the *Language* in which stories will be told. In part, they expect them to be told by means of specific, concrete events and characters. The episodes that comprise the heart of the story must occur at a specific time and place, and there must be particular characters involved in the episodes. Statements about general patterns of events or the dispositional properties of characters are elements of the background. Sternberg (1978) described how the contrast between particular events and summaries of prior actions is used to differentiate Narration from Exposition. Our evidence indicates readers are quite sensitive to this.

We have found at least one nice example of a genre-specific convention for stories. The motives of characters or causes for action are almost never stated explicitly. The motivational structure is almost always implicit, though it is clearly important for understanding the causal connections among events in the story. The task of figuring out why a character has done something is complex, and requires a general theory of goals and plans on the part of the understanding system (e.g., Wilensky 1978, 1980). No doubt there are many other such conventions, but this particular one has very important consequences for processing. The implicit information must be recovered in order to understand fully the connections among the events.

Simple essays

Unlike the simple stories we have studied, simple essays do not have as well-defined a form at either the underlying or surface level. The simple story has a tightly organized structure, organized around a plot, a series of events that are causally related and that unfold in the complication-resolution plan described earlier. However, essays can have many forms because they have many purposes. Further, each type of essay seems to be governed by a looser set of conventions than those found for stories. This is not surprising, since even simple essays are written for a variety of purposes and the mapping of purposes onto rhetorical strategies is quite flexible. However, though this genre is more loosely structured than the simple story, readers do have expectations about the types of structures they will find. Let's look at some simple examples.

One common type of simple essay is the inductive argument. The author's goal is to convince the reader of a thesis, and evidence relevant to the thesis is presented as the heart of the essay. At the level of underlying structure, inductive arguments do not have a linear organization analogous to the causal, temporal organization found in stories. There is the thesis itself and statements of the evidence pertinent to the thesis. Any particular thesis has the potential for an indefinite number of evidence statements that might be relevant to it. However, as a practical matter of text convention, a thesis is typically supported by a modest number of evidence statements. In the types of simple texts we have examined, usually no more than two or three distinct types of evidence are cited. Rhetoric books often describe various princi-

ples for selecting evidence (see, e.g., Baker 1976; Hughes and Duhamel 1962; Kinneavy 1971; Payne 1969).

At the surface level, there are different ways to arrange an inductive argument. Following the principle of *Scaffolding*, however, the writer must always give the reader enough introductory information to make the unfolding argument structure apparent. Typically, this is best done by presenting the thesis at the beginning of the essay. The evidence is then presented, and the thesis is restated at the conclusion. Alternatively, the evidence can be presented first, leading to the statement of the thesis at the end. If this is done, however, the writer must take special care to inform the reader that the evidence supports a thesis which will not be revealed until the end of the essay. The evidence itself can be ordered in different ways, embodying the principle of *Orderly flow* for essays. These different orderings reflect the persuasive purpose of the inductive essay. Most authorities agree that the most persuasive ordering is to put the very strongest piece of evidence at the end. However, there are various ways to organize the remaining pieces. The *climactic* order builds from the weakest evidence to the strongest, while the *Nestorian* order starts with the second strongest piece and then builds from the weakest to the strongest (Hughes and Duhamel 1962). Unlike stories, *Segmentation* for the essay takes the form of paragraphs with information chunked according to topic. There are principles which govern sentence organization within the paragraph. For example, Kieras (1978) has studied readers' expectations about the placement of topic sentences within paragraphs. Our own data suggest that readers also have expectations about how the principle of *Language* is instantiated for essays. Readers expect a paragraph to be a blend of abstract statements of general principles and specific, concrete illustrations or examples.

Another common kind of essay is one which compares and contrasts two entities. For example, in work which we will not be describing here, we used two such essays, one in which a football halfback and a ballerina were compared, with emphasis on their similarities, and another in which two very similar maladies, heat exhaustion and sunstroke, were compared, with emphasis on their differences. There are two dominant types of organization for such essays: one in which all the properties of one entity are described before all those of the second, and another in which the two entities are described concurrently, with parallel properties described in alternation for the two. This contrast is not particularly surprising, perhaps, but it does influence what readers expect to find once they realize the purpose of the essay.

Empirical investigations of text processing

Let us now briefly describe the types of investigations we have conducted. Our strategy has been to use a number of different tasks to try to understand what it is that readers are doing while reading. In this section we will describe these tasks, and in the next section present some results from these tasks for stories and essays.

The texts

All of our texts are fairly simple and short so we can use them in different tasks without creating very long sessions. We used four different stories (the numbers in parentheses indicate the number of sentences per story):

Lentil (52): This story was taken from McCloskey (1940), and is a well-formed children's story. Since we will be discussing it in some detail later, a synopsis of its plot appears in table 3.

Stranger (44): This story was taken from Finlay (1969). It is also a well-formed story, a fable about the costs of greed and selfishness.

Circle Island (18): This story was originally introduced by Dawes (1966). The version we used was taken from Thorndyke (1977). Although this story fits Thorndyke's story grammar, it is not well-formed for reasons we will describe later.

War of the Ghosts (28): This classic was used by Bartlett (1932) in his studies of schemata. It is an American Indian folktale, and because it uses conventions and knowledge unfamiliar to most of us it is quite difficult to understand.

Our choice of these four stories was quite deliberate. We wanted two well-formed and two ill-formed stories so we could contrast our readers' behavior for these two types.

Table 3
Synopsis of "Lentil".

Story part	Content
Setting	A small midwestern town called Alto, Ohio
Characters	Lentil – a boy who wanted to sing and whistle, but couldn't so learned to play the harmonica instead Colonel Carter – a rich, important man who had given many buildings and parks to the town of Alto Old Sneep – an old, crabby fellow who complains about everything and everybody
Plot	Colonel Carter is returning to Alto after a two-year absence. The town decides to have a celebration. Old Sneep mutters that Colonel Carter needs to be taken down a peg or two. Preparations are made for the celebration: flags and signs are put up, the band is at the station, the mayor has a speech ready. The train arrives. As Colonel Carter steps from the train, Old Sneep is seen by all on the top of the station sucking a lemon. The band gets all puckered up and can't play. Everyone is silent and embarrassed, and Colonel Carter begins to look angry. Lentil saves the day by stepping up and playing on his harmonica. Colonel Carter is pleased, and a happy celebration is had by all, including Old Sneep.

Table 4
First two paragraphs of *Carpeting* essays.

Well-formed	Ill-formed
<p>I should start by admitting that as little as five years ago carpeted classrooms would rightly have seemed too fanciful and expensive.</p> <p>The carpeting then available would have been costly, difficult to maintain, and would have required frequent replacement. Now, however, because of improved materials, the arguments in favor of extensive carpeting seem a great deal more plausible.</p> <p>New indoor-outdoor synthetics are stain resistant, fade resistant, durable and inexpensive.</p> <p>They have made carpeting seem much less a luxury than a reasonable, even desirable alternative to tile floors.</p> <p>Briefly, there seem to be three central arguments in favor of carpeting.</p> <p>First, of course, carpeting is attractive. Now, admittedly, modern technology offers a great variety of attractively colored tiles. The days of drab, institutional grays, greens, and browns in tile are over.</p> <p>But while tile may approach carpeting in terms of color, it has a hard and unattractive texture.</p> <p>Carpeting, on the other hand, is colorful, attractive to the touch, and comfortable to walk on.</p> <p>It goes a long way toward creating a pleasant atmosphere all of us would like to work in, both in and out of class.</p> <p>Richly colored carpeting, such as bold reds often used in banks and commercial offices, would make our facilities less institutional. Bright carpeting can easily make attractive an area that would otherwise seem Spartan and sterile.</p> <p>In short, carpeting seems desirable simply because it is more attractive to look at and walk on than tile.</p>	<p>As little as five years ago carpeted classrooms would rightly have seemed too fanciful and expensive.</p> <p>The carpeting then available would have been costly, difficult to maintain, and would have required frequent replacement. Improved materials have made the arguments in favor of extensive carpeting seem a great deal more plausible.</p> <p>New indoor-outdoor synthetics are stain resistant, fade resistant, durable and inexpensive.</p> <p>They have made carpeting seem much less a luxury than a reasonable, even desirable alternative to tile floors.</p> <p>Carpeting is attractive. Modern technology offers a great variety of attractively colored tiles. The days of drab, institutional grays, greens, and browns in tile are over.</p> <p>While tile may approach carpeting in terms of color, it has a hard and unattractive texture.</p> <p>Carpeting is colorful, attractive to the touch, and comfortable to walk on.</p> <p>It goes a long way toward creating a pleasant atmosphere all of us would like to work in, both in and out of class.</p> <p>Richly colored carpeting, such as bold reds often used in banks and commercial offices, would make our facilities less institutional. Bright carpeting can easily make attractive an area that would otherwise seem Spartan and sterile.</p>

We will also report data for two essays, each of which had two versions created by embodying the same underlying structure in two surface forms. The essays we used were:

Carpeting (37): This persuasive essay argues that carpeting is really more cost-effective than tile for classroom floors. The standard version was taken from Baker (1976). We created an ill-formed version by removing the signalling devices from the surface structure. The first two paragraphs of both versions of this essay are given in table 4.

Ice Age (22): This essay describes in a fairly factual way the possibility that we may be facing another ice age. It was taken from Jones and Faulkner (1968). The two versions differed in that one presented the thesis at the beginning followed by the evidence, while the second presented the evidence first, followed by the thesis. This second version is ill-formed because it does not make it clear to the reader that the evidence will precede the thesis statement.

For all of the texts used in these studies, an indication of the importance of each constituent was obtained by having an independent group of subjects cross out half the material in each text and then obtaining a profile of the frequency with which individual elements were deleted. This information will be referred to as *Importance Ratings* later in this paper.

Subjects

All of the subjects in the studies to be described were college students who were paid at a rate of \$ 2.50 an hour for their participation.

Tasks

We used two different tasks with each of these sets of materials, using different groups of subjects for each task.

(1) Talking out loud

The subject was shown each sentence in the text one at a time, in sequence, and was asked to talk out loud into a tape recorder about a number of things. In particular, we asked subjects to talk about any inferences or elaborations they felt compelled to draw on the basis of the current sentence, any connections they saw between the current sentence and any prior ones, any predictions about what might be coming up, and any comments they had about the text or their understanding of it. Subjects who talked out loud to the essays were also asked to comment on the role an individual sentence had in the overall organization of the essay if they felt compelled to. The tapes from these sessions were transcribed, and checked, and the transcriptions segmented into idea units and the units classified by type of statement. The segmentation and classification were checked for reliability by having two people perform these tasks.

(2) Reading time

Subjects were presented with each text at a computer terminal. Each time they pressed a key the next sentence of the text appeared. Only one sentence was shown

at a time. Subjects were told to read the text as normally as possible. Those reading the stories were told that later on we would explore how well they understood each story. Essay readers were told that they would later be asked to write a one-sentence summary of each essay. The primary data from this task are the times subjects devoted to each sentence in each text.

Processing simple stories

What is a reader doing while reading a simple story? This question has been at the heart of a series of investigations we have been carrying out. In this section we will present a broad sketch of our view of what the reader is doing, and then present several sets of data from our research that provides support of this view.

The reader of a simple story is confronted with the following task. A text embodying various aspects of the story is available as input. The text will be processed against a background of several types of knowledge that are relevant to it. The final product of understanding will be an interpreted representation of the essential elements of the story. However, with most stories, this representation must be constructed from incomplete information in the text. Much that is important to interpreting the elements of the text as a story is left implicit.

To try to give a concrete idea of what readers are doing while reading a simple story, let us describe some of our talking-out-loud data for several stories we have been examining. Table 5 presents the relative frequencies of different types of things readers talk about during this task. As you can see, most of their talking is devoted to making inferences, generating predictions, and commenting on connections to prior information. The relative frequencies of these activities are roughly the same across the four stories shown in table 5, though there are some interesting exceptions that we will comment on later. Though comments about the story or about their own understanding are low in overall frequency, they are very diagnostic of aspects of stories that readers are sensitive to.

We will first consider an example of a well-formed simple story in order to show how the principles bear upon what a reader is doing during comprehension. *Lentil* is a straightforward children's story whose surface organization is quite simple. The first 17 sentences are the Exposition, in which the three major characters and the seeds of the potential conflict are introduced. The Narration begins with sentence 18, and the climax that distinguishes Complication from Resolution occurs during sentences 30 to 32. Our analysis of what readers are doing while reading "Lentil" is based on twelve subjects who talked out loud while reading it. Later we will describe how the talking-out-loud data correspond to the sentence-by-sentence reading times of another group of subjects who were reading silently.

Throughout the Exposition of "Lentil" the talking-out-loud subjects were clearly collecting information and formulating tentative hypotheses about what was likely to happen in the story. They all recognized that the three central characters yield a

Table 5

Proportion of talking-out-loud productions in each category.

Category	Lentil	Stranger	Ghosts	Circle Island
Predictions	0.22	0.23	0.13	0.26
Questions	0.04	0.02	0.10	0.01
Comments on structure	0.09	0.06	0.08	0.10
Comments on own behavior	0.03	0.03	0.04	0.02
Confirmation of predictions	0.02	0.03	0.01	0.02
References to antecedent information	0.29	0.36	0.30	0.27
Inferences	0.30	0.24	0.30	0.27
General knowledge and associations	0.02	0.04	0.03	0.06

highly probable line of conflict and resolution: Old Sneep and Colonel Carter will be the source of the conflict, and Lentil will provide the resolution. At sentences 18 and 19, where the Narration begins, the subjects brought together their tentative hypotheses and formulated general plans for the rest of the story. Table 6 shows some examples of what subjects said at this point. It was striking to us how regular this phenomenon was: virtually all subjects did the same thing at about the same place in the story.

Throughout the processing of the Narration the hypotheses constructed earlier by subjects were in evidence. Each event was incorporated into the general plan constructed at the end of the Exposition. The impact of these hypotheses was most dramatically revealed at sentences 30 and 31. The readers knew something was going to happen, but had no idea what. Consistent with the expectation that a story contains novel elements, the readers expected to be surprised by the specific

Table 6

Examples of reader comments to sentence 18 in "Lentil".

Subject	Comments
24	"I expect the plot will succeed in getting the Colonel to hear Lentil playing his harmonica. The Colonel will be impressed and Lentil will be rewarded somehow".
17	"Maybe a celebration is planned (parade, etc.) and Lentil will win the day with a rousing welcoming song".
07	"Expect to read that Colonel Carter now will have some kind of role in what's going on with Alto and his music and Old Sneep. Expect to hear something about Colonel Carter's reaction to Lentil".
23	"We expect to see some interaction between Colonel Carter, Old Sneep, and Lentil. Probably a great celebration. Suspect that Lentil will probably be asked to play for him".

form of the complication, even though they knew it would involve something that Old Sneep does to Colonel Carter. Sentence 30, "Then there was a wet sound from above" is totally surprising. No one can tell at this point what the wet sound is. But most subjects stated immediately, prior to going on to sentence 31, that Old Sneep must be implicated and that the climax is at hand. Even though Lentil had not been mentioned since sentence 14, most subjects predicted that Lentil's central role in the story was about to emerge. Thus, the "wet sound" is a highly informative event. Because the story is well-written (at least according to the conventions for such children's stories), the hypothesis-based predictions subjects made in response to the climactic event were in fact right. Once the climax is passed, the mode of processing changed quite drastically. The readers appeared to be operating in a confirmatory mode. No new surprises were expected. Over and over one finds in the protocols statements like "That's what I expected" or "Yup", indicating that predictions generated were now being found to be congruent with the emerging details of the Resolution.

"Lentil" is a good example of a story where the writer and the reader are operating in harmony. The Exposition leads all of the readers to establish a background and a set of hypotheses which successfully guide the subsequent processing. The same expectations are derived by different readers at just about the same points in the story, and specific events tend to be interpreted in the same way. The climax is especially striking. Though it is unpredictable, it is immediately interpretable and is integrated into the general representation of the story being constructed by the reader.

We have contrasted "Lentil" with several other stories, some of which clearly violate the principles listed in table 2. We will briefly mention two of these. The version of "Circle Island" used by Thorndyke (1977) has two serious violations of the principles. First, the whole story violated the principle H. (2) in table 2, which, for stories, claims that the Narration of the story must be told in specific, concrete terms. In "Circle Island" no specific characters are developed and no specific actions or events are described. Most subjects in the talking-out-loud task assumed the text was the Exposition of a story. Many were surprised when it ended, stating that they expected a Narration to follow. To these readers the story was told at the wrong level. The second problem was that most subjects could not link the last sentence with the previous seventeen. The last sentence states that civil war broke out, but subjects consistently stated that not enough information had been presented to allow them to construct a reasonable scenario which led to a civil war. Thus, the principle of *Connectivity* was violated. Since "Circle Island" conforms to the story grammar described by Thorndyke, this is a good example of how adherence to a story grammar is not a sufficient condition for a story to be well-formed.

Bartlett's (1932) famous "War of the Ghosts" is not even well-formed at the level of underlying structure, at least for readers from our culture. Readers have a terrible time with it. There is no evidence that any of the twelve subjects who talked out loud to this story ever formulated a coherent hypothesis about the

global organization of the story, although some were able to generate some local hypotheses. The confusion of our subjects is illustrated in the comments in table 7. These comments were all made in reaction to the sentence in which ghosts are first introduced. In this sentence, one of the main characters infers that he has encountered ghosts. The basis for this inference is not at all clear to readers from our culture. The confusions generated by this sentence include low-level confusion about the referents of pronouns as well as confusion about the basis for the ghost inference itself.

Mandler and Johnson (1977) presented a convincing analysis which shows that the primary problem with "War of the Ghosts" is that readers have difficulty constructing any causal links between the individual episodes which follow each other in time. Thus, readers cannot discern an *Overall plan*, since neither *Coherence* nor *Completeness* can be detected. Further, there are too many bizarre or unfamiliar events, so readers have difficulty assimilating the story to a *Conventional world*. One can continue through the list of principles in table 2 and show that "War of the Ghosts" provides examples of violations of most of them.

By contrasting the talking-out-loud protocols of subjects reading well-formed and ill-formed stories, we have gathered considerable support for the claim that readers possess the kind of knowledge described in table 2. Further, these same data seem to reveal how subjects use this knowledge in their interpretation of each sentence as they encounter it in a story. However, given the obvious artificiality of the talking-out-loud task, is there any connection between what readers tell us in this task and what readers do in a task that more closely approximates normal reading? To answer this, we collected reading times for subjects who read each story silently

Table 7
Examples of reader comments to ghost sentence in "War of the Ghosts".

Subject	Comments
8	"I don't get that at all. I don't think it refers to the rest of the story".
9	"Is he the Indian? Somebody, either ludicrously or seriously is suggesting that some of these could be ghosts. Could be the warriors, the young men, the violence".
12	"I can't imagine why he would say that, unless maybe they were speaking about him".
13	"(chuckle) Ah, well, the young man ... uh, I draw a blank on this sentence".
14	"Jeess, I don't know what the hell is going on. They are afraid of somebody's ghost? We don't know who. One of the town people? Maybe the warriors are ghosts".
15	"This doesn't seem to fit in anywhere. I have no idea how to interpret this sentence or even where this sentence came from".
16	"The young man thought that the ... not sure what it means, but there were some ghostlike qualities to the Indian. I don't know what that means".

at a computer terminal. One overall effect in the reading times is that *War of the Ghosts* was read much more slowly than any of the other three stories. The average time per syllable was 415 msec., compared to 219, 278, and 180 for *Lentil*, *Stranger*, and *Circle Island*, respectively. This difference was highly significant in an analysis of variance ($F(3, 39) = 13.2, p < 0.001$). This fits in nicely with the overall general confusion shown by the talking-out-loud subjects who were reading *War of the Ghosts*.

We also examined the sentence-by-sentence details of the reading times. Fig. 3 shows the type of data provided by this reading time task. This figure presents the reading rates for a group of twelve subjects reading "Lentil". The reading rates shown on the ordinate of fig. 3 have been adjusted to take into account differences in sentence length. A qualitative examination of these reading times reveals some interesting correspondences with the talking-out-loud data. Notice that there are numerous long reading rates during the early portion of the story. These are most likely due to the attempts by subjects to store background information and formulate general hypotheses. Of particular note are the long times for sentences 16 through 20, where the Exposition shifts to the Narration. This is where the talking-out-loud subjects were formulating the general hypotheses they used to guide their further processing. The peak at sentence 31 and the flat reading times afterward correspond, respectively, to the large amount of inferential and predictive activity at the climax followed by confirmatory processing that we noticed in the talking-out-loud data. In general, the pattern of reading times corresponds to the reader's pattern of processing strategies revealed by our analysis of the talking-out-loud protocols.

These qualitative impressions for "Lentil" were supported by a quantitative analysis of the reading times. We performed a stepwise multiple regression using the

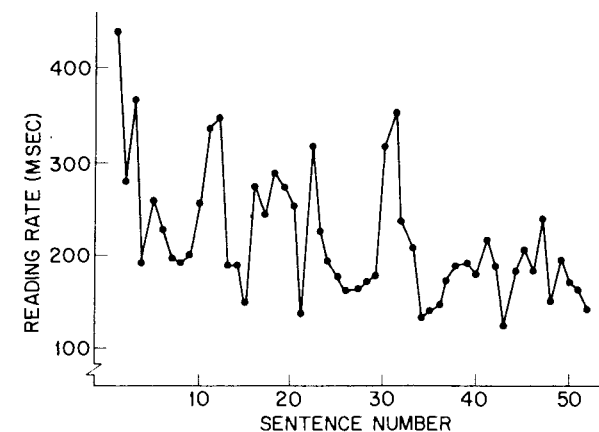


Fig. 3. Average reading rate for each sentence in *Lentil*.

mean reading time per sentence as the dependent variable and a series of possible predictors of reading time as the independent variables [1]. Table 8 shows the results of this analysis. This table shows the variables that were and were not selected by the stepwise multiple regression as significant predictors of reading time. Two analyses are shown: one that did and one that did not include the serial position of the sentence as a variable. Note that in both analyses the number of syllables per sentence accounts for a very large percentage of the variance in reading times. However, in addition, the number of inferences made by talking-out-loud subjects also emerged as a significant predictor, and in the second analysis where serial position was excluded, so did the number of predictions. What these analyses reveal is that there is an association between places in "Lentil" where the talking-out-loud subjects generate inferences and predictions and where the silent-reading subjects take more time. To us, this suggests quite strongly that the information we collect from the talking-out-loud subjects is useful in helping us to formulate hypotheses as to what the normal reader is doing while reading a simple story.

Tables 9 and 10 show similar multiple regression data for other stories we have examined. In table 9, another well-formed story shows similar associations between properties of the talking-out-loud data for that story and the corresponding reading times. In table 10, similar analyses for two ill-formed stories showed little association between the talking-out-loud data and the reading times. This difference between well-formed and ill-formed stories is potentially interesting, though we would want to replicate it for a wider range of stories before we would make much of it. But certainly the analyses of "Lentil" and "Stranger" are encouraging.

[1] Multiple regression analysis is a standard statistical technique for quantitatively evaluating the relationship between one or more predictor variables and a dependent variable. For instance, in tables 8, 9, and 10, reading time is the dependent variable, and a number of other variables are explored as possible predictors of the reading times across sentences. The terms "Coeff.," "Sig.," and "Cum. R^2 " are statistics which pertain to the outcome and interpretation of this analysis. "Coeff." refers to the regression coefficients which indicates how many units of change occur in the dependent variable for each unit change in a given predictor variable (e.g., in table 8, part 1, each additional syllable in a sentence is estimated to increase reading time by 194 msec). The "Sig." statistics indicate whether or not the effect of a predictor (indicated by the coefficient) is statistically significant (i.e., is large enough not to be the effect of normal random variation). Selected predictors in these tables are defined as just those variables whose effects are statistically significant in this sense. Finally, the "Cum. R^2 " statistics indicate what proportion of the total variation in reading time scores across sentences can be attributed to each predictor variable. For example, the variation in the number of syllables across sentences accounts for about 70% of the total variability in the reading times for these sentences, while serial position only accounts for an additional 5% of the variability. In general, the R^2 statistic is one measure of the relative importance of a predictor in the set, and the overall "Cum. R^2 " provides an overall measure of how much variation in the reading times can be attributed to the set of predictors as a whole. Thus, in part 1 of table 8, about 79% of the total variability in reading times across sentences can be accounted for by the selected variables. The remainder is unexplained variation.

Table 8
Multiple regression analysis of reading times for "Lentil".

Forward stepwise regressions ^{a)}	Coeff.	Sig.	Cum. R^2
<i>1. Predictors selected:</i>			
Syllables	193.7	0.0000	0.696
Serial position	47.2	0.0019	0.748
Inferences	118.5	0.0036	0.789
<i>Predictors not selected:</i>			
Importance			
Predictions			
Questions			
Comments on own behavior			
Comments on structure			
Confirmation of predictions			
Reference to antecedent information			
General knowledge and associations			
<i>2. Predictors selected:</i>			
Syllables	189.7	0.0000	0.696
Inferences	122.8	0.0044	0.742
Predictions	87.9	0.0477	0.762
<i>Predictors not selected:</i>			
Importance			
Questions			
Comments on own behavior			
Comments on structure			
Confirmations of predictions			
Reference to antecedent information			
General knowledge and associations			

a) Dependent variable = mean reading time per sentence.

Processing simple essays

Because they are written and read for different purposes, one would expect stories and essays to be read in somewhat different ways. On the other hand, since both employ many general linguistic conventions, there ought also to be many similarities. At a general level the similarities are captured by the kinds of principles shown in table 2. In this section, we want to focus on some of the differences we observed in how our subjects approached the reading of simple essays. To us, these differences clearly reveal that college readers know and use a wide variety of genre conventions in reading simple coherent texts.

We will first examine the data from our talking-out-loud task. Table 11 shows some general statistics about the frequency with which subjects said different types

Table 9

Multiple regression analysis of reading times for "Stranger".

Forward stepwise regressions ^{a)}	Coeff.	Sig.	Cum. R ²
<i>1. Predictors selected:</i>			
Syllables	212.9	0.0000	0.493
Serial position	59.5	0.0006	0.588
General knowledge and associations	223.9	0.0070	0.659
<i>Predictors not selected:</i>			
Importance			
Predictions			
Questions			
Comments on structure			
Confirmation of predictions			
Reference to antecedent information			
Inferences			
<i>2. Predictors selected:</i>			
Syllables	183.2	0.0000	0.493
Importance	-23.3	0.0043	0.540
Predictions	89.5	0.0036	0.603
General knowledge and associations	211.7	0.0108	0.666
<i>Predictors not selected:</i>			
Questions			
Comments on structure			
Reference to antecedent information			
Inferences			

^{a)} Dependent variable = mean reading time per sentence.

of things during the talking-out-loud task. The somewhat different distribution of statements in table 11 when compared with table 5 reflects the somewhat different instructions given to the talking-out-loud subjects in the essay tasks. Not surprisingly, explicitly asking subjects to talk about how the current sentence fit in to the overall plan of the essay generated more statements about the structure.

What is not revealed by these overall figures are some very important qualitative differences in what subjects said to essays when compared with stories. Perhaps the most dramatic difference came in the kinds of predictions made by readers. Note that in tables 5 and 11 predictions are relatively common: they represent about a quarter of the productions for the essays and a third for the stories. However, the kinds of predictions were very different. The typical predictions made by the reader of a story were specific. They predicted specific events that might occur later in the story, involving specific characters. Table 6 contains typical examples. The specificity of the predictions increased as the story developed, not sur-

Table 10

Multiple regression analysis of reading times for "War of the Ghosts" and "Circle Island".

Forward stepwise regressions ^{a)}	Coeff.	Sig.	Cum. R ²
<i>"Ghosts"</i>			
<i>Predictors selected:</i>			
Syllables	358.8	0.0000	0.743
General knowledge and associations	513.9	0.0020	0.826
<i>Predictors not selected:</i>			
Importance			
Predictions			
Serial position			
Comments on structure			
Reference to antecedent information			
Inferences			
<i>"Circle Island"</i>			
<i>Predictors selected:</i>			
Syllables	182.4	0.0001	0.604
<i>Predictors not selected:</i>			
Serial position			
Importance			
Predictions			
Questions			
Comments on structure			
Reference to antecedent information			
Inferences			
General knowledge and associations			

^{a)} Dependent variable = mean reading time per sentence.

Table 11

Proportion of talking-out-loud productions in each category for essays.

Category	Ice Ages		Carpet	
	Well-formed	Ill-formed	Well-formed	Ill-formed
Predictions	0.24	0.29	0.18	0.24
Questions	0.12	0.12	0.06	0.08
Comments on structure	0.32	0.24	0.28	0.32
Comments on own behavior	0.03	0.04	0.03	0.03
Confirmation of predictions	0.01	0.02	0.01	0.03
References to antecedent information	0.18	0.14	0.28	0.19
Inferences	0.10	0.12	0.11	0.10
General knowledge and associations	0.01	0.04	0.04	0.01

prisingly, since more and more information was available to the reader about the plot line being developed. But the important point was that the predictions were specific even very early on: those shown in table 6 were generated only about a third of the way into "Lentil". In marked contrast, the predictions given in the essays were much more general. They often consisted of comments to the effect that readers expected to see another argument, expected another example, *etc.* But the specific argument or the specific example were seldom generated. We think this difference in the types of predictions generated by readers reflects some important differences in the way they approach these two text types. The reader of a story has a set of firm expectations about the type of substantive events that will constitute acceptable continuations of a story. Given background information about the characters and their motives, much can be anticipated about how the conflict and resolution of the story will proceed. However, with an argument, it is apparently more difficult to predict the specifics. Readers know that an inductive argument (*e.g.*, *Carpeting*) will have various elements of supporting evidence for the main point, and they know (perhaps trivially) that a compare and contrast will have comparisons and contrasts. But their predictions do not reduce to the level of specifics. For example, table 12 presents predictions made by subjects at the end of the first paragraph of the well-formed version of the *Carpeting* essay. The first paragraph gives some background information, introduces the thesis of the essay and announces that there will be three arguments made in support of the thesis. In contrast to the comments given at the end of the background section for *Lentil* (see table 6), the essay readers do not seem to be going beyond what the author has told them about the arguments to be presented.

Readers of the essays seemed to be quite sensitive to the surface devices used to organize the components of the text. This was revealed in two ways. First, readers seemed to be able to anticipate the ends of paragraphs and other major breaks in the argument quite well. Apparently they were sensitive to the level of the language and the general pace of the argument. Paragraphs were often organized by having a

Table 12
Examples of reader comments at the end of the introductory paragraph of the well-formed *Carpet* essay.

Subject	Comments
02	"It's going to go on to describe what is good about carpeting. Before it just told how it came to be that they're using more carpeting. I think they're going to tell the reasons why".
03	"I expect to find out what the three central arguments in favor of carpeting are".
04	"Now you would expect him to go on and possibly list and possibly explain each of the arguments in favor of carpeting".
06	"Sounds like they are going to sell me carpeting now. They will go into all the good points of carpeting and try to sell me a roll".

general claim or point made near the beginning (*i.e.*, a topic statement) and then following this with a variety of specific points or illustrations. Often the paragraph would end with a general summary. This alternation of general and specific language is clearly a convention of essay writing. Readers expect general statements of main points: they don't expect the main points to be implicit. However, they expect the main points to be supported with concrete examples or arguments. Further, they expect only so much supporting detail. Though an inductive argument and each major supporting point potentially have an indefinite amount of material, writers tend to present only a small number of what is possible: two or three major points, one or two examples, *etc.* Readers expect this, and use these expectations to pace their understanding of the text. These general conventions are described in rhetoric books (*e.g.*, Baker 1976; Hughes and Duhamel 1962; Kinneavy 1971; Payne 1969), and our readers were sensitive to them.

The readers were also sensitive to surface rhetorical devices used to organize the text. In the reading time profile for the well-formed version of *Carpeting* (shown in fig. 4), two of the longest reading times are for sentences beginning with the rhetorical device, "in short" (sentences 15 and 29 in fig. 4). Recall that subjects were told to read with the goal of writing a summary later. The reading time pattern suggests to us that subjects were using rhetorical devices to signal where they should focus their attention in order to be able to write a good summary later on. No such signals were available in the ill-formed version of the *Carpeting* essay. Performance in the talking-out-loud task suggests that this lack of signalling had an effect. While readers of the well-formed version always had a good sense of where they were in the essay, there was much evidence in the ill-formed version that readers were often confused or misled as to the progress of the argument.

The readers of the essay on the ice ages showed their sensitivity to the organiza-

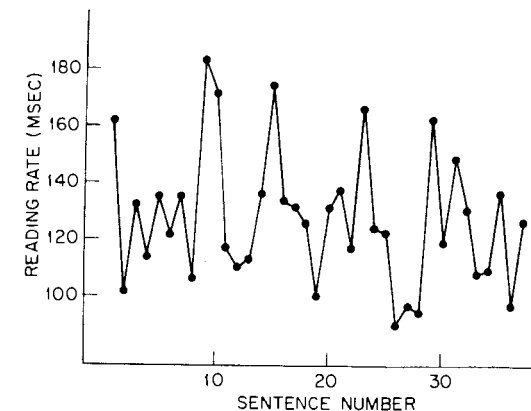


Fig. 4. Average reading rate for each sentence in the well-formed version of *Carpeting*.

tion in another way. The two versions of this essay varied on where the general conclusion was stated. Those who had the conclusion stated only at the end had a much harder time getting the drift of the essay. Their protocols revealed consistent confusion as to the central point of what they were reading. Again, readers expect to be told what the essay is about early on, and are confused when this does not happen.

The reading times were sensitive to the well-formedness of the essays. For both versions, the overall reading times were considerably slower for the ill-formed versions than for the well-formed ones. Specifically, a regression analysis that partialled out variables like sentence length or syllables revealed no difference in overall reading time per sentence for *Ice Age* or *Carpeting* essays, but the ill-formed version of each essay required about 900 msec longer to read per sentence than the well-formed versions ($F(1, 113) = 7.05, p < 0.001$). Well-formed versions of *Ice Age* and *Carpeting* essays took 3680 and 3773 msec per sentence, respectively, while the ill-formed versions took 4576 and 4387 msec per sentence.

Another difference between the essay data and the story data was in the relationship between the talking-out-loud protocols and the reading times. A series of multiple regression analyses revealed no clear relationship between any quantitative characteristic of the talking-out-loud data and the mean reading times. The only variable to emerge as a significant predictor of reading time was the length of the sentence. This is in marked contrast to the story data, where several indices of talking-out-loud behavior were correlated with the reading times. This is yet another indication of the differences in the behavior of the subjects who were reading the two genres. While the subjects talking-out-loud to the stories were generating rich, interconnected hypotheses as they progressed through the passage, those reading the essays did little more than comment on general aspects of the essay structure. This showed up in the emergence of serial position of a sentence as a factor in the multiple regressions for the stories but not for the essays. Seemingly, subjects read more slowly at the beginning of a story while they generated hypotheses and more quickly as they got farther into the story because much of what they were doing was confirming earlier predictions. No similar pattern emerged in the reading times for the essays, nor was there evidence in the talking-out-loud protocols of a similar predictive strategy. Story readers' hypothesis construction seemed to lead to different amounts of time being devoted to different story constituents, as revealed by the intercorrelations of the talking-out-loud and reading time tasks. No similar process seemed to be involved in the reading of the essays.

To summarize, the reader of an essay has general expectations about the overall structure of the argument, comparison, or other point being made in the essay. The reader quickly recognizes the type of point being made, and at a general level is sensitive to the organizing devices in the surface structure of the essay. However, unlike the story reader, the reader of an essay does not appear to engage in rich hypothesis generation and testing. The reader seems to adopt a more passive strategy, waiting for each new item of information to be presented and trying to fit it into the overall scheme of the argument.

Of course, one ought to be cautious in overinterpreting the behavior of readers from the small sample of texts we have examined. In this paper we have reported on four stories and two essays (each with two versions), and any literate person knows that the domains of stories and essays are very rich, with many types. We are actively pursuing this issue by examining a much wider range of texts in both domains. But we feel relatively confident that the broad differences between story readers and essay readers that we have described in this paper are accurate characteristics of literate readers.

General discussion

In this paper we have reported on some results obtained for two simple genres, stories and essays. These are genres that are familiar to any reasonably literate reader, such as the college students who served as our subjects. Our main claim about these readers is that they know, either explicitly or tacitly, a number of conventions for how texts of these types are written, and they use this knowledge actively during their comprehension of the text. They have strong expectations about what they will find in the text, and use these expectations to guide their understanding. When their expectations are violated, as in an ill-formed story like "War of the Ghosts" or the ill-formed versions of our two essays, their verbal protocols reveal confusion and their silent reading times are slowed down considerably. When their expectations are met, as in "Lentil", "Stranger", or the well-formed versions of our essays, they appear to be able to profit from the application of their knowledge of genre conventions to the process of understanding.

A capsule summary of the difference in strategies for the readers of stories and essays might go as follows. The basic orientation of the reader to a story is *prospective*. The reader is looking ahead, trying to anticipate where the story is going. Except at the beginning, where an overall hypothesis is being developed, the story reader tends to relate each sentence to the general hypotheses and predictions that have been developed. In contrast to this, the reader of the essay appears to adopt a *retrospective* orientation. Each new element in the essay is related to earlier elements. There is little anticipation of what is coming up, except at the most general level. This difference in orientation on the part of the reader is of course due to the basic difference in underlying structure of these two genres. The story has a causal, temporal structure, with events ordered and interrelated in well-specified ways. Further, the general schema for a story dictates that the events must unfold according to a pattern of complication and resolution. These constraints make a predictive strategy quite useful. An essay, such as an inductive argument, has no similar structure. Rather, a general hypothesis is supported by a variety of evidence, and the support relationship between each succeeding piece of evidence and the (usually) previously stated thesis makes the retrospective strategy appropriate. It is extremely interesting to us that our readers, especially those in the talking-out-loud task,

exploited these differences in establishing their overall strategy for comprehending the texts.

If our talking-out-loud data are representative, readers appear to have considerable knowledge about both the underlying form and surface conventions for these simple genres. Table 2 attempted to capture at a general level the kind of knowledge they have. Presumably this general knowledge represents a kind of genre schema, and would be applicable to a wide variety of specific text types. While the schema sketched in table 2 has obvious limits (e.g., it has limited utility for poetry), it probably reflects the general expectations literate people have for many types of texts. We believe that our empirical investigations provide a good start at discovering what people know about two simple types of discourse. However, we are obviously far from a complete cognitive theory of genre. In the remainder of this discussion we would like to raise four issues which need to be addressed if we are to develop a more complete theory of genre.

First, we need to characterize in much more detail the principles in table 2. For example, what is an adequate formal or linguistic representation of these principles? Can we develop a plausible psychological representation for the principles? Do the principles all have the same status? We have already suggested that the principles of *Connectivity* and *Overall plan* could be formally represented in terms of, say, a story grammar representation (although the specifics and adequacy of such representations is a matter of considerable debate). Other principles like *Specificity* or *Language* do not seem to have the same status, but refer rather to more qualitative stylistic or aesthetic considerations. Specifying the formal and psychological nature of these principles is especially important if we want to characterize precisely the well-formedness of texts.

A second issue is how we can apply or instantiate the general principles given a particular genre. At present the principles have been applied on intuitive grounds, using empirical protocols as a heuristic to illustrate or suggest a particular formulation of a principle for a particular genre. However, we obviously need a more principled way of applying the principles.

A third issue is how these principles are learned, not only in children learning to read and write particular genres but also in adults who may have occasion to master new forms of discourse in a profession or elsewhere (e.g., technical forms of writing, instructions, memos, new literary genre, and so on). Presumably, the adult reader would bring to bear something like the principles in table 2 and would induce from particular instances of a genre how these principles are particularized.

Finally, while our analysis of written communication examined the roles of both the reader and writer, we have focussed in this paper on the reader's behavior. But our analysis — in particular, the principles listed in table 2 — is just as applicable to the writer. Presumably a writer must learn both the underlying forms for a genre and the principles of surface composition. In fact, in the abstract the contrast between underlying and surface forms could correspond to the generation and the revision processes often discussed in connection with writing (e.g., Grey 1972;

Flower and Hayes 1977, 1979). Good and bad writers ought to differ, in part at least, in the extent to which they have acquired the principles of composition for the genres they plan to write. However, while they may have tacit understanding of the principles in their role as a reader, these do not necessarily readily translate into effective writing strategies. A significant part of the writer's task is to be able to anticipate the effects of his or her composition on the reader. Failure to do so effectively usually results in a poor composition. Studies of the contrast between good and bad writers, of writers who are studying composition, and of an individual writer progressing through successive drafts ought to be revealing of the extent to which these principles play a role in the writer's task.

We have found our talking-out-loud task to be quite revealing of both the knowledge possessed by readers and the processes they employ to understand a simple text. In this paper we have only conveyed a very little of the information contained in the protocols for this task. We believe this technique has much potential usefulness for gaining and understanding of the conventions governing a wide range of text types. Presumably the task could be of great interest to scholars of literary processes as well as those, like us, who are primarily interested in the cognitive processes of ordinary readers.

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