MANY PROBLEMS AND SOME TECHNIQUES OF TEXT ANALYSIS *

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The state of the art in text analysis and text comprehension research, especially in theoretical work in linguistics, psychology, and artificial intelligence, has not gotten much beyond subjective methods of analysis of critical texts, often of a trivial size and often selected because features of such texts illustrate nicely the theoretical point being argued by the analyst. This paper represents an attempt to assist text researchers in sharpening methods of analysis by looking for a number of discourse properties on different levels simultaneously. Close subjective analysis of longer texts is argued to assist in evaluating past theories and discovering new classes of discourse phenomena, thus advancing the state of the art in text comprehension research. This paper explores two children's texts from the standpoint of a plans analysis, a story grammar analysis, an analysis of information structure, and analyses of problems connected with conjunction, anaphora, and point of view.

1. Introduction

Ideally, it should be possible to examine a given text using simple, replicable methods of evaluation to determine not only the level of difficulty but the sources of difficulty such a text presents. But such methods simply do not now exist. The state of the art in such matters, especially in theoretical work in linguistics, psychology, and artificial intelligence, has not gotten beyond subjective methods of analysis for any but the simplest kind of text property. for

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example, lexical frequency counts or measures of sentence length.

The main purpose of the Text Analysis Group of the Center for the Study of Reading has been to advance the state of theoretical work on text properties. To this end, we have involved ourselves in what we readily admit is subjective, but close, analysis of texts. We do this for three reasons.

First, it allows the sharpening of tools of analysis and a determination of which methods of analysis are or are not likely to be usable and fruitful, albeit subjective and intuitive. As an example, we have attempted a given-new or topic-comment analysis of a text, but the methods of analysis we have attempted to use turned out either to be impossible to apply to non-trivial texts, or when applied consistently, led to intuitively absurd results. Such an outcome shows the poverty of the theories with which such methods are associated and calls for further theoretical work on these matters.

Our second reason for performing close subjective analysis of texts is that looking simultaneously for several kinds of properties is likely to reveal new classes of phenomena, and to suggest research on their roles in text comprehension.

Finally, we perform our analysis because we are convinced that the state of theoretical work on text properties can be advanced beyond its present form only by considering data bases considerably richer than those presently available. Most theoretical discussions of text properties are based on a single text, often of a trivial size and often selected because features of that text illustrate quite nicely the theoretical point being argued by the analyst. Whether such an analysis is generalizable to other texts is left to other researchers (who are usually busy with their own work) or students of the original analyst (whose duty is to bolster the theory). Research is thus either fragmented or shortsighted, in either case a situation that may lead to a stagnation of the field.

In this paper, our approach has been, for the most part, to assess some of the factors of discourse comprehension that seem worthy of future study. In 1977 and 1978, the authors chose two children's texts, Babar Loses His Crown (de Brunhoff 1967) and "The Wonderful Desert" (Moore and Mastratto 1959) (hereafter BABAR and DESERT), the first a narrative text, the second a descriptive-expository piece. From the disciplines of linguistics, psychology, and artificial intelligence, we charged ourselves to discover "what was there" of interest. We analyzed these two texts from lexical-, syntactic-, and text-level standpoints, and we also analyzed the illustrations in and layout of the texts. This work is reported in full in three documents (Green et al. 1980a, 1980b, 1980c).

This paper is a highly edited and condensed version of the text-level section of Green et al. 1980a. Section two of this paper treats the analysis of the organizational structure of texts and contains comments on how (if at all) this structure is indicated overtly to the reader. Section three is devoted to a discussion of a number of text-level discourse properties (information struc-
ture, point-of-view, connective devices and anaphoric devices) and the possible relevance these properties have to a theory or theories of text comprehension.

2. Organizational structures

2.1. Introduction

The structural analysis of texts can be carried out at a number of levels, depending on the length and type of text. A richly structured text such as BABAR could possibly bear analysis at as many as four or five levels of organization. In the absence of a general and empirically vulnerable theory of the structure of texts (cf. Morgan and Sellner 1980 for discussion), it has been necessary to turn to pre-theoretical analyses restricted to certain literary genres, analyses like the Plans analysis described in section 2.2. and the Story Grammar, discussed in section 2.3, both of which are limited to analysis of narrative texts, the latter to narrative fiction.

2.2. Interacting plans analysis

2.2.1.

If we want to know why some children have difficulties learning to read, we must develop a better idea of what they are reading, or could be reading. Analysis of texts alone will not tell us what is the best way to help someone learn to read, but it makes asking better questions possible. This section, together with the reports, ‘What makes a good story?’ (Bruce 1978) and ‘Interacting plans’ (Bruce and Newman 1978), constitutes one part of the larger text analysis effort.

Understanding the plans and beliefs of characters in a narrative is clearly an important aspect of reading comprehension. The study of such plans is part of text analysis because it depends on an exacting study of the way actions are described in the text. It is also an analysis of what goes on “between the lines” of a text since it considers motivations and reasonings that may not be explicitly stated.

A plans analysis is particularly appropriate for two of the central questions of text analysis: “What is it that makes a given story easy or hard to comprehend?” and “What is it that makes a given story good or bad?”. The answers to these questions surely interact, but it is not true that difficulty alone determines the quality of a text, nor even its appropriateness for a child whose reading skills have developed to a known level.

2.2.2.

The basic theoretical tenets of interactive plan analysis and representation
have appeared in this journal and elsewhere (Bruce 1980, and Bruce and Newman 1978). It is intuitively clear that the complexity of stories can differ even when surface syntactic complexity, vocabulary level, and passage length are held constant. What may differ are the complexities of the characters' motivations, actions, and goals. A reader needs to be able to infer plans from the often sketchy statements of actions and intentions of actors. He or she must then be able to use these induced plans to connect events. There are a number of specific abilities a reader would need in order to understand plans in this way. We do not know that these abilities are a major cause of reading comprehension difficulties, or even that they form a complete or well-defined set of skills with respect to understanding plans. Rather, they point to areas that might be worth investigating.

Among the complexities are the following:

1. **Changes in plans.** Plans in a story can remain fairly constant, like Babar's plan to retrieve his crown, or plans may change in response to events. The number and magnitude of changes may be a source of difficulty.

2. **Size of plans.** Plans vary in their inherent complexity. A plan may involve a long sequence of acts or may be accomplished by a single act.

3. **Embeddings of beliefs.** Whenever a belief is about another person's beliefs, one must be able to shift point of view. Sometimes a story, e.g., 'Hansel and Gretel' (Lucas et al. 1945) requires multiple shifts of point of view, to beliefs about beliefs, etc.

4. **Embeddings of intentions.** Similarly, intentions may be embedded. For example, Hansel and Gretel's parents intend the children to have the intention of following them into the woods.

5. **Embeddings of plans.** A consequence of the embeddings of beliefs and intentions is that one's plan can be defined with reference to other plans, and those plans to yet other plans. Hansel's stepmother, for instance, tries to block Hansel's attempt to block her plan to abandon Hansel and Gretel.

6. **Degrees of interaction.** When there are multiple actors in a story, their plans can be more or less interconnected. Hansel and Gretel's plans are intertwined with their parents' plans. Each is trying to respond to the others and to get the others to act in a particular way. In other stories there may be only one character, or characters' plans may not interact as tightly.

7. **Deception.** A story that involves deception, e.g., 'Hansel and Gretel', is inherently more complex than one that does not.

8. **Conflicts.** The number and types of conflicts among plans in a story may also be a source of complexity. In a general sense, we can view actions as attempts to reduce conflicts among plans. For example, there is a potential conflict between a plan I believe you to have and the plan I want you
to have. There is also a potential conflict between a plan I want you to believe I have, and the plan I believe you believe I have. It is not necessarily the case, however, that plans of any type can conflict with plans of any other types. In fact, the identification of types of plans leads us to an identification of types of conflicts that can arise among plans in interactive situations. This suggests a number of questions about people's recognition of and response to such conflict situations. For example:
(a) To what extent do people of different ages recognize embedded plans?
(b) How deep do these embeddings go?
(c) Do the potential conflicts actually arise in all situations?
(d) How sensitive are people to the ability of those they are interacting with to perceive such embeddings and conflicts?
(e) How are the virtual plans (Bruce 1980: 296) and the conflicts among them signaled in text?
(f) What are the consequences of one's understanding of different levels of interpretation of virtual plans?
(9) Maintaining different points of view. Having to maintain different points of view, e.g., that one character believes X where another believes not-X, imposes demands on the reader. In addition to the levels of embedding mentioned above, there may be problems associated with maintaining a large number of differing beliefs or maintaining any differences for an extended period.
(10) Cultural presuppositions. Stories that involve beliefs about character types or simply facts about the physical world may place differential demands on readers depending on their experiences prior to reading.
(11) Beliefs outside of "shared belief space". In a normal episode most beliefs are "shared" among participants, meaning not only that they both believe, but that they believe that the other believes, and that the other believes that they believe. The reader can then assume that all knowledge is transparent to all. Often, though, one must assume that there are beliefs outside of the shared space, not necessarily conflicting beliefs, but beliefs that are not known to one or more characters.
(12) Inference. The number of extra beliefs needed and the amount of deduction required to link together actions in a story is also an indication of possible difficulties for the reader.
(13) Explicitness of plans. Texts vary in the degree to which they are explicit about the plans and intentions of characters in the story. Stories are more difficult when the reader has to infer plan structures from the simple statements of actions.
(14) Act hierarchies. An important aspect of interacting plans is that people develop them and carry them out in the context of their perceptions of others' actions. The same action can be viewed at various levels or clumped together with other actions. There can be many levels of conceptualization for the same act or sequences of acts.
2.2.3.
Along with complexities of plans, one of the most interesting results of our analyses in terms of interacting plans has been the realization of the tightly interwoven character of the plans representations. Any representation of "meaning" can be viewed as an arbitrary and unsatisfying abstraction from the "whole", but plans seem even less divisible than other facets of meaning. It is difficult, for example, to change one small part of a plan's representation without producing rippling effects throughout the representation.

A consequence of this holistic property of plans is that a single belief can assume tremendous importance. In a fairly straightforward fable like 'The Fox and the Rooster' (reprinted in Bruce 1980: 300–301), the reader's belief that the Rooster believes that foxes like to eat roosters appears to be a critical belief for the building of the typical adult interpretation of the story. Some children do not seem to have this belief and build a different interpretation in which the Rooster is an unwitting potential victim of the Fox and is saved through no effort of his own by a Dog.

The latter interpretation is internally consistent, and it matches the story as well as the typical adult interpretation. Is it therefore also correct? How many different interpretations are there? We may not be able to answer those questions, but we can observe that the one critical belief has had significant ramifications for the interpretation. Consider how readers with the two interpretations would answer the following questions:

(1) Did the Rooster trick the Fox?
(2) Did the Fox trick the Rooster?
(3) Was the Rooster smart?
(4) Did the Rooster think that the Fox liked his singing?
(5) Was the Rooster happy with what the Dog did?

The notion of critical beliefs seems worth pursuing. It may account for some differences in interpretations due to cultural variation found among readers. It also needs to be considered when we think of testing for comprehension. Finally, it shows one more way in which the things the reader brings to the text are as crucial to understanding as what is "in" the text.

2.2.4.
What do interactive plans analyses tell us about text comprehension?
Understanding plans in stories is a complex task that may require years of exposure to high quality texts to learn. Consequently, we should expect children and adults to understand stories in different ways, simply because they have had varying amounts of experience. It would not be surprising to find examples of understanding at each of the following levels to be an indicator of experience with reading:
(a) Isolated sentence understanding – each sentence is understood but connections are not made.
(b) Islands of understanding – local connections among sentences are made but no overall pattern is seen.
(c) Limited plans understanding – basic plans are comprehended, but not interacting plans.
(d) Embedded plans understanding – full understanding of the interactions among plans of characters in a story.

An interacting plans analysis also gives some guides for our expectations about developing readers. First, the complexity of plans means that readers may understand in different ways, yet still be reading, and hence, learning to be better readers. Second, the importance of ‘critical beliefs’ means that readers with different backgrounds may build divergent interpretations of the same texts. Both of these points need to be considered seriously when we think of what it means to test comprehension skills.

2.3. Story grammar analysis

This section has two goals. The first is to illustrate briefly how a specific set of predictions about story memory can be made, using a story grammar analysis. The second is to raise some critical issues about story comprehension which have not been directly addressed.

In the past few years, it has become increasingly apparent that models of single word or sentence comprehension cannot account for many of the important factors affecting the comprehension of discourse material. Although theories of discourse comprehension must eventually explain how these smaller units influence the comprehension of an entire passage, an approach describing the semantic relationships between sentences is necessary.

In an attempt to extend Bartlett’s (1932) work on story memory, opp’s (1958) morphology of the folktale, and Rumelhart’s (1975) initial schema for stories, several story grammars have been constructed to describe the structural basis of story understanding. A major theoretical assumption of these grammars specifies that memory for stories is a constructive process, resulting from the interaction between incoming information and pre-existing cognitive structures containing knowledge about the generic characteristics of stories. These structures or schemata influence the way a listener will break down incoming story information into its component parts. Schemata aid the listener by specifying the types of information and the types of logical relations that are most likely to occur at various points in a story. It is then assumed that the listener can determine whether any necessary information has been omitted or whether the correct logical relations have been used to connect the various story components. Thus, the major assumption underlying the description of a
story schema is that comprehension of a story involves the use of an ideal story structure to reorganize, represent, and retrieve incoming information. When text structures do not conform to the rules specified by a story schema, then readers or listeners will attempt to transform the incoming information so that a representation can be constructed that adheres more to the structure of an ideal story schema.

In several studies on story comprehension, Stein and Glenn have described a story schema in detail and have presented evidence to support several hypotheses concerning the validity of a story grammar (Stein 1978; Stein and Glenn 1977; Stein and Nezworski 1978). A story structure can be described in terms of a tree diagram which is a hierarchical network of story categories and the logical relations which connect them. The initial division of a story consists of two parts: a setting plus an episode structure. The setting begins the story with the introduction of a protagonist and normally includes information about the social, physical, or temporal context relevant to the development of the episode. The setting is not part of the episode, as it is not directly related to the subsequent behavioral sequence described in the episode. However, information in the setting category may constrain the possible types of behavioral sequences which then occur.

The remaining story information in the episode consists of a sequence of five categories: initiating event, internal response, attempt, consequence, and reaction. There are several factors which alert a reader or listener to the fact that one category has ended and another has begun. Temporal markers such as "one day", "suddenly", "finally", etc., often signal the beginning of a new category. Such markers facilitate the breakdown of stories into components. The semantic content of a statement and the relationships among statements are, however, just as important in determining the division among categories. Thus, readers or listeners must sometimes infer that new categories are beginning or they may find explicit markers from which they recognize the new category.

Certain types of information are always contained in the internal representation of an episode, and the temporal order of category information and the logical connections between categories are also critical components of a story schema. By using the categories described in the schema, the reader or listener can make predictions about incoming information. The text researcher, too, can make a set of predictions about the nature of story memory, specifically with reference to story recall. Although recall does not guarantee an isomorphic correspondence to the underlying representation of story information, it does allow an initial assessment of the types of story information thought to be most critical in maintaining the semantic coherence of the text of a story. Therefore, the next two sections will discuss predictions concerning the types of information most frequently recalled, the types of new information which will be added to a story, and the order in which story information will be recalled.
A story statement, in most instances, is equivalent to a single sentence in the text of a story. The sentence, however, is not necessarily the critical component for defining whether information can be classified into one or two statements. Rather, it is the function of the information within the context of a story that is the critical determinant of the unit of analysis. Stories are basically concerned with goal-oriented behavior and ideally consist of a sequence of statements directly related to the attainment of the goal. Therefore, the types of logical relationships existing among story statements in an episode are the critical factors in predicting the saliency of individual statements in recall. In story studies, accurate recall is defined as the production of statements containing an extremely close correspondence to the semantic content of the original story material. The syntactic form of story memory is less important. If the relationships among statements are directly causal in nature and are related to the character's major goal attainment, then such statements have a high probability of being recalled. In recall, then, certain story statements assume a more important role than other statements.

Two additional factors are important in predicting the saliency of each story statement. The first factor concerns the semantic content of the statement. Although two statements may be causally related to one another, the information in the first statement may directly imply the type of information in the second statement. In this situation, the recall of the second statement becomes unnecessary or redundant. A second factor for predicting saliency concerns how well a particular story statement matches the type of knowledge acquired about the specific sequence of events being presented. Often two statements in a story will again be causally related to one another, but the listener will recall a statement that is an integration of both statements, or a statement which contains information from which the actual story statements could be inferred. Thus, the semantic content of a statement, as well as the type of relations among statements, affects the probability of recalling individual statements.

In past studies it has been found that certain categories of information were better recalled than other categories. The categories most frequently recalled were major setting statements, initiating events, and direct consequence statements. Attempts were in the middle of the frequency distribution, while internal responses, reactions, and purely descriptive settings were infrequently recalled. These results seem to suggest that statements within these latter categories are either semantically redundant or not directly related to the protagonist's attempt to attain a specific goal.

The saliency of story information is also related to the organization of story information into higher order units. The episode is the main psychological unit in a story structure. Just as there are different types of relationships among statements within an episode, there are also different types of relations linking the episodes of a story. The relationships among episodes also play a critical
role in determining whether story statements will be recalled. In many stories, such as BABAR, there is one overriding goal stated in the first episode of the story. The remainder of the story, then, consists of a number of episodes containing subgoals that are directly related to the protagonist's desire to attain the major goal. If an episode contains subgoals directly related to the major goal, it should be well recalled. However, there may be episodes in a story which have only an indirect relationship or no relationship to the major goal. Because these episodes are "empty" in the sense of being unrelated to the goal, they serve little purpose and are readily forgotten.

2.3.2.

The next set of predictions derivable from story grammar analysis concerns the variables that regulate the ability of a listener or reader to recall the correct temporal sequence of a given story text. Two categories of results will be given.

If the temporal organization of a story text corresponds to the structure described by the grammar, subjects will have little difficulty organizing incoming information and recalling the temporal sequence of a story text. Even children as young as four can recall the current temporal sequence of a story text. However, when the text sequence diverges from the order specified by the ideal form, listeners have difficulty maintaining the exact order of the text and reorganize the story text in several different ways, ways representative of an idealized form corresponding more to the structure described in the grammar than to the sequence actually heard.

If the story sequence in a text is altered by simply reversing the positions of two adjacent statements, subjects recall the story in one of two ways: they either reverse the two statements so that the order resembles that described in an ideal structure or they insert a causal or temporal connector to signal the fact that an inversion has occurred. When the information in an experimental text is moved more than one location away from its "normal" position in an ideal sequence, different strategies are used: in this case, subjects either interpolate extra material to connect the moved information more appropriately to surrounding information or they delete the moved information altogether.

Predictions can also be made for more global recall. In many stories there are two or three episodes which are sequenced in an arbitrary fashion such that there is no "a priori" reason that one episode should occur before another. There is no direct causal relationship linking the two episodes. Here the probability of a subject's maintaining the correct temporal order of the episodes in recall decreases markedly. Thus, the type of connection linking episodes not only predicts whether an episode will be recalled, but also predicts the order in which episodes are recalled.
2.3.3.

Although preliminary results are very promising for the use of a story grammar or story schema to understand parts of the comprehension process, the important work in this field is in the initial stages. There are several issues that still need much more investigation.

(1) Encoding. To date, most of the studies completed on stories have used only recall procedures. While recall is important in assessing memory as far as retrieval goes, this methodology does not directly answer questions about the encoding process or the actual process of representation. Again, one of the major assumptions underlying memory for stories is the proposed interaction between incoming information and pre-existing operations and knowledge structures. It is not clear at the present time how the interaction of these variables differs during encoding and retrieval. For example, Stein and Nezworski (1978) have shown that subjects recall stories in a very specific temporal sequence and will transform incoming information so that the order of output matches the order described in an ideal story structure. However, these transformations may occur only as a function of the constraints placed on working memory during retrieval. The underlying representation of the story may be more complex and more representative of the pattern of incoming information. Both Mandler and Johnson (1977) and Stein and Nezworski (1978) have stated that although there may be similarities in the process of using schemata during encoding and retrieval, there are also significant differences.

One method to show the differences between encoding and retrieval processes is the use of recognition and probe procedures. Stein and Glenn (1977) have already demonstrated that certain types of story information (internal responses), infrequently recalled by children, are very accurately encoded (when probe techniques are used to assess comprehension). Stein and Nezworski have also shown that although subjects reorder stories containing violations of an ideal form, they are aware of the types of violation occurring in the structure of a text. Thus, during the process of encoding stories, subjects incorporate much more and different information about the text structure than they are able to retrieve.

(2) Inferences. The difference between the encoding and retrieval of stories also raises questions about the actual structure of the representation of stories. One of the most important issues related to the comprehension of stories concerns the types of inferences made during the process of encoding and representation. Story information often deals with moral dilemmas where children continually make inferences about the acceptability of a character's goals, plans, and attempts to attain the goal. That is, inferences are made spontaneously about whether or not a set of actions are good or should have
been performed and whether or not the character is seen as good or bad. Inferences are also made about a character’s personality traits, affective states, and perceptions about some of the story events.

Although stories sometimes explicitly state this type of information, more often than not the reader must make inferences about this information. Because these inferences are related to the way children apply story information to their own problems and behavior, it becomes critical to begin a more detailed investigation of this type of information that is inferred.

(3) Semantics. The more general problem with existing story grammars is that they do not provide a method for understanding the resulting representation of the specific semantic concept of a story. Although general predictions in the Stein and Glenn grammar were made about information salience in recall, based on the relational structure created among story statements, these predictions do not concern the specific content of story material. The development of a more encompassing model is necessary. Such a model would lay out specific predictions about the recallability of each specific story statement. Although we can show, for example, that causal relations among statements and their relations to the character’s goal are important, these factors do not allow enough specificity about recall to make fully accurate predictions.

A final issue which needs investigation concerns the changes which occur in story structures as a function of age. Stein and Glenn, in a study on story production, show that story length and the complexity of the story structure change as a function of age. Young children do not produce certain types of stories, e.g., interactive character episodes, complex goal structures, etc. Now it is necessary to determine just how these different structural characteristics affect comprehension.

3. Discourse properties

This section describes a number of text-level discourse properties that have characteristics that may affect reading comprehension. Section 3.1 consists of a general discussion of information structure, which is posited as scaffolding for the comprehender to build a model of the text and integrate a memory representation of the discourse. Section 3.2 is a very brief discussion of linguistic phenomena that reflect the narrator's or character's point of view, phenomena that reflect the narrator's attempt to influence the reader's perception of events described. Section 3.3 contains discussion of two major text-connector devices: conjunctions and anaphoric devices.
3.1. Information structures

There has been a great deal of interest recently in the notion of information conveyed by a sentence, how information is conveyed, what its form is, and whether the structure of a sentence or discourse is dependent on or reflects the information communicated. It has been postulated that comprehension of text depends crucially on the ability of the reader to match up the text with an appropriate organization within which to interpret the text. In this section, we examine a number of the terms used in the description of information structure schemata (or perhaps sub-schemata), and we evaluate the feasibility and utility of applying such notions to a complete text, i.e., BABAR and DESERT.

We begin with the notion topic. Some authors use this term to mean discourse topic, or what a discourse is about. Other authors use it to mean sentence topic, or what a sentence is about. Topics are sometimes viewed as unexpressed propositions which characterize “aboutness” of a discourse (Keenan and Schieffelin 1976). That is, throughout a discourse, topics are established, and any given sentence will be related to the current discourse topic or establish a new topic. There do not seem to be any good tests for this kind of discourse topic, and we have found in attempting a partial analysis of topic in BABAR and DESERT that the notion “discourse topic” is in need of quite a bit of refinement.

For other scholars, topics are syntactic elements. These topics are either surface constituents in some languages (Li and Thompson 1976) or they appear as nodes in a semantic representation that may or may not be syntactically realized (Gundel 1977). Perhaps related to topic and perhaps not is the term theme. This is used variously to mean (1) the point of departure of a sentence, i.e., the element that comes first in a sentence (Halliday 1967); or (2) what a clause is about (Kuno 1975); or (3) those elements in the sentence that are already within the hearer’s or reader’s sphere of knowledge, i.e., information that has already been introduced to the comprehender by the writer or speaker (Danes 1974).

Related to this last notion of theme is another set of terms, given and new information. Given information is used to mean the information the speaker believes to be present in the (short-term) consciousness of the hearer (Chafe 1976) or what the speaker believes to be recoverable from previous discourse (Halliday 1967). Kantor (1977) extends Chafe’s notion of a given-new distinction to suggest a concept of degrees of activatedness of information in the consciousness of hearer or reader to explain the degrees of comprehensibility of various referential expressions, e.g., pronominal, demonstrative, definite, definite with added descriptors.

A major problem with almost all the studies referred to above is that they give no methodology for the analysis of texts in general. Indeed, the analyses used to exemplify the theories are usually restricted to critical texts composed
of passages of two to six sentences in length. As a result, we find the various constructs difficult to apply to actual texts like BABAR and DESERT. In Green et al. (1980a: 89–95) we attempted to view the BABAR and DESERT texts according to a discourse topic analysis, a new-old information breakdown, and a strictly “seat-of-the-pants” approach of “filling in” missing information which, we hypothesized, was needed to maintain topical connections between sentences.

We found our ability to characterize what was discourse topic in BABAR at any given point utterly futile. In the expository text, DESERT, we were much happier with our intuitions of what was discourse topic at what point in the piece. But then a perturbing question arose: Is the notion topic applicable to descriptive or expository discourse but not to narrative?

Accepting an affirmative answer to this question should cause the text analyst to question the notion of discourse topic as a linguistic notion, for if it were, it should be easily applicable to any genre or text-type. Thus, it would seem from our analysis that a notion of discourse topic is a fundamental construct or organizing principle of exposition and so belongs in the cognitive rather than the linguistic realm.

As for old/new, theme/rheme, activated/non-activated distinctions, our analyses were inconclusive. We believe something related to these notions exists, but the methodology for analyzing texts in such terms is, from the literature and from our albeit meager attempts, entirely inadequate to the task of providing a reproducible analysis of a complete, natural text. Again, more descriptive work is needed on a variety of texts written by authors, not by text analysts.

Finally, our attempts to “fill in” missing information to keep a topical connection proved to us that text-level inferences are probably the most crucial aspect of text understanding, but also the most elusive. We could not even come close to systematizing the kinds of inferences we were able to make, or how we made them. The one conclusion we were able to draw was that the least interesting inferences for the study of text comprehension are those that follow automatically from a comprehender’s knowledge of the language plus the ability to reason. Inferences that can or must be made of the sentence in isolation are the same as those one would make if a sentence is discourse-initial.

The hard-to-define inferences are those that involve the relations between propositions expressed by sentences and those concerned with what is relevant in a discourse. What kinds of inferences are necessary and what kinds are not.

3.2. Point of view

There are a number of places in BABAR where the author shifts from his standard detached and unbiased narration. Tagging each of these with labels would be premature, since the data to be discussed are mostly one of a kind.
Further study of real text needs to be made to see if any generalizations will obtain. Here, however, are some of the passages and some rough characterizations of them which identify devices meriting further attention.

In this first example:

But Babar can't eat. He is thinking about his crown. He needs it tonight. He must wear it to the opera. He fears his crown is gone forever.

the author is clearly speaking as if from inside the character's head. The third and fourth sentences especially might well have been quotes, e.g., *Babar thinks* "I need it tonight. I must wear it to the opera".

But nowhere in *BABAR* is there any thought-quotation; this seems to come close:

The Babar family circles around him. Babar says, "Ahem!" The man looks up. He is not the Mustache man at all. "Oh, excuse us," says Babar...

The fourth sentence here is interesting because of the phrase "at all". Again the narrator is speaking from the protagonist's point of view. The phrase "at all" is oral syntax, and reflects the expectations of the speaker (i.e., Babar). A more neutral description of the scene would be accomplished by something like "He is not the Mustache-man" or "He turns out not to be the Mustache-man". Linguistic forms like "at all", which reflect the speaker's attitude, are pervasive. Analysis of the rhetorical exploitation of such forms would be greatly aided by even a preliminary dictionary of such forms.

A final example of point of view is this:

Poor Babar! His crown is lost again.

This statement is clearly a plea directly from the narrator for sympathy for King Babar. Also, the word "lost" here reflects the narrator's taking Babar's point of view in a subtle way. Previously, "lost" was used only in direct quotation of Babar. Here, instead of characterizing Babar's thoughts, as the narrator did in "He fears his crown is lost forever", he takes Babar's point of view and simply speaks of the crown as missing, as if it were his own.

3.3. Connective devices

This section contains discussions of two important elements which function to weave the threads of discourse in a text into a coherent entity, but which are perhaps among the most difficult to describe in full. We speak here of *conjunctions*, which specify relations between the clauses they introduce and other clauses or larger chunks of text, and of *anaphoric devices*, which relate references to individuals within the text, subject to a set of often subtle
constraints which interact in ways that are not yet entirely understood.

These devices may affect comprehension by making it more or less difficult for the reader to reconstruct the structure of the text, so that he or she will be able to perform such processing tasks as are necessary for a full appreciation of the text, e.g., forming expectations as to what will come next, picking out relevant details in what is being or has just been processed, etc. Once it has been understood exactly how these devices reflect and signal information about structure and other discourse-level properties, it will be possible to evaluate texts with regard to them, and it will also be possible to establish how much of a factor they actually are in efficient text comprehension.

3.3.1. Conjunctions

Conjunctions play a crucial role in providing the reader with information both about the story structure and about the story content. We present here a brief list of some of the categories of conjunctions we found in BABAR, together with a discussion of what we believe to be their importance to discourse analysis and comprehension research.

The most frequent conjunction in BABAR is but. Sentence-initial *but* must be distinguished from the use of *but* to conjoin parallel clauses within a sentence. The latter usage introduces a clause whose content is contrary to the expectation that the writer intends to be generated in the reader by the preceding clause or clauses within the same sentence. Sentence-initial *but* makes a similar contrast, not between the following clause and the one immediately preceding it (which is in a different sentence), but between the following clause and possibly some proposition at a higher level of discourse. This proposition may be a stated one, or one which must be inferred from what is stated somewhere in the preceding discourse.

We begin our analysis of some of the connective functions of *but* in BABAR with an instance of sentence-initial *but*:

"I need my crown!" says Babar. "I must wear it tonight!" "Don't worry," says Celeste. "We'll find that Mustache-man. We'll look all over Paris till we do." So out they go, looking for the man with Babar's bag. "He may be up in the Eiffel Tower," says Celeste. "All visitors to Paris go up there."

Now they are up in the Eiffel Tower. *But* the man with Babar's bag is not.

*But* here marks the fact that the family expected to find the Mustache-man in the Eiffel Tower and, contrary to their expectations, did not find him. The expectation that the man would be there was created by Celeste's statement that the Mustache-man might be up in the Eiffel Tower and by the fact that the family did indeed go up in the Eiffel Tower. (Note that no explicit statement that the family went up in the Eiffel Tower for the purpose of finding the
Mustache-man is made - this must be inferred by the reader.)

But in its next occurrence as a clause-conjoinder requires quite a deductive chain to interpret properly:

Now they are up in the Eiffel Tower. But the man with Babar's bag is not. "Look at the boats down there!" the children shout. "Let's go for a ride."

Babar is sad, but he goes along.

To fully comprehend the last sentence, the reader must assume that when one is sad, one generally does not feel like doing something that is enjoyable, or perhaps that when one is sad, one does not feel like being around others. Now with this as a cultural presupposition, the reader must also know or believe that taking a boat ride is supposed to be an enjoyable thing. An instantiation of the general cultural presupposition, then, leads to an understanding of why Babar's going along for the ride is contrary to the expectation of the probable behavior of Babar, given the knowledge that he is sad.

The next occurrences are in the following discourse:

The boat does not stop. So Arthur dives off. "I'll catch him," he cries. "I'll catch the Mustache-man!" Arthur climbs out of the water just as fast as he can. He is all wet. He sees the man with the bag. Arthur calls to him. But the man does not hear him. He is walking away. Arthur runs after him. He waves. He yells, "Come back, Mister! You have Babar's crown!" But now the man is on a bus. The bus goes down the street. Now the Mustache-man is gone.

The first occurrence of but is simply a contrary-to-expectation conjunction, which could have joined the clause containing it to the preceding one in a single sentence, e.g. "Arthur calls to him, but the man does not hear him.

The second occurrence is somewhat more complicated: But is contrary to expectation but is also combined with now to signal a change in the temporal setting. This but does not crucially refer to the proposition that the Mustache-man is on the bus, but rather to an inference that Arthur has failed to get the Mustache-man's attention and stop him from going away.

The next but is different yet:

Arthur is standing in the sun to dry his clothes. Suddenly he sees the whole family. They come running toward him. "I'm so glad to see you," he says. "But the red bag - it got away."

Here we have a but of contrast. Arthur has stated that he is glad to see the family. This is a happy event. Now he must tell the family the sad news. that the bag got away. Notice that we cannot view this but as contrary to the expectations of the family, for if that were the case, Arthur should have been able to use a discourse-initial, "But the red bag got away ." Obviously this sentence would be anomalous in context. Rather, we must see the conjunction here as contrasting the happy with the sad.
It is also very interesting to look at those contexts where *but* could be used and is not, and also those contexts which would be incomprehensible without the conjunction.

We find one case in BABAR where the conjunction *but* would fit nicely, but is not used:

Suddenly Zephir shouts, ‘Babar, look! Up on the bridge! The Mustache-man! He is there with your bag!’

The children all shout, "Captain, stop! Stop the boat! Let us off!"

The boat does not stop.

*But* would have fitted quite nicely as the first word of the last sentence here. The situation is perfect for a contrary-to-expectation conjunction. We might wonder whether the fact that the conjunction is not present hinders comprehension.

In the sentence that we have looked at above, “Babar is sad, but he goes along”, the conjunction *must* be included. The discourse would be decidedly odd if the two clauses were made into separate sentences with no text conjunction uniting them:

“Look at the boats down there!” the children shout. “Let’s go for a ride.”

Babar is sad. He goes along.

The last two sentences seem entirely unrelated without the conjunction. Clearly much more work needs to be done both on the comprehension of sentence connection with and without conjunctions and on the theoretical psycholinguistic aspects of when conjunctions are required by the comprehender and when they are not. This is an almost entirely uncharted area.

Another interesting kind of text conjunction is one we call a *topic connector conjunction*. The sole example in BABAR is:

Sadly they came up from the subway. Babar says nothing. He is very, very sad. And the children are very tired.

The last sentence here is the one of interest because it really does not relate to any of the previous discourse. The Babar family has been chasing the elusive Mustache-man all over Paris and has lost him once again in the subway. The topic at the beginning of the passage is clearly Babar’s feelings. We hypothesize that the conjunction *and* of the final sentence serves to unite the final sentence with the previous statements about Babar by refocussing the topic from Babar’s feelings to feelings of the protagonists in general. Notice that the
discourse would sound less connected without the conjunction:

Sadly they come up from the subway. Babar says nothing. He is very, very sad. The children are very tired.

The function of the conjunction and is perhaps one of forcing the cohesion of topic within the same scene.

Now and then, which are traditionally considered to be temporal adverbs, may also be seen as kinds of topic connecting or topic establishing conjunctions. Now, especially, functions throughout BABAR to convey the information that a new scene or a new event is about to be introduced. It typically introduces a sentence which describes the accompanying illustration. Without the illustrations, rather long chains of inferences are required to connect half of the sentences beginning with now with the preceding discourse. Some examples:

Queen Celeste and King Babar pack their crowns. Babar puts his crown in a little red bag.

Now the Babar family is on the train. The train is coming into Paris.

The inference must be made that the Babar family got on the train.

"He may be up in the Eiffel Tower," says Celeste. "All visitors to Paris go up there."

Now they are up in the Eiffel Tower. But the man with Babar's bag is not.

Again an inference that the family went up in the Eiffel Tower must be made. Examples like these occur at the beginning of scenes.

The other now's are more difficult to analyze:

Arthur runs after him. He waves. He yells, "Come, back Mister! You have Babar's crown!"

But now the man is on a bus. The bus goes down the street. Now the Mustache-man is gone.

The first now is a scene-setting conjunction, descriptive of the illustration and requiring an inference that the man got on a bus. The second now is different. It reflects the point of view of the episode-protagonist, Arthur. Whereas the illustration-descriptive, scene-introduction now refers to the present relative to the reading of the story (that is, it reflects the language a narrator would use if the story were being told or read with the illustrations as cues), this now refers to the present time relative to the event being described.

The conjunction then provides us with some interesting properties as well. It appears that this conjunction can be used to signal a change or break-up in an action sequence. For example:
They get out in front of a market. "I guess we'll have to forget about my crown," sighs Babar. So the children begin to run and play. They race around. They hide behind boxes. Then they see another man with a small red bag. All the children rush after him.

Notice that without the conjunction *then* in this discourse, the sequence is incomprehensible, i.e.,

So the children begin to run and play. They race around. They hide behind boxes. They see another man with a small red bag.

A *parallelism* is set up here with sentences of similar structure and length, i.e., "They race around. They hide behind boxes". Thus, for the reader to be able to comprehend immediately the fact that the children see another man with a bag, the author must mark such information as *not* on a par with the preceding sentences.

Much more work, both theoretical and experimental, is necessary before we will be able to describe when or where this kind of marking is required to facilitate comprehension.

### 3.3.2. Anaphoric devices

A major cohesive device in any text is that of *anaphoric reference*, or the reference of a noun or noun phrase to some previous mention of that item. The simplest forms of anaphora are those of coreferential nouns or pronouns. For example, in:

Queen Celeste and King Babar pack their crowns. Babar puts his crown in a little red bag.

*Babar* in the second sentence refers anaphorically to the phrase *King Babar* in the first. *His* in the phrase *his crown* also refers to Babar. These anaphoric references are ubiquitous in every kind of text. That is, we typically find pronominal references following close behind their referents.

There are in the texts we examined, however, a fair number of anaphoric references that are not so straightforward. In this section, we will give some representative examples of these and discuss the problems such uses of anaphoric devices may pose for comprehension.

#### 3.3.2.1. One aspect of discourse that can be studied as part of a text analysis program concerns how characters, objects, events, places, etc. are first introduced into the discourse and then later referred to anaphorically in terms of either a definite pronoun or a definite description. Such an analysis can provide the data needed to answer many interesting questions about a text, including the following:

1. What particular assumptions underlie the use of each definite description
in a text and are those assumptions justified? (A definite description may
be used either to introduce a character, object, etc. or to refer to it
anaphorically. It is a unique description in that in using it, the
speaker/writer makes one of two general assumptions. One assumption is
that there is one and only one discourse entity which the listener/reader is
already aware of and would associate with that description. The other
assumption is that in using it, the listener/reader knows that there is (or
can be) only one object so describable and creates a unique discourse entity
accordingly. Given the first general assumption, a reference analysis can be
used to identify both the reason that the speaker/writer assumes a definite
description will pick out any discourse entity the listener/reader is aware
of and the reason that it can discriminate among all those so known. Given
the second general assumption, a reference analysis can be used to identify
what knowledge of the world or of English the listener/reader must
possess in order to guarantee such uniqueness.)

(2) To what extent are the characters, objects, etc., separable, on the basis of
the descriptions given or derivable from the text? (Low separability may
lead to confusions.)

(3) What is the rate at which discourse entities are introduced? (Too many in
rapid succession may be too great a load on processing and/or memory.)

(4) How much text intervenes between a discourse entity's introduction and a
subsequent anaphoric reference to it? (If the gap is large, there may be
insufficient content to the anaphoric expression to find the intended
entity.)

(5) At any given point in the text, which discourse entities does the
speaker/writer assume the listener/reader is focussed on such that they
can be accessed via the minimal cues of definite pronominal reference? If
there are several entities accessible via the same pronoun, on what basis
(contexual and/or inferential) does the speaker/writer presume the
listener/reader can identify the intended referent? (This is the pronoun
resolution problem discussed at length in the artificial intelligence and
cognitive psychology literature (cf. Charniak 1972; Winograd 1972; and
Chafe 1976; Kantor 1977, among others.)

This section is based on a preliminary analysis of BABAR. In this initial
work, we have focussed on the first question above, since any of a wide range
of skills and knowledge – syntactic, semantic, factual, etc. – may be called
upon to justify a particular definite description.

The analysis is based primarily on research reported on in Nash-Webber
(1978a, b). Before describing our method of analysis and its application to
BABAR, it would be useful to understand some of the fundamental assump-
tions guiding our approach to research on reference. The central notion is that
of a discourse model. We assume that one objective of discourse is to com-
municate a model. The speaker/writer has a model of some situation and wishes to communicate this model to a listener/reader. Thus, the ensuing discourse is, at one level of interaction, an attempt by the speaker to direct the listener in synthesizing a similar model. (In this sense, we are equating "understanding" with "synthesizing an appropriate model".)

Informally, a discourse model may be described as the set of entities "naturally evoked" by a discourse and linked together by the relations they participate in. These are the discourse entities that were mentioned above. In order to understand what we mean by the notion of entities "naturally evoked" by a discourse, consider the following sentence:

Each 3rd grade girl brought a brick to Wendy’s house.

Then consider each continuation below. In each case, the referents of the definite pronoun (e.g., "she", "it", "they") would be an entity "naturally evoked" by the first sentence:

(a) She certainly was surprised.  
   *She* = Wendy
(b) They knew she would be surprised.  
   *They* = the set of 3rd grade girls.
(c) She piled them on the front lawn.  
   *them* = the set of bricks, each of which some 3rd grade girl brought to Wendy’s house
(d) She was surprised that they knew where it was.  
   *it* = Wendy’s house
(e) Needless to say, it surprised her.  
   *it* = the brick-presenting event

Now a speaker/writer is usually not able to communicate at once all the relevant properties and relations of these discourse entities. That task requires multiple acts of reference. The speaker/writer may refer to an entity in the discourse model in two ways. One way is with a definite pronoun. In using a definite pronoun, the speaker/writer assumes (1) that on the basis of the discourse thus far, a similar entity will be in the listener/reader’s (partially formed) model; and (2) that the listener/reader will be able to access and identify that entity via the minimal cues of pronominal reference. The referent of a definite pronoun is thus an entity in the speaker’s discourse model which is presumed to have a counterpart in the listener’s discourse model. Alternatively, the speaker may refer to an entity in the discourse model by constructing a description of it in terms of some or all of its known properties and/or relations, e.g., a definite description.

So while a discourse entity *E* can be the referent of a definite anaphor *A*, we
consider $A$'s antecedent to be a unique description of $E$ conveyed to the listener by the immediately preceding text. The relationship between the discourse on the one hand and the referents of definite anaphora on the other is thus a direct one, mediated by the discourse participants' models.

It is our belief that one can formalize, at the sentence level, rules for deriving unique descriptions of the discourse entities evoked by a text. A preliminary set of eleven formal rules which are sensitive to such aspects of a sentence as how each noun phrase is determined, what the relative scope of each quantifier is, and what dependencies exist between noun phrases due to relative clauses can be found in Nash-Webber (1978a, b). As given there, the rules do not taken into account tense, modality, belief and deontic contexts, and certain aspects of negation, all of which can be shown to be necessary factors in forming appropriate unique descriptions. However, in performing our preliminary reference analysis, we have intuitively extended the rules to cover these aspects as well.

As an example of these rules, consider the following one, RW-I, which applies to propositions in which a singular existential quantifier (i.e., a singular indefinite noun phrase) has the widest scope.

**(RW-I)** If a proposition $S_j$ is of the form

$$(3x: A) \cdot Px$$

then it follows that

$$(3x) \cdot y = iz: Az \& Pz \& \text{evoke } S_j, z$$

i.e., informally, if a proposition states that there is a member $x$ of class $A$ for which $P$ is true, then there exists a discourse entity describable as "the $A$ which $Ps$ which was mentioned (or evoked) by the proposition". (Here $i$ stands for Russell's definite operator, iota.) Since this description can be ascribed to this discourse entity, it can be referred to with a definite anaphor.

There are many places in BABAR where the application of this rule, RW-1, accounts for both the existence of a new discourse entity and an appropriate unique description for it. A particularly straightforward example is the first sentence of page 20 of the story, which we shall label (20.1) for convenience.

(20.1) The boat is going toward a bridge.

As a first approximation – that is finessing the semantics of "going toward" – sentence (20.1) can be represented as

$$(3x: \text{Bridge}). \text{Going-toward } b_1, x.$$  

where $b_1$ is a unique label for the discourse entity referred to anaphorically with the definite description "the boat". Since this matches the left-hand side
of rule RW-1, it follows that

\[(\exists y) \cdot y = i\text{ Bridge} \& \text{Going-toward} \text{ } h_1, z \& \text{evoke } S_{(20.1)}, z.\]

i.e., there exists an individual discourse entity uniquely describable as "the bridge which was mentioned in sentence (20.1) which the boat was going toward". This is the discourse entity referred to anaphorically via the definite description "the bridge" in the very sentence:

(20.2) Suddenly Zephir shouts. "Babar, look! Up on the bridge."

This kind of reference analysis allows us to make some interesting comments about the readability of a text. In particular, we will focus on the justifiability of definite descriptions (question 1 above). As stated, the rule RW-1 given earlier is only applicable when an existential noun phrase is understood to have a wide scope over a sentence. (To put this more simply, though less accurately, the listener/reader understands an existential as having wide scope under the assumption that the speaker/writer has some particular \(x\) in mind which nevertheless cannot be referred to as "the \(x\)" since it is not unique.) With this in mind, it is clear that the rule RW-1 is not applicable to the second sentence on page 6 of BABAR:

(6.2) The Babar family is waiting for a taxi.

This does not mean that they are waiting for some particular taxi, but rather that they are waiting for any one that comes along. In other words, sentence (6.2) should not evoke a discourse entity uniquely describable as "the taxi mentioned in sentence (6.2) which the Babar family is waiting for". But now consider the very next sentence of text:

(8.1) The taxi takes them to their hotel.

How might the writer justify this definite reference to "the taxi"? This phrase cannot refer to the particular taxi the family is waiting for, since it is not the case that they are waiting for a particular one. However, the author may be assuming that the listener/reader will infer that if the family is waiting for a taxi, then eventually it will be the case that a taxi picks them up. This latter sentence, "A taxi picks them up", does imply the existence of a discourse entity uniquely describable as "the just-mentioned taxi which picked them (= the Babar family) up", which is presumably the referent of the definite anaphor "the taxi." Thus, the use of this definite description is motivated by the writer's assumption that the listener/reader both can and will make this plausible, world-knowledge-based inference about the eventual appearance of a taxi.
Such inferences may demand a high level of sophistication and familiarity with the real world and thus strain the listener/reader's ability to follow the text.

3.3.2.2. In this section we take up in more detail two of the questions posed at the beginning of the previous section, and introduce an additional aspect of discourse reference which might be expected to be a source of difficulty in comprehension. We comment first on the subtleties of beginning to solve question 4, how much difference distance between a pronoun and its referent makes. Then we consider certain intricacies of the resolution problem, question 5.

As mentioned in the preceding analysis section, anaphoric reference by pronouns may lead to comprehension difficulty if the pronoun referent is too far removed in time or topic from its original referent, as in this made-up discourse:

John is one of my best friends. And his sister, Suzanna, is one of the best tennis players in the country. In fact, she might even make the International Circuit this year if her luck holds out. She just has to win one more tournament in California, and then she's a cinch to be invited. Anyway, as I was saying, he is one of my best friends....

Here, the pronoun he in the final sentence is not very comprehensible after all the information about a different topic, namely Suzanna, has been presented. Notice that in no way can the pronoun reference be said to be ambiguous - John is the only possible referent. Still, the time and topic shift may cause comprehension problems.

In BABAR, we find many, many pronoun references. For the most part, these references follow closely in time the lexical noun phrases that they refer to, as in this passage:

Arthur climbs out of the water just as fast as he can. He is all wet. He sees the man with the bag. Arthur calls to him. He is walking away. Arthur runs after him. He waves. He yells, "Come back, Mister. You have Babar's crown!"

With an understanding of the situation, the reader has little if any difficulty interpreting the referents of the he's and him's.

But there is one class of pronoun references that one would suspect, on the basis of distance between references, would cause comprehension difficulties, but which do not in fact do so. This has to do with the references of the pronoun they. In this next example, which stretches over five pages:

They all follow him, shouting, “Stop, please, Mr. Mustache.”

Too late! Stuck again! The gates at the bottom of the stairs snap shut.

“Bring back my crown!” shouts Babar. But the man gets on a train, and the train goes away.

Sadly, they come up from the subway.
there is quite a bit of intervening material between the two they’s. We hypothesize that the reason the second occurrence of the pronoun seems so immediately comprehensible is that the notion of “the Babar family” is highly topical, in that the concept of the Babar family is central to the story and always kept in mind. Thus, almost any reference to the family in any way, even with a pronoun, may be expected to be easily understood, unless there is a competing discourse entity that is also highly topical.

We now take up a subcase of the resolution problem which we call contextual redefinition. As an example of this, let us examine the use of the phrase, “the children” in BABAR. In this first passage from early on in the book, we see the phrase referring specifically to three individuals – Pom, Flora, and Alexander:

Here are: the children – Pom, Flora, and Alexander. Here are Cousin Arthur and his friend Zephir, the monkey.

But we find a different referent in the following passage later in the text:

They get out in front of a market. “I guess we’ll have to forget about my crown,” sighs Babar. So the children begin to run and play. They race around. They hide behind boxes. Then they see another man with a small red bag. All the children rush after him. Arthur knocks over a box of apples. Zephir knocks over a box of fish.

Here children, at least by the second mention, seems to refer to all five of the younger protagonists. This point may be argued here, but not in another example even farther into the story:

Celeste says, “We’ll put the children to bed in the hotel. Then we’ll leave them and go to the opera.”

Back in their hotel room, they say goodnight to the children. The three littlest ones are already fast asleep.

Now exactly who has been running and playing in the market or who is tired is not terribly crucial to the story. Nevertheless, the contextual redefinition of particular lexical items is seen in these examples. Uses of the same lexical phrase for different references is a possibility in general and can lead to ambiguities or confusions of reference. The same problem of contextual redefinition is also a possibility, perhaps more so for pronouns. Thus, the resolution problem remains one of the most difficult to solve for text analysts who look at language comprehension.

4. Conclusion

Our study of BABAR and DESERT was most rewarding for the questions it raised rather than for the answers we attempted to provide. We have not really
analyzed BABAR and DESERT; rather, we have assessed various approaches to text analysis, using BABAR and DESERT as our points of departure.

Had we chosen other texts, we might have focussed on different text properties or organizational schemes. We suspect however, that our main conclusion would have remained the same: There is much to be described and much to be questioned in doing text analysis and comprehension research. There is no one "correct" theory or method of analysis; researchers must recognize that proposed formalisms of discourse analysis or theoretical constructs of discourse are based, as far as we can see, on subjective methods of analysis and description.

We are indeed advancing the state of the art, but what we are doing is art, until we better understand our tools and methods of analysis and until we have examined more fully how the mind of the text comprehender interacts with the richness of language and the text itself.

References


