THE ROLE OF THEMATIZATION IN DISCOURSE PROCESSING

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ABSTRACT

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Three experiments investigated the effects of passage thematization on three aspects of discourse processing: sentence comprehension, memory and production. Experiment 1 examined times for reading target sentences embedded within paragraphs and memory for those sentences. The passage theme occurred in the target sentence either before or after some other less thematized constituent. The results indicated that the ordering of noun phrases in a sentence affected reading times of sentences of only one of the four types of sentences employed, the Active/Passive type. Passive sentences with sentence subjects which were thematized were read more rapidly than passive sentences with subjects which were not thematized. In recall, the Conjunct Movement and Dative Movement sentence types were most susceptible to the effects of thematization, showing a tendency to place a thematized noun phrase prior to a less thematized noun phrase.

Experiment 2 investigated the effects of passage thematization on sentence surface structure using an unconstrained production task. Participants generated continuations for single sentences or for partially developed passages in which either the

subject or object of the last sentence was thematized. Overall, there was some bias to begin continuations with the object of the last sentence; this effect was strongest when the object of the last sentence was thematized.

Experiment 3 was designed to examine some implications of schema views of knowledge representation for the effects of thematization sentence production. Participants generated continuations of sentences containing abstract or concrete subject nouns after reading single sentences, lists or thematically-related contexts. Generation latency was the dependent measure. Abstract nouns generally produced longer latencies than concrete nouns, although there was a tendency for the difference between abstract and concrete production latencies to be attenuated in the presence of long, theme-related contexts.

Experiments 1 and 2 thus showed that passage theme affects processing of sentence surface structure, affecting the comprehension as well as the production of information. Experiment 3 found some support for a theory which implies that the effects of thematization are due in part to narrowing of the range of information relevant to a particular concept. Thus, a passage theme appears to play an active role in discourse processing, directing both the integration and production of new information.

IN MEMORY

OF

MY PARENTS

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CHAPTER 1

Introduction

Recent approaches to the study of language comprehension and production (Clark & Haviland, 1977; Clark & Lucy, 1975; Carpenter & Just, 1977a,b; Clark, 1973a) have emphasized cooperative aspects of discourse processing, in which both speaker and hearer are viewed as having expectations as to how sentences in a discourse are to be used. These approaches share two principles of cooperation in discourse processing: the reality principle and the cooperative principle (Grice, 1967). According to the reality principle, a speaker attempts to produce utterances referring to a central idea, or theme, that the hearer can understand. The role of the speaker is to provide information which will adequately represent the theme being discussed. Using the information conveyed and the world knowledge which the hearer is presumed to possess, the speaker attempts to narrow the scope (i.e., focus on a specific aspect) of the discourse topic to be comprehended by a hearer. In achieving these ends, the cooperative principle proposes that the speaker will produce only truthful utterances relevant to the discourse topic.

The comprehender, on the other hand, assumes that the incoming utterances can be understood. His goal, in turn, is to

construct an adequate representation of the newly conveyed information, which he assumes is limited to a particular discourse topic. In so doing, he assumes that the speaker has provided him with valid information.

The 'cooperative' approach suggests that a discourse focuses on a central idea, or more conventionally, has a theme. The position taken here is that a discourse theme and the underlying thematic knowledge framework which a theme references, direct the utterances and expectations of a speaker and hearer in a discourse.

A thematic framework of a passage may be viewed as an abstract, meaningful representation of a passage which is developed in production or comprehension (Kintsch & van Dijk, 1978; Kintsch & Vipond, 1977; Meyer, 1975; Norman & Rumelhart, 1978). Within the framework, information is usually conceived as being stored in propositions, with more important information more easily accessible than less important information. Thematic frameworks have also been attributed with the property of self-embedding. That is, in the course of developing a theme, a discourse may reference and develop one or more subthemes.

The theme of a passage is viewed as activating memories of general world knowledge which are related to it (Kintsch & van Dijk, 1978; Schank & Abelson, 1977). These memories, in turn, will influence speaker and hearer expectations which result from the processing of the thematic framework (i.e., limiting expectations of events likely to occur within a discourse),

and will facilitate both tying relations together across a passage and the construction of inferences where necessary.

A theme and a thematic framework can be thought of as general language phenomena. Themes may be invoked in a variety of discourse situations, ranging from very short to very long discourses. Themes further apply to a variety of discourse types: stories, narratives, descriptive passages, etc.

Given the active role a thematic framework is assumed to play in discourse processing, invoking a thematic framework may likely affect the form and/or content of discourse utterances, and therefore, may likely affect their processing as well. In the research which follows, two potential roles of a thematic framework were investigated: as a discourse device which directs the structure of and expectations about the structure of sentence information in production, comprehension, and memory, and as a discourse device wich limits the scope of information produced. Before turning to the results of the present research, however, it will be useful to examine past investigations of the role of the thematic framework or thematization in discourse processing.

Thematization and Discourse Processing

A number of early investigations of thematization examined the role of thematization as a useful mnemonic device for the memory of a passage (Dooling & Lachman, 1971; Dooling & Mullett, 1973; Pompi & Lachman, 1967; Sulin & Dooling, 1973). The research grew out of a position held by Bartlett (1932) that the underlying

meaning of a discourse was stored in memory in an abstract schema (or representation). In the absence of surface structure information, this representation was proposed to guide the reconstruction of information in recognition or recall. This led to the prediction that readers would make thematic errors in recognition memory. Indeed, the recognition studies (Pompi & Lachman, 1967; Sulin & Dooling, 1973) did demonstrate that highly theme-related words which had not appeared in a passage were likely to be falsely recognized on a subsequent recognition test.

Dooling and Lachman (1972) and Dooling and Mullett (1973) demonstrated the effects of thematization on recall. In the Dooling and Lachman study, readers were presented with ambiguous stories which were difficult to comprehend in the absence of a thematic title. Half of the readers were informed prior to reading the passage (via a title) what the story was about. Those readers with knowledge of the theme recalled significantly more of the passage. Dooling and Mullett investigated whether this effect was the result of a more efficient encoding strategy or more effective reconstruction of the material in recall, by varying whether knowledge of the passage theme was given before or after reading a passage. Recall of the passage was superior to recall with no knowledge of the theme only when the passage theme was known prior to reading a passage. Dooling and Mullett argued that thematization was an efficient mnemonic device in recall due to its organizing properties at input.

Bransford and Johnson (1972) took issue with the idea that the thematic framework served solely as a mnemonic device: "The present writers view the role of the topic [theme] as something more than a schema for generating lexical matches or associations, however. Its [thematization's] critical role appears to be in helping subjects create contexts that can be used to comprehend the passages in the first place." (p.724). They further believed that comprehenders "create semantic products that are a joint function of input information and prior knowledge." (p.718).

Bransford and Johnson replicated the finding that knowledge of the passage theme before reading produced superior recall to theme-after readers. However, they further showed that theme (in this case, a passage title) was neither necessary nor sufficient for maximum passage comprehension. In their experiment, a pictorial context providing basic passage referential information was found to be the most effective aid to passage comprehension.

The results of the Bransford and Johnson study indicate that more than just a title is necessary for theme to be effective. The passage theme must also identify its referents and generate expectations about the range of information which is relevant to it (based on world knowledge of typical situations). In so doing, it must also specify to some degree the nature of the interrelations between the expected information. Where a passage title or theme does this, one will benefit in comprehension. In the Bransford and Johnson study, it is unclear whether the title identified appropriate discourse referents. Moreover, it is

unlikely that the thematic expectations generated by the titles ("Possible Breakdowns in Communication During a Serenade") matched the intended discourse relations ("If the balloons popped, the sound wouldn't be able to carry..."). In other cases (e.g., the "Washing Clothes" example), the title clearly designates the thematic referents, as well as elicits an appropriate range of expectations concerning the information yet to come. In any case, it is clear that knowledge of the intended discourse referents and thematic relations provides critical information for passage comprehension.

The notion of conceptual frameworks in which incoming information can be interpreted has received considerable attention in recent years under the guises of "frames" (Minsky, 1975), "schemas" (Rumelhart, 1975; Rumelhart & Ortony, 1977), and "scripts" (Schank & Abelson, 1977). Despite the different terminologies, there are certain beliefs common to all approaches which are relevant to the function of thematization. According to the conceptual framework approaches, generic knowledge of the world is organized in memory in conceptual frameworks. Each framework contains stereotypic knowledge relevant to a certain object or event. If particular information in one framework is also relevant to another, then cross-references are made so that one framework may call up another. Furthermore, conceptual frameworks may embed within one another. When references are made to the framework's central object or event, all of the related

elements of the framework are also activated. A familiar example of Schank and Abelson's (1977) is the restaurant script. Knowledge of eating in a restaurant activates knowledge of other stereotypic restaurant behavior: having a waitress bring one a menu, ordering food, eating, receiving a check, leaving a tip, and paying.

Rumelhart and Ortony (1977) view the conceptual framework or schema as essential to discourse processing: "Schemata are the key units of comprehension. Within the general framework presented here, comprehension can be considered to consist of selecting schemata and variable bindings which will 'account for' the material to be comprehended, and then verifying that those schemata do indeed account for it." (p.18). In other words, in comprehension one activates a particular conceptual framework and then fleshes out its parts. The same would be true in production: one would activate a framework in the mind of the hearer and then provide him with the necessary information to fill out its sub-parts.

One arrives at the following view of the role of thematization in discourse processing: Thematization is the process of instantiating, developing, and maintaining a conceptual representation of a discourse. It provides the basic foundation or framework for the new information conveyed in a passage. The thematic framework functions to direct productions and is essential in the comprehension and integration of incoming information. The active role thematization is proposed to play

in discourse processing suggests that it produces expectations about the nature of incoming or outgoing information. In other words, thematization places constraints on what is relevant to a thematized topic. It serves to limit the scope of information relevant to a particular topic. The discourse theme will refer to the linguistic realization of that representation, and provides rapid access to (or instates in consciousness) the conceptual representation which it realizes.

Since the passage theme and its underlying thematic framework are proposed to play an active role in discourse processing, it will be important for the comprehender and producer to identify the discourse theme early in a discourse. Kieras (1978) has proposed that one way in which a hearer might be alerted to the discourse referent or theme (and in so doing, activating relevant thematic frameworks) is by placing the most important piece of passage information at the outset of the passage. In a series of experiments Kieras found that readers were more likely to choose the initial sentence of a passage as what the passage was about than any other sentence.

An alternative means of alerting the hearer as to what a passage is about is repeating a particular propositional argument throughout a passage, proposed by Perfetti and his colleagues (Perfetti & Goldman, 1974, 1975; Perfetti & Lesgold, 1977). In passages used by Perfetti and Goldman (1974, 1975), passage raters consistently chose as passage theme (the

instantiation of the thematic framework) that propositional argument which appeared most frequently throughout the passage.

Perfetti and Goldman were also interested in the effects of passage theme on recall, but approached the issue from a slightly different perspective than the earlier studies. The researchers viewed theme as providing a basic referential framework in which all incoming passage information was integrated. However, they felt that a passage could be viewed from two separate but interacting levels: the thematic level and the individual sentence level. The interaction between the two levels was the subject of their research. Specifically, Perfetti and Goldman were interested in two questions: how effective was the passage theme as a retrieval cue for a particular sentence within a passage, and did the position of the thematized element in the sentence affect the accuracy of its recall.

In Perfetti and Goldman's passages, what was designated as the passage theme appeared either as the sentence subject or sentence object of the to-be-remembered sentence. It was reported that the thematized element was an effective prompt for recall regardless of its sentence subject or object status. What was significant in this finding was that the sentence object was only an effective prompt when it was also the passage theme. The sentence subject, on the other hand, was a reliable retrieval cue either when thematized or not. Perfetti and Goldman concluded that knowledge of the passage theme provided an efficient means of locating and retrieving information in a passage. In other words,

thematizing some ideas appeared to make the discourse relations to that idea more accessible in memory.

Perfetti and Goldman also reported accurate recall of passage sentences whose subjects were the thematized concept. When shifts in recall occurred (when thematized and non-thematized sentence elements changed positions in the recalled sentences), they were most likely to occur when the passage theme appeared as the object of the to-be-remembered sentence. Shifts in recall reflected participants attempts to have the subjects of sentences consistent with the passage theme.

As further evidence of the interaction between levels, in the Perfetti and Goldman (1975) study, readers were also asked to indicate which of two sentences provided a better continuation of the passage. In one sentence, the sentence subject agreed with the passage theme, while in the alternative sentence, the sentence object agreed. The raters consistently chose the sentence in which the passage theme initiated the sentence. Thus, raters appeared to prefer talking about the same theme that was previously being discussed.

Based on the results of the Perfetti and Goldman research, Perfetti and Lesgold (1977) proposed several principles of thematic structure that potentially could affect discourse processing. Only one principle will be considered here: an argument's (or a concept's) degree of thematization. Perfetti and Lesgold proposed that the greater number of passage propositions that an argument appears in, the more likely it is that the

argument will be considered as the discourse theme. As was noted earlier, this was the defining feature of theme in the Perfetti and Goldman (1974, 1975) studies. Perfetti and Lesgold proposed that thematization (or at least the realization of a theme in a particular passage element) had two implications for processing. First, the theme may allow for a more rapid access of the conceptual structure underlying the thematized element. This feature would explain why passage theme was such an effective retrieval cue for sentence recall. Second, they proposed that rapid access in turn might facilitate the integration of new information within the thematic framework.

Perfetti and Lesgold's rapid access prediction is interpretable within the reading comprehension model of Kintsch (Kintsch & van Dijk, 1978; Kintsch & Vipond, 1977). The purpose of reading comprehension in Kintsch's model is the development of a representation of the incoming discourse. According to Kintsch, the underlying representation is a hierarchically arranged 'list' of the passage's explicit and implicit propositions. The hierarchical arrangement indicates that certain of the passage's propositions are more central than others. As a processing model, the model attempts to predict which propositions of a discourse will be best recalled, or selected in story summarization. It further attempts tp provide a plausible explanation of why such propositions are chosen.

According to the model, each sentence of a text is analyzed into its underlying propositions. Certain of the text's

information may be temporarily maintained in a 'short term memory buffer' to aid in the comprehension of later incoming information, or the information may be filed away in its appropriate place in its long term memory representation. The model assumes that there are capacity limitations operating in short term memory. As such, only a small portion of the overall text base (between 4-7) propositions is temporarily held in short term memory at any point in time.

Kintsch and his associates have proposed that there are at least two features which increase the likelihood that a particular proposition or set of propositions will be retained in short term memory: proposition importance (those high up in the hierarchy will be retained) and recency (more recent ones are also activated). With each new incoming set of propositions, a re-evaluation is made as to which propositions will be retained in memory. The model predicts that if appropriate antecedents are currently available in short term memory, comprehension should be relatively easy. If, however, a search of antecedents must be conducted, or a new antecedent established, comprehension will be difficult. In terms of recall, the more frequently an item is maintained in or re-cycled through short term memory, the more likely it is that it will be recalled. Kintsch (Kintsch & van Dijk, 1978; Kintsch & Vipond, 1977) cites evidence from both reading time and recall studies supporting the model's predictions.

It follows from Kintsch's model that what is designated as the passage theme should be particularly useful in recall, since its activation and cross-passage connections should provide easy access to much of the information in a passage. In Kieras' (1978) view, the initial passage sentence which is usually judged as the passage theme is also identified by readers as being very important. Since importance determines maintenance in short term memory during comprehension, the theme is likely to be activated throughout comprehension.

If the theme appears in numerous propositions across the passage, it will also serve to make the passage more coherent. Kintsch and van Dijk have argued that repeated reference is a basic element of text coherency or connectedness. Moreover, if a passage is thematized, it will be cohesive as well: Propositions referencing the theme will be related, adding new information to previously given information and implications. In sum, repeated reference of the theme provides rich connections across all the passage propositions (Halliday & Hasan, 1976). Repeated reference also means repeated cycling through short term memory. Thus, the theme is a readily available concept in short term memory. Since reference to the theme provides rich connections across the passage propositions, its repeated activation increases the likelihood of greater activation of its associated relations.

Kintsch's model is a model of semantic cohesiveness, in that what defines cohesiveness is the repetition of arguments or propositions across a passage. Kintsch does not comment on the

actual structure of information as it is input to the comprehender, other than in terms of a passage's number of argument repetitions or propositions. Perfetti and Goldman's (1974, 1975) results suggest, however, that thematization and surface sentence structure are closely related: Participants prefer passage continuations which begin by referencing the passage theme; and, when shifts occur in recall, the tendency is to shift the passage theme to a more prominent point in the sentence. Thus, there is some evidence that passages have structural cohesiveness, as well. Before the implications of the thematization-sentence structure interaction are discussed, however, the importance of sentence structure will be considered.

The Sentence Level

Sentence structure has been analyzed in the following ways: analyses which apply to any sentence and analyses which are usually only applicable in the context of a larger discourse. The former category includes the theme/rheme analysis of Halliday (1967), Hockett's (1958) topic/comment distinction and Chafe's (1976) subject/predicate analysis. The given/new information distinction (Chafe, 1974, 1976; Clark, 1973a; Halliday, 1967) is an example of the latter.

Halliday's (1967) theme/rheme analysis delineates that which is being talked about in a sentence or a clause, the theme, from what is being said about it, the rheme. It is analogous to Hockett's (1958) topic/comment analysis. In both classification

schemes, the theme (topic) always precedes the rheme (comment). Examples (1) and (2) illustrate the analyses.

(1) John brought Sally to the party.

(2) Sally was brought to the party by John.

In sentences (1) and (2), John and Sally, respectively, are the themes or topics of the sentences, as they appear first in the sentences. In either the theme or topic analysis, the speaker decides which constituent of a sentence will be thematized by placing that constituent at the head of the sentence. The one which appears first in the sentence plays a very important role, as it sets the stage for the rest of the sentence.

MacWhinney (1977) has also noted the special significance of the first element in the sentence, which he has termed the sentence 'starting point'. He has argued that the sentence starting point serves as the base for the organization of the rest of the sentence. In both production and comprehension, it serves as the point to which the information contained in the rest of the sentence is attached.

Chafe (1976) has characterized the subject/predicate analysis in a similar manner. In Chafe's analysis, the sentence subject plays an important role by announcing what is being discussed (as in the previous analyses). It also serves as a peg to which new knowledge may be attached (reminiscent of Perfetti and Lesgold's view of passage theme and MacWhinney's analysis). Chafe believes that the normal prominent positioning of the sentence subject plays an important role in cognitive processing.

Hornby (1972) investigated the subject/predicate distinction in a sentence-picture matching task. Participants were presented a sentence accompanied by a pair of pictures. The task was to indicate which of the pair the sentence was about. However, neither picture exactly matched the sentence. In one picture, the agent of the action described matched the picture while the object of the action mismatched; the reverse was true for the other picture.

Hornby's results dealing with active and passive sentences are of particular interest here. What Hornby found was that in normal active sentences, the picture whose actor matched the subject of the sentence was more likely to be chosen as the picture illustrating what the sentence was about. For passive sentences, the picture whose object matched the subject of the sentence was more likely to be chosen as the picture illustrating what the sentence was about. He concluded on the basis of results across various sentence types (active, passive, cleft, and pseudocleft) that it was the psychological subject (the grammatical subjects in the cases of active and passive sentences) which determined what the sentence was about. In active and passive sentences, then, the sentence subject plays an important cognitive role as the psychological subject, for it serves as the base to which new information can be added.

Thus, the notion that a sentence or utterance can be divided into some kind of topic (what the sentence is about) and comment (what you are saying about it) is a meaningful distinction.

Speakers of English consistently identify the topic of a given sentence. Chafe's (1976) assumption and Hornby's (1972) research suggest that a cognitive subject is a psychologically valid concept. Furthermore, there appears to be a parallel between the functions of the passage theme (or thematized concept) and the sentence subject (or topic). In the early theme studies, knowledge of the theme was shown to provide a base to which or through which new information could be added or interpreted. As a retrieval cue, the designated theme provided easy access to passage information. At the sentence level, it was similarly argued (Chafe, 1976) that the sentence subject acts as a peg to which sentence information can be added. As a retrieval cue, Perfetti and Goldman (1974) have demonstrated that the sentence subject is a most effective reminder of information contained in the sentence. These findings suggest that the relationship between passage theme and sentence subject will have important implications for discourse processing.

Halliday (1967) maintained that in addition to a thematization analysis, a sentence may also be divided into information units, some of which would be focal (generally signalled by higher pitch, longer duration and greater intensity in spoken English). The distinction between focal and non-focal information units is the basis for the new/given information distinction. Halliday proposed that focal units emphasize the new information being added to a discourse, that is, information which is not recoverable from the preceding discourse. The information

which is recoverable (i.e., given information) does not usually receive emphasis.

In Halliday's thematization system, one should recall that two proposals were made: first, that all sentences possess a theme/rheme distinction; and second, that theme always precedes rheme. The information structure of sentences is not subject to these same restrictions. Halliday maintained that new information was a feature of all sentences (provided that the speaker is obeying the rules of discourse) while given information is an optional feature. This allows for the situation where the first sentence of a discourse introduces all new information--that is, the speaker introduces a new topic into the hearer's consciousness. Halliday also proposed that the given/new information structure of a sentence was independent of sentence position: information focus at any point in a sentence is possible simply by manipulating intonation and stress.

Chafe (1974, 1976) has offered a slightly different interpretation of the given/new information distinction. According to Chafe, given information is information which the speaker assumes to be in the hearer's consciousness at the time of the utterance. New information, on the other hand, is information which is believed by the speaker not to be in the hearer's consciousness, either because the hearer is no longer aware of it, or because it hasn't yet been introduced into awareness. Chafe (1976) argues that Halliday's (1967) notion of recoverability of given information from a discourse introduces a gap into the

comprehension process. For given information to be most useful in the comprehension process, the information must be readily available in consciousness. This viewpoint is consistent with Kintsch's model of the comprehension process, and is the view espoused here.

These analyses must also be viewed from the perspective of production, however. The speaker must not only choose which sentence elements will be focal and non-focal, but s/he must also decide where in the sentence the elements will be positioned. Since the speaker is trying to make a current sentence cohesive with past discourse and at the same time lay the groundwork for information yet to come, both factors should influence the final sentence information structure selected. Related to this point is an interesting distinction which Halliday draws between given information and sentence theme (or topic): "While 'given' means 'what you were talking about' (or 'what I was talking about before'), 'theme' means 'what I am talking about' (or 'what I am talking about now')." (Halliday, 1967, p.212). It stands to reason that a discourse will be more cohesive if "what I am talking about now" is an extension or elaboration of "what I was talking about a sentence ago".

This claim has been the concern of many psycholinguists in recent years (for example, Clark, 1973a; Clark & Haviland, 1977; Haviland & Clark, 1974; Carpenter & Just, 1977, a,b). In Clark's seminal paper "Comprehension and the Given-New Contract", the processing demands entailed by sentence information structure were

formulated in the given-new strategy. Clark agreed with the philosopher Grice (1967) that speakers and hearers engaged in a discourse follow certain cooperative communicative principles: to be informative, true, relevant, and unambiguous. In an effort to be unambiguous, the speaker provides background (given) information which he assumes is known to the hearer. To this base he adds new information presumably unknown to the hearer. It should be noted that this conceptualization is similar in form to Chafe's (1976) and Hornby's (1972) psychological subject/predicate analysis.

Clark's major concern lies with the hearer and what he does in comprehending the incoming information. Clark maintained that the hearer, aware of the given-new strategy followed by the speaker, would base his comprehension procedures upon this same strategy. It was proposed that the hearer first determined the information structure of the current sentence. The hearer would then conduct a memory search (either of the contents of short term memory or long term memory) for the antecedent of the given information. When the appropriate antecedent was located, the new information of the utterance would be added to that memory structure.

The consequence of this strategy is that whenever the information structure of the current active memory proposition does not match that of the previous discourse, comprehension begins to break down. The hearer may resort to constructing inferences to bridge the gaps between a past and current sentence,

construct a new antecedent for the given information, or reconstitute the current information to fit with the past discourse. However, each one of these alternative activities is predicted to make comprehension more difficult. This prediction has in fact been supported in a variety of experimental settings: Failure to provide an appropriate antecedent referent in a discourse (Haviland & Clark, 1974; Manelis & Yekovich, 1976), and the mismatch of information structure across discourse sentences (Carpenter & Just, 1977,a,b) have been shown to increase language processing times.

There is one final point concerning given/new information which should be made. It is not at all clear that the division between given and new information is all or none. Bates (1976) suggests that different elements in a sentence may be "tuned up or down" depending upon their degree of newness or givenness, respectively. This phenomenon at the sentence level parallels Perfetti and Lesgold's (1977) idea of degree of thematization, suggesting another possible source of interaction between thematization and sentence structure in discourse processing.

The Interaction Between Thematization and Sentence Structure: Implications for Processing

There are two important characteristics of discourse processing which are relevant to the thematization-sentence structure interaction: first, the thematized referent is likely to be held in short term memory during discourse comprehension due

to its importance and its repeated activation through reference across propositions; second, it takes time to locate antecedents if they are not directly held in short term memory. As was mentioned earlier, the thematized element is likely to be a highly activated concept in memory. It is assumed, too, that isolating a theme will activate relations and expectations that influence the development of the thematic framework. The implication for processing is that the incoming sentences which reference the theme should be easily comprehended. Furthermore, it was suggested that the passage theme and the sentence subject perform similar roles in processing: both announce, respectively, what a passage or a sentence will be about, and then have information attached to them. This consideration leads to the proposal that if a theme has been established and a thematic framework instantiated, the time to comprehend an incoming sentence should be decreased if its subject references the passage theme. Conversely, comprehension of the same sentence should be slowed if its subject does not match the passage theme.

In Experiment 1 of the following research, the hypothesis that sentence structure affects sentence reading times was examined. Participants were given nine sentence passages to read, sentence by sentence. The reading times of a target passage sentence whose subject did or did not reference the passage theme were recorded. It was predicted that reading times of a sentence whose subject referenced the passage theme would be faster than

the reading times for that sentence in a comparable context, where the subject did not reference the theme.

Experiment 1 also investigated the interaction between passage theme and sentence structure in terms of readers' memory for particular passage sentences. Perfetti and Goldman (1974, 1975) reported that participants were highly accurate in recalling passage sentences in which the sentence subject referenced the passage theme. Shifts in recall from passive to active occurred more often in the condition where the sentence object referenced the passage theme (Perfetti & Goldman, 1975). The general tendency was to shift the theme-related information to an earlier position in the sentence (the subject position).

Experiment 1 attempted to replicate this finding as well as to test the generality of the theme-sentence structure interaction. In the first experiment to be reported, four different sentence types were used which allowed the movement (or position exchange) of constituents with the sentence: Conjunct Movement, Dative Movement, Word Substitution, and Active/Passive. Examples of each sentence type are listed below.

(3) Conjunct Movement:
John walked with Mary.
Mary walked with John.

(4) Dative Movement:
John gave Mary the book.
John gave the book to Mary.

(5) Word Substitution:
John loaned Mary five dollars.
Mary borrowed five dollars from John.

(6) Active/Passive:
John took Mary to the airport.
Mary was taken to the airport by John.

In a Conjunct Movement sentence, an exchange of noun phrase constituents (NPs) does not affect the implication of the sentence: if John walks with Mary, it implies that Mary walks with John. Nor are the roles of the NP actors altered: regardless of sentence structure position, each NP actor is equally partaking in the action specificed by the verb. A similar analysis can be made for Dative Movement sentences. The Dative Movement transformation does not affect the intent of the sentence, for regardless whether book or Mary precedes the other, the end result is that Mary possesses the book; moreover, in terms of sentence roles, an instrument remains an instrument and a recipient remains a recipient. Given the apparent lack of constraints on NP ordering in Conjunct Movement and Dative Movement sentences, one might expect that if an early sentence element does not reference the passage theme, then the thematized element in the sentence will move leftward in recall. In other words, the highly activated thematized NP will be output first in recall. A high percentage of shifts was expected in such inconsistent conditions because NP movement has been shown to occur readily in recalling Conjunct Movement and Dative Movement sentences in the literature on given/new information structure (Bock, 1977; in this experiment Conjunct Movement was called subject/object reversal).

Dative Movement sentences provide an interesting test of the hypothesis regarding degree of thematization proposed by Perfetti and Lesgold (1977), and Bates' (1976) hypothesis regarding degree

of givenness. In passages containing Dative Movement sentences, the theme always appeared as the subject of the target sentence. However, another character was introduced in the passage who was referenced prior to the target sentence. What was of interest was whether or not a subtheme ('older information') was more likely to be recalled earlier in a sentence than a less thematized topic ('newer information').

For example, consider the sentence pair presented in (4). Passages were constructed such that John and Mary were the theme and subtheme of one passage, while John and the book were theme and subtheme, respectively, in another passage. Of particular interest was the accuracy in recall when John and Mary were themes, and the target sentence was John gave the book to Mary, as compared to when John and the book were themes, and the target was John gave Mary the book. Given that a more thematized element tends to move leftward in recall, a Dative Movement shift was expected in each case mentioned above.

Shifts in the Word Substitution and Active/Passive sentences appear more complex, as examples (5) and (6) illustrate. Word Substitution sentences involve the exchange of NP consistuents as well as the substitution of a new verb. Moreover, the exchange of NPs may result in NP role changes, a change participants may not be likely to make. In exchanging constituents in Active/Passive sentences, words may be added or deleted (i.e., the morphemes be+en, and by). Previous research (James, Thompson, & Baldwin, 1973) has indicated a participant bias for the active form of

Active/Passive sentences (i.e., a bias against recalling an active sentence in the passive structure). Therefore, it was expected that while some shifts in recall would occur in cases where the thematized element could be moved leftward, the percentage of shifts in recall would be less for Word Substitution and Active/Passive sentences than for the Conjunct Movement and Dative Movement sentence types. However, if the theme-structure interaction is a basic feature of thematization in discourse processing, then the interaction should produce similar effects in recall across all sentence types.

If the interaction of theme and sentence structure is a general phenomenon of discourse processing, then one should also expect to find its effects on text production as well. Text production has not received the same degree of attention by cognitive psychologists as has sentence and text comprehension. What research there is has generally been devoted to eliciting descriptions of situations (Ertel, 1977; Osgood, 1971; Tannenbaum & Williams, 1968; Turner & Rommetveit, 1968),, and question-answering tasks (Bock, 1977; Bock & Irwin, 1980; Carroll, 1958).

In production the speaker's goal is the production of coherent discourse. Semantically, the speaker can achieve this by repeated reference to the theme. This would result in the increased activation of the thematic element. As the discussion of discourse comprehension suggested, there is a structural component to achieving cohesion as well. One can maximize cohesiveness by keeping "what is being talked about now" the same as "what was being talked about before". If a passage theme has

been established, one would expect passage continuations to begin by referencing the highly activated thematic framework, regardless of whether the last sentence preceding the continuation referenced it. This was investigated in Experiment 2.

In Experiment 2 passage contexts of six sentences were used as settings for eliciting passage continuations. All the passages had as their last sentence a sentence of the form "NP_1 verbed NP_2 prep NP_3", as (7) illustrates. In one half of the

(7) John sent Mary to the store.

passages the sentence subject NP_1 of the last sentence referenced the passage theme. In the other half, the sentence object, NP_2, referenced the passage theme. Participants in the study were asked to generate continuations for the passage, with the constraint that their productions begin by referencing either the subject, NP_1, or object, NP_2. The prediction was that if the thematized element and its relations with the theme framework are readily available in short term memory, then thematization should influence the structure of the passage continuations such that productions beginning with a reference to the thematized constituent should be more likely than productions that do not.

Experiment 2 also examined the nature of passage continuations in the absence of a thematized context. Of interest here was whether or not topics (subjects) of sentence continuations for passages would be different at the beginning of a passage, as compared to topicalizations after a theme has been established. To investigate this question, passage continuations

were elicited for passage final sentences that were presented in isolation. It was predicted that the tendency to continue with the subject or object of a sentence would be different in the presence or absence of a context. Beginning sentence continuations were not expected to be strongly biased toward referencing either the subject or object of the passage final sentence when that sentence was presented in isolation. In contrast, when this sentence was the final sentence of a passage, more subject responses (i.e., beginning sentence continuations with the same subject that appeared in the passage final sentence) were expected when the subject of the final sentence was also the passage theme, as compared to when it was not the theme. Conversely, more object responses (i.e., beginning sentence continuations with the same object that appeared in the passage final sentence) were expected when the object of the final sentence was also the passage theme as compared to when that sentence appeared in isolation. Again, the prediction that producers would be more likely to generate sentences with the thematized element as their topic is based on the hypothesis that repeated activation of the thematized framework makes the thematized element readily available in short term memory. Continuations that begin with the thematized element should optimize comprehension because the antecedents of "what I am talking about now" are readily available in short term memory and highly activated. This is not the case at the beginning of a passage where all new information has been introduced. The subject and object NP should be equally available as antecedents

for a succeeding sentence continuation because both should be activated to the same degree. There should be no apriori thematic constraints to interact with the structure of the to-be-produced sentence at the beginning of a passage, or, in the case of the experimental task used here, when the passage final sentence is presented in isolation.

In sum, Experiments 1 and 2 were quite similar in the study of production processes. Both experiments were interested in the effects of the thematic framework on the structure of sentence information. The main difference between the two was in the nature of the material produced. In Experiment 1 the effect of the thematic framework was examined using the reproduction of old information. In Experiment 2, the effects of the thematic framework were examined in an unconstrained production task.

CHAPTER 2

Experiment 1

The effects of thematization upon the reading comprehension and reproduction of a passage sentence were assessed in Experiment 1. Specifically examined in Experiment 1 was the effect of sentence topicalization (i.e., whether the sentence topic instantiated the designated passage theme) on the time taken to read a sentence and the accuracy of recall for the form and content of that sentence.

Kintsch and Vipond (1977) proposed that in reading a passage sentence, a reader tries to integrate the sentence into a preexisting discourse framework. If, as proposed in Chapter 1, one effect of thematization is increased availability in memory of the referent of a passage theme, one would predict that comprehension and integration of passage information would be easiest (and therefore, most rapid) when a sentence topic references the passage theme. In this case, the information which is related to the sentence topic (Chafe, 1976) can be easily attached to the passage's thematized discourse framework. In Experiment 1, one hypothesis tested was that sentences whose topics referenced the the passage theme would be read more rapidly than sentences whose topics did not reference the passage theme.

In testing participants' reproduction of passage sentences, an underlying assumption was that a thematic framework directs the reproduction of passage information. If a thematic framework is activated and the referent of the passage theme is highly available, one would expect that the passage theme would be output first in sentence reproduction in the role of sentence topic. This hypothesis was investigated in Experiment 1 and led to two predictions. The first prediction was that sentences whose topics referenced the passage theme on input would be accurately reproduced. On input, the structure of these sentences matches the pre-existing discourse structure. In reproduction, even if the exact surface structure representation of these sentences is forgotten, the hypothesis leads one to predict that the thematic sentence constituent would be output prior to other sentence information. The output sentence would have the same constituent ordering as on input.

The second prediction was that sentences in which the thematic element occurred in a non-topicalized position would be reproduced less accurately. Specifically, if the exact surface structure of the original sentence could not be retrieved, it was predicted that shifts in recall would occur such that the thematic sentence constituent would be moved leftward in recall to a more topicalized position.

To test the generality of the relationship between a thematic framework and sentence structure, four types of sentences were examined: Conjunct Movement, Dative Movement, Word Substitution,

and Active/Passive. Of the four types, only the Active/Passive category contained sentences (passive sentences) which are known on the basis of previous research (Hornby, 1972) to specifically show topicalized sentence information. If all four sentence types show the same pattern of response on reading time and reproduction indices, it would indicate that the effects of thematization on passage processing are not limited to a single sentence type.

Method

Participants

Sixty-four Michigan State University undergraduates enrolled in introductory psychology classes participated in the experiment for extra credit.

Materials

Target Sentences. The 32 target sentence pairs used in the experiment were of four types: Conjunct Movement (John walked with Mary in the moonlight. vs. Mary walked with John in the moonlight.), Dative Movement (John gave Mary the book. vs. John gave the book to Mary.), Word Substitution (John led Mary to the hidden treasure. vs. Mary followed John to the hidden treasure.), and Active/Passive (John invited Mary to the party. vs. Mary was invited to the party by John.). The verb forms from which the sentences were generated are listed in Table 2-1 for each sentence type.

Table 2-1

Experiment 1 Verbs Used as a Function of Sentence Type

Conjunct Movement	Dative Movement
walked	gave
argued	sent
danced	read
spoke	offered
played	brought
went	sang
ate	showed
competed	threw
Word Substitution	**Active/Passive**
led-followed	invited
beat-lost	asked
embarrassed-ashamed of	reminded
afraid of-frightened	kissed
bought-sold	kicked
bequeathed-inherited	drove
borrowed-loaned	blamed
taught-learned	accused

For Conjunct Movement sentences, eight sentences of the form 'NP_1 verbed NP_2 prep NP_3' were generated for each verb, where NP_1 and NP_2 were names of people. The eight alternative sentences 'NP_2 verbed NP_1 prep NP_3' were also generated. The mean length of Conjunct Movement sentences was 7.1 words; the mean number of content words was 4.3 words (articles, prepositions, and auxiliary verbs were excluded from the content word count.).

For Dative Movement sentences, eight sentences of the form 'NP_1 verbed NP_2 NP_3' were generated where NP_1 and NP_2 were names of people and NP_3 was an object. The eight complementary Dative Movement sentences of the form 'NP_1 verbed NP_3 to NP_2' were also generated. The mean length of Dative Movement sentences was 5.5 words; the mean number of content words was 4.0 words.

For Word Substitution sentences, eight sentences of the form 'NP_1 $verb_a$ NP_2 prep NP_3' were generated for each verb along with the eight complementary sentences 'NP_2 $verb_b$ NP_1...'. In generating sentences of this type, the goal was to topicalize NP_2 while maintaining an active sentence structure. Verb substitution was necessary for this sentence type. The mean length of Word Substitution sentences was 6.0 words; the mean number of content words was 4.4 words.

For Active/Passive sentences, a total of 16 sentences were generated, eight active and eight passive. In sentences of this type, NP reversal was only possible using the Active/Passive

transformation. The mean length of Active/Passive sentences was 7.0 words; the mean number of content words was 4.0 words.

Contexts. The variable of interest in this experiment was the relationship between the topic of the target sentence and the referent of the passage theme. To study this relationship, it was necessary to create contexts in which topic and theme matched and mismatched. Two six sentence context passages were constructed for each target sentence pair. Either version of the target sentence was a meaningful continuation of either of its paired passages.

In Experiment 1, the passage theme was operationally defined as the most frequently occurring argument in the passage, as suggested by Perfetti and Goldman (1974, 1975). For the Conjunct Movement, Word Substitution, and Active/Passive target sentences, NP_1 was thematized in one version of the context; NP_2 was thematized in the alternate version. Context versions of the Active/Passive and Conjunct Movement sentences were identical (with the exception of the exchange of NP roles). The mean number of thematic referent repetitions for Conjunct Movement passage contexts was 12.9 (median, 13; range, 10-17). For the Active/Passive contexts, the mean number of thematic referent repetitions was 10.5 (median, 10; range, 8-12).

Minor changes were made in the alternate versions of Word Substitution sentence contexts in order to ensure that the target sentences would be meaningful continuations. Word Substitution context changes were solely dependent upon the content of the generated passages. For Word Substitution passage contexts, the

mean number of thematic referent repetitions was 12.2 (median, 13; range 9-16).

Dative Movement context versions differed more extensively. For the Dative Movement target sentences, two six sentence contexts were generated where NP_1 was the theme of both , passages. In one version of the passage, NP_2 was a subtheme, referenced a mean number of 5.3 times prior to the target sentence (median, 5; range, 4-6). NP_3 was a less thematized constituent, referenced a mean number of 1.7 times prior to the target sentence. In the alternate version, NP_3 was the subtheme, referenced a mean number of 5.3 times prior to the target sentence (median, 5; range, 4-6). In this version, NP_2 was the less thematized element, referenced a mean number of 2.0 times prior to the target sentence. The two versions of the passages were different in all cases.

In all contexts, the target sentence was followed by two sentences concluding the passage. Experiment 1 target stimuli and their appropriate contexts are listed in Appendix A.

List Construction. Two lists of test stimuli were used in the experiment. Lists were composed of 32 stories, with each list having equal numbers (eight) of Conjunct Movement, Dative Movement, Word Substitution, and Active/Passive target sentences. Only one context version of each story was randomly assigned to a list. There was one constraint on context list assignment. For convenience, the generated passages thematized either a man or a woman. In the case of Active/Passive, Word Substitution, and Conjunct Movement passages, there were an equal number of male and

female passages on each list in order to avoid any possible confounding. Among Dative Movement passages, there was an equal number of person and object subthemes on each list.

One-half of the target sentences on each list had topics consistent with the passage theme, one-half did not. In the case of Dative Movement target sentences, one half of the first referenced sentence objects were consistent with the passage subtheme, the remaining were not.

In summary, the experiment had as stimuli: two lists of target sentences (List) belonging to four sentence types (Sentence Type) embedded within a version of a preceding thematized context (Passage). In target sentences, sentence topics (or in the case of Dative Movement sentences, the first referenced sentence object) did or did not reference the passage theme (or subtheme) (Consistency).

Each passage sentence appeared on positive image Kodak slides. Stimulus materials were originally typed in capitals on white bond paper in elite black lettering. The sentences were left-justified on each slide.

Recall Task Materials. Booklets containing the thematized contexts without the target sentences were prepared for the recall task. Passages were randomly arranged in the booklet.

Procedure

Participants were randomly assigned to one of four Passage x List conditions. There were 16 participants per condition, and each participant was tested individually. Participants sat approximately four feet in front of a screen; they were allowed to

move closer to the screen if necessary to improve the visibility of the slides.

Each participant read 32 passages, with each passage sentence rear projected on the screen in front of the participant. After reading and comprehending each sentence, participants pressed a button in front of them which triggered the presentation of the next slide. The time taken to read each sentence was recorded by a PDP-8 computer, measured from the opening of a shutter attached to the slide projector to the participants' pressing of the comprehension button. Approximately 500 msec. separated each slide, the time necessary to advance the slide projector.

The beginning of each passage was preceded by a READY slide to prepare the participant for the upcoming text. The passage conclusion was signalled by an END slide. A fifteen second interval separated each passage (This interval was enough time to change the Kodak slide carousels when necessary.).

Participants were informed that they would be presented with 32 short passages to read in the experiment, and that each sentence of the passages would be presented individually. They were instructed to press a button located in front of them after they had read and comprehended each sentence. Participants were also told that each passage would be preceded by a slide with the word READY printed on it and concluded by a slide with the word END printed on it. Prior to the 32 test passages, participants were presented with a practice passage similar in format to the actual passages used in the experiment to familiarize them with

the procedure. Appendix B contains the instructions read to participants in the reading time portion of Experiment 1.

After reading the passages, the participants were given the test booklet containing the 32 passage contexts without the target sentences. Participants were instructed to recall as accurately as possible the sentence that was missing from each passage. Participants were urged to provide a response to each passage. The actual instructions read to participants in the recall portion of Experiment 1 are contained in Appendix C.

Analysis

The design as described was a 2 x 2 x 2 x 4 design in which Passage (1 or 2), and List (1 or 2), were between-subject independent variables; Consistency (Consistent or Inconsistent sentence topic) and Sentence Type (Conjunct Movement, Dative Movement, Word Substitution, or Active/Passive) were within-subject independent variables.

The dependent variables in the analysis were reading times and recall percentages. Mean reading times for each condition were computed across participants as well as across materials. These means were then submitted to separate ANOVAs in which participants and materials were treated as random effects, respectively. The min F' statistic was then computed for each effect of interest (Clark, 1973b).

Target sentence recall was scored according to the following categories: NP Order Preserved recall, Shift recall, Correct recall but no NP order information, and Errors and Omissions in recall. NP Order Preserved recall was recall in which the

sentence ordering of NPs matched that of the original sentence. This category was composed of four scoring sub-categories: Verbatim recall, Pronoun Substitution, Gist recall and And recall. Responses in the Verbatim category were either identical or very similar in form to the original sentence. Minor deviations in recall were allowed in the Verbatim category: failure to recall a particular word in a sentence (e.g., Carol led Nick to the hidden treasure., recalled as Carol led Nick to the treasure.), and some verb substitution (e.g., Joe invited Maureen to the party., recalled as Joe asked Maureen to the party.). In the Pronoun Substitution category were responses in which the NPs were recalled as pronouns (e.g, Patty kissed Mike in the moonlight., recalled as She kissed him in the moonlight.). In the Gist category were responses which preserved the NP ordering of the original sentence, but may have changed the sentence type (e.g, Gail was ashamed of Walter., recalled as Gail was embarrassed by Walter.), or added an expectation or implication to the original sentence (e.g., Steve spoke with Martha in the hallway., recalled as Steve apologized to Martha in the hallway.). In the And scoring category, responses preserved the original NP ordering, however, both NP_1 and NP_2 now headed the sentence (e.g, Jimmy played with Joan in the park., recalled as Jimmy and Joan played in the park.).

Responses in the Shift category could be one of three types: Expected Shift, Other Shift, and And Shift. Expected Shifts were sentences recalled in the alternative form prescribed by the sentence type (e.g., Patty kissed Mike in the moonlight., recalled

as Mike was kissed by Patty in the moonlight.). Responses in the Other Shift category changed the position of the NPs. In addition, the sentence structure may have been altered or implications added to the sentence content (e.g, Steve spoke with Martha in the hallway., recalled as Martha received an apology from Steve in the hallway.). This category was the Shift equivalent of the NP Order Preserved Gist category. The And Shift category was the Shift counterpart of the NP Order Preserving And category. Responses in this condition not only exchanged the positions of the NPs, but moved them to the head of the sentence as well (e.g., Jimmy played with Joan in the park., recalled as Joan and Jimmy played in the park.).

A final correct content recall category was scored as Correct recall but no NP order information. Responses in this category replaced the sentence NPs with the pronoun They (e.g., Jimmy played with Joan in the park., recalled as They played in the park.). Responses in this category were excluded from further analysis.

The final two recall scoring categories were Errors and Omissions. Responses which were contradictory to or irrelevant to the information contained in the original passages were scored as Errors. Failure to provide any response whatsoever was scored as an Omission.

Participants' recall responses were blind scored twice by the experimenter. The reliability of scoring between time one and two was 98%.

Following scoring, percent recall for each category was tabulated. Separate ANOVAs in which both participants and materials were treated as random effects were conducted on the following data sets: NP Order Preserved recall, Shift recall, Errors and Omissions. Separate ANOVAs were also performed on the data in each of the NP Order Preserved and Shift recall scoring sub-categories. Min F' statistics were then calculated for each of the effects of interest.

Results

The independent variables of primary interest in Experiment 1 were Consistency and Sentence Type. Their effects on passage processing will be discussed in two sections. Reading time results will be presented first. Recall results, examining how these factors affected NP Order Preserved recall and NP Shift recall, will then be presented. The Results section will conclude with a discussion of the effects of the counterbalancing variables of List and Passage on reading time and recall indices. In Experiment 1, the significance level was set a $p < .05$.

Reading Time Analysis. A prediction of Experiment 1 was that consistent sentences (sentences in which the sentence topic referenced the passage theme) would be read more rapidly than inconsistent sentences. In Experiment 1, the mean time to read a consistent sentence was 1540 msec.; the mean time to read an inconsistent sentence was 1573 msec. The 33 msec. difference (Consistency main effect) was not significant in a 2 x 2 x 2 x 4

ANOVA in which participants and materials were random. F values for this and other reading time analysis results are listed in Table 2-2.

Sentence Type differentially affected the Consistency manipulation, as indicated by the Sentence Type x Consistency interaction. Table 2-3 lists the mean reading times of the four sentence types in the consistent and inconsistent conditions. As can be seen in the table, there is little difference between consistent and inconsistent sentence reading times for the Ccnjunct Movement sentences, a somewhat bigger difference for Word Substitution and Dative Movement sentences, and a large difference between consistent and inconsistent Active/Passive sentences. A Newman-Keuls analysis of the condition means indicated that Consistency only affected Active/Passive sentences. That is, only consistent Active/Passive sentences were read significantly faster than their inconsistent counterparts.

Experiment 1 was designed so that in each list there appeared two active consistent Active/Passive sentences, two passive consistent Active/Passive sentences, two active inconsistent Active/Passive sentences, and two passive inconsistent Active/Passive sentences. The results of the reading time analyses indicated that for each verb base, inconsistent active sentences were read more slowly than consistent active sentences. Among the sentences used in Experiment 1, the active Active/Passive category sentences were the only active sentences for which this was the case.

Table 2-2

Reading Time Analysis Results

Effect	F Value	p
Consistency	F_1 (1, 60) = 3.416	
	F_2 (1, 12) = 4.409	
	min F' (1, 47) = 1.927	
Sentence Type	F_1 (3,180) = 45.682	***
	F_2 (3, 12) = 18.166	***
	min F' (3, 23) = 12.997	**
Consistency x Sentence Type	F_1 (3,180) = 2.892	*
	F_2 (3, 12) = 4.686	*
	min F' (3, 70) = 1.788	

* Significant at $p < .05$
** Significant at $p < .01$
*** Significant at $p < .001$

Table 2-3

Mean Reading Times for Consistent and Inconsistent Sentence Types in msec.

	Conjunct Movement	Active/ Passive	Word Substitute	Dative Movement
Consistent	1661	1594	1506	1400
Inconsistent	1686	1701	1566	1338

Sentence Type affected overall reading times, as indicated by the Sentence Type main effect. Mean sentence type reading times were ordered as follows: Dative Movement (1369 msec.) < Word Substitution (1536 msec.) < Active/Passive (1647 msec.) = Conjunct Movement (1674 msec.). A Newman-Keuls test indicated that the time differences between Dative Movement, Word Substitution and Active/Passive sentence types were significant. Active/Passive and Conjunct Movement mean sentence reading times were not found to be significantly different. These results are likely due to the fact that the mean lengths of sentences were also ordered in the same manner: Dative Movement (5.5 words) < Word Substitution (5.99 words) < Active/Passive (7 words) < Conjunct Movement (7.13 words). Further support for this position comes from the ratio of reading time/words read. This ratio orders sentence types as follows: Conjunct Movement (235 msec./word) = Active/Passive (235 msec./word) < Dative Movement (249 msec./word) < Word Substitution (259 msec./word). It would appear, then, that there was little difference in the reading times of different sentence types.

Summarizing the results of the reading time analyses, Consistency only differentially affected the reading times of Active/Passive sentences. The results indicated that inconsistent Active/Passive sentences were read significantly slower than consistent Active/Passive sentences.

Recall Analysis. In the recall task, 71.15% of all responses preserved the content of the original target sentences; 28.85% of the responses either contained incorrect or irrelevant

information, or were not recalled. The high rate of content recall supported the idea that the recall task was not an overly demanding task and could be performed reasonably well.

Table 2-4 contains the percentage breakdown of responses falling into each scoring category. As can be seen in the table, 39.36% of all recall responses preserved the original ordering of the NPs; 23.98% of the responses changed the order of the NPs; 7.81% of the responses correctly recalled the sentence content but provided no information as to the original NP ordering (i.e., the original NPs were replaced by the pronoun They); 24.61% contained incorrect information; no information was recorded for 4.24% of the responses.

The remaining recall analysis results will be presented in the following order: NP Order Preserved and Shift Recall collapsed across all scoring sub-categories; NP Order Preserved recall by each sub-category; NP Shift recall by scoring sub-category; and an analysis of Error and Omission data. As in the reading time analyses, the variables of interest were Consistency and Sentence Type and their interaction.

Table 2-4

Percent Recall in Major Scoring Categories

NP Order Preserved	NP Order Shifted	"They"	Error	Omit
39.36%	23.98%	7.81%	24.61%	4.24%

NP Order Preserved and Shift Recall. A 2 x 2 x 2 x 4 ANOVA was performed on all recall data which was considered NP Order Preserved recall. Percent recall was summed over the Verbatim, Pronoun Substitution, Gist, and And recall sub-categories. The results of this analysis are listed in Table 2-5. Consistency did affect the accuracy of sentence recall: more consistent sentences were recalled preserving the original ordering of the NPs (44.14%) than inconsistent sentences (35.55%).

Sentence Type also affected accurate recall: Word Substitution and Active/Passive sentences were more accurately recalled (50.59% and 48.24% recalled, respectively). This difference was confirmed by a post-hoc Newman-Keuls test. No

Table 2-5

NP Order Preserved Recall Analysis Results
Over All Scoring Categories

Effect	F Value	p
Consistency	F_1 (1, 60) = 19.457	***
	F_2 (1, 12) = 6.588	*
	min F' (1, 21) = 4.922	*
Sentence Type	F_1 (3,180) = 48.777	***
	F_2 (3. 12) = 4.695	*
	min F' (3, 14) = 4.283	*
Consistency x Sentence Type	F_1 (3,180) = 7.25	***
	F_2 (3, 12) = 2.311	
	min F' (3, 21) = 1.752	

* Significant at $p < .05$
** Significant at $p < .01$
*** Significant at $p < .001$

differences were found between recall levels of Word Substitution and Active/Passive sentence types or Dative Movement and Conjunct Movement sentence types.

The Consistency x Sentence Type interaction was significant in the participants random analysis, only. Table 2-6 contains the mean percent recalled for the different sentence types in the consistent and inconsistent conditions. As can be seen in the table, Consistency had little effect on the accuracy of recall of Active/Passive and Word Substitution sentence types. A Newman-Keuls test of these mean differences was not significant. However, Consistency did affect the accuracy of recall of Conjunct Movement and Dative Movement sentence types, indicated by a significant Newman-Keuls test. More topic-theme consistent Conjunct Movement and Dative Movement sentences were recalled than inconsistent Conjunct Movement and Dative Movement sentences.

Shift responses were also summed across shift sub-categories. Results of Shift analyses are listed in Table 2-7. As predicted,

Table 2-6

Mean Percent Recalled in the NP Order Preserved Scoring Category for Consistent and Inconsistent Sentences

	Conjunct Movement	Active/ Passive	Word Substitute	Dative Movement
Consistent	37.5	47.27	51.95	39.84
Inconsistent	17.97	49.22	49.22	25.78

Consistency affected recall performance: more shifts occurred in the inconsistent condition (28.42%) than in the consistent condition (19.34%) Further, Sentence Type affected the degree of shifting: more shifts occurred with Dative Movement (30.47%) and Active/Passive (29.49%) sentences than with Word Substitution (21.88%) or Conjunct Movement (13.67%) sentences. A post-hoc Newman-Keuls test indicated that these differences were significant.

Consistency did interact with Sentence Type. Table 2-8 contains the mean percent of Shift recall of consistent and inconsistent sentences by sentence type. As can be seen in the table, consistency appeared to have little effect on Active/Passiv and Word Substitution sentence types. A post-hoc Newman-Keuls tes indicated that significantly more shifts occurred in inconsistent Conjunct Movement and Dative Movement sentences than their consistent counterparts; no difference was found among Word Substitution and Active/Passive sentence types. These findings are consistent with the findings of the overall NP Order Preserved recall analyses, where it was found that Conjunct Movement and Dative Movement sentence types were particularly responsive to the Consistency manipulation, while Word Substitution and Active/Passive sentence types were not.

NP Order Preserving and Shift Recall Sub-categories. Separate analyses of each NP Order Preserving scoring sub-category were conducted to determine if total category results were representative of all sub-categories. The results of these analyses for the variables of interest are reported in Table 2-9.

Table 2-7

NP Order Shift Recall Analysis Results
Over All Scoring Categories

Effect	F Value	p
Consistency	F_1 (1, 60) = 37.879	***
	F_2 (1, 12) = 8.26	*
	min F' (1, 18) = 6.781	*
Sentence Type	F_1 (3,180) = 25,367	***
	F_2 (3. 12) = 5.653	*
	min F' (3, 14) = 4.623	*
Consistency x Sentence Type	F_1 (3,180) = 11.625	***
	F_2 (3, 12) = 4.113	
	min F' (3, 21) = 3.038	

* Significant at $p < .05$
** Significant at $p < .01$
*** Significant at $p < .001$

Table 2-8

Mean Percent Recalled in the NP Order Shifted Categories
for Consistent and Inconsistent Sentences

	Conjunct Movement	Active/ Passive	Word Substitute	Dative Movement
Consistent	3.52	31.25	21.09	21.48
Inconsistent	23.83	27.73	22.66	39.45

Table 2-9

Analysis Results of NP Order Preserved Recall in Scoring Sub-Categories

Analysis	Effect	F Value	p
Verbatim	Consistency	F_1 (1, 60) = 2.453	
		F_2 (1, 12) = 2.223	
		min F' (1, 37) = 1.166	
	Sentence Type	F_1 (3,180) = 33.071	***
		F_2 (3, 12) = 10.222	***
		min F' (3, 20) = 7.808	**
	Consistency x Sentence Type	F_1 (3,180) = 3.925	**
		F_2 (3, 12) = 2.648	
		min F' (3, 33) = 1.581	
Pronoun	Consistency	F_1 (1, 60) = 10.762	***
		F_2 (1, 12) = 9.095	*
		min F' (1, 36) = 4.929	*
	Sentence Type	F_1 (3,180) = 16.498	***
		F_2 (3, 12) = 4.924	*
		min F' (3, 20) = 3.792	*
	Consistency x Sentence Type	F_1 (3,180) = .173	
		F_2 (3, 12) = .12	
		min F' (3, 33) = .071	
Gist	Consistency	F_1 (1, 60) = 18.242	***
		F_2 (1, 12) = 8.667	*
		min F' (1, 25) = 5.875	*
	Sentence Type	F_1 (3,180) = 1.356	
		F_2 (3, 12) = .215	
		min F' (3, 16) = .636	
	Consistency x Sentence Type	F_1 (3,180) = 1.131	
		F_2 (3, 12) = 1.453	
		min F' (3, 56) = .636	
And	Consistency	F_1 (1, 60) = 15.3	***
		F_2 (1, 12) = 6.425	*
		min F' (1, 23) = 4.525	*
	Sentence Type	F_1 (3,180) = 29.376	***
		F_2 (3, 12) = 16.273	***
		min F' (3, 28) = 10.472	**
	Consistency x Sentence Type	F_1 (3,180) = 10.4	***
		F_2 (3, 12) = 5.713	*
		min F' (3, 28) = 3.687	*

* Significant at $p < .05$
** Significant at $p < .01$
*** Significant at $p < .001$

Analyses of the Verbatim scoring category indicated that Consistency had no overall effect on levels of verbatim recall. The mean percent of consistent sentences recalled verbatim was 16.7%; 18.75% of inconsistent sentences were recalled verbatim.

Sentence Type did affect verbatim recall. Fewer Conjunct Movement and Dative Movement sentences were recalled verbatim (9.96% and 9.57%, respectively) than Active/Passive or Word Substitution sentences (23.37% and 25%, respectively). A post-hoc Newman-Keuls test indicated that the difference between the Conjunct Movement-Dative Movement and Word Substitution-Active/Passive sentences types was significant. No other significant inter-sentence type differences were reported.

Consistency interacted with Sentence Type in verbatim recall. The mean percent recalled for each of the Consistency x Sentence Type conditions are listed in Table 2-10. A Newman-Keuls post-hoc test indicated that consistency only affected the Active/Passive sentence type. Furthermore, as seen in the table, more

Table 2-10

Mean Percent Recalled in the Verbatim Scoring Sub-Category for Consistent and Inconsistent Sentences

	Conjunct Movement	Active/ Passive	Word Substitute	Dative Movement
Consistent	9.77	22.66	22.27	12.11
Inconsistent	10.16	30.08	27.73	7.03

inconsistent Active/Passive sentences were recalled verbatim than consistent sentences.

The three remaining categories of NP Order Preserved recall reflect recall in which part of the original sentence trace has been lost. The prediction made for these categories was that in the absence of a specific surface structure representation, recall of consistent sentences would be more accurate than recall of inconsistent sentences. Support for this position was found in each of the remaining NP Order Preserved analyses.

In all three scoring sub-categories, Consistency significantly affected recall of sentences: more consistent sentences were recalled than inconsistent sentences. Table 2-11 lists for each scoring category the percent of consistent and inconsistent sentences recalled.

Sentence Type was a significant factor in the Pronoun Substitution and And scoring categories; Sentence Type was not a

Table 2-11

Mean Percent of Consistent and Inconsistent Sentences Recalled in Each Scoring Sub-Category

Scoring Category	Consistent	Inconsistent
Pronoun Substitution	16.8	12.21
Gist	6.1	2.9
And	4.49	1.07

significant factor in Gist recall. In Pronoun Substitution recall, a post-hoc Newman-Keuls test indicated that significantly fewer Conjunct Movement sentences (5.08%) were recalled with pronouns than any of the remaining three types: Active/Passive (16.41%), Word Substitution (18.75%), and Dative Movement (17.77%). In And recall, Conjunct Movement sentences far exceeded all other types. A post-hoc Newman-Keuls comparison indicated that significantly more Conjunct Movement sentences (9.18%) were recalled in this manner than any other sentence type (Active/Passive, .98%; Word Substitution, .98%; Dative Movement, 0.0%). No other differences between sentence types were found. Since more NP Order Preserved Conjunct Movement responses fell in this category than any other non-verbatim category, there may be a bias toward recalling Conjunct Movement sentences in this manner. The And construction is one variant of the Conjunct Movement sentence form--in this category, if NP_1 verbed with NP_2, it implies that NP_1 and NP_2 verbed--and it may be the more preferred variant.

There was no interaction between Consistency and Sentence Type in the Pronoun Substitution and Gist recall scoring sub-categories. With respect to And scoring, the interaction was significant. A post-hoc Newman-Keuls test indicated that there were significantly more consistent And responses for Conjunct Movement sentences than any other type of sentence.

In summary, analyses of NP Order Preserved recall scoring sub-categories supported the general finding that more consistent sentences were recalled NP Order Preserved than inconsistent sentences. While Word Substitution and Active/Passive sentences

were most likely to be recalled with the NP order preserved, more Active/Passive sentences fell into the verbatim category than any other sentence type. When Conjunct Movement sentences were recalled with NP order preserved, they were more likely than other categories to fall into the And scoring category.

The results of the NP Shift sub-category analyses for the variables of interest are listed in Table 2-12. Consistency significantly affected recall in the Expected, Other, and And Shift sub-categories. In each analysis, significantly more inconsistent sentences were shifted in recall than consistent sentences. Table 2-13 lists the percentage breakdown for each scoring category.

Sentence Type significantly affected the Expected Shift and And Shift scoring categories. Ordering among the sentence types in the Expected Shift analysis was identical to the overall Shift analysis: Dative Movement (27.54%) = Active/Passive (25%) > Word Substitution (17.58%) > Conjunct Movement (5.27%); where the differences indicated were significant in a post-hoc Newman-Keuls test. Among And Shifts, a Newman-Keuls post-hoc test indicated that significantly more Conjunct Movement sentences (6.05%) fell into this scoring category than any other sentence type (Active/Passive, 0.0%; Word Substitution, 1.17%; and Dative Movement, 0.0%).

The Expected Shift and And Shift categories' analyses also indicated an interaction of Consistency and Sentence Type. Table 2-14 lists by Sentence Type the mean percent of consistent and inconsistent sentences recalled in the Expected Shift category.

Table 2-12

Analysis Results of NP Shift Recall in Scoring Sub-Categories

Analysis	Effect	F Value	p
Expected Shift	Consistency	F_1 (1, 60) = 19.017	***
		F_2 (1, 12) = 3.947	
		min F' (1, 17) = 3.269	
	Sentence Type	F_1 (3,180) = 52.604	***
		F_2 (3, 12) = 5.966	**
		min F' (3, 15) = 5.358	*
	Consistency x Sentence Type	F_1 (3,180) = 9.588	***
		F_2 (3, 12) = 3.341	
		min F' (3, 22) = 2.476	
Other Shift	Consistency	F_1 (1, 60) = 6.742	*
		F_2 (1, 12) = 2.833	
		min F' (1, 23) = 1.995	
	Sentence Type	F_1 (3,180) = 1.115	
		F_2 (3, 12) = .321	
		min F' (3, 28) = .249	
	Consistency x Sentence Type	F_1 (3,180) = 1.976	
		F_2 (3, 12) = 1.051	
		min F' (3, 28) = .686	
And Shift	Consistency	F_1 (1, 60) = 5.094	*
		F_2 (1, 12) = 6.508	*
		min F' (1, 47) = 2.857	
	Sentence Type	F_1 (3,180) = 13.505	***
		F_2 (3, 12) = 15.639	***
		min F' (3, 51) = 7.247	**
	Consistency x Sentence Type	F_1 (3,180) = 5.494	***
		F_2 (3, 12) = 5.492	*
		min F' (3, 45) = 2.746	

* Significant at $p < .05$
** Significant at $p < .01$
*** Significant at $p < .001$

Table 2-13

Mean Percent Consistent and Inconsistent Sentence Recall in Each NP Shift Scoring Sub-Category

Scoring Category	Consistent	Inconsistent
Expected Shift	16.21	21.48
Other Shift	2.25	4.2
And Shift	.88	2.74

Table 2-14

Mean Percent Recalled in the Expected Shift Category for Consistent and Inconsistent Sentences

	Conjunct Movement	Active/ Passive	Word Substitute	Dative Movement
Consistent	1.17	26.95	16.8	19.92
Inconsistent	9.38	23.05	18.36	35.16

A post-hoc Newman-Keuls analysis of the Expected Shift category indicated that the Consistency manipulation only significantly affect Conjunct Movement and Dative Movement sentences. Table 2-15 presents the same breakdown of the And Shift category. A Newman-Keuls post hoc analysis of mean differences indicated that significantly more inconsistent sentences were recalled in this category than any other sentence type.

With respect to the overall Shift analysis, the individual analyses did tend to support the general finding that inconsistent CM and DM sentences were more likely to shift in recall than their consistent counterparts. The individual analyses indicated that certain sentence types exhibited the NP shift if recalled in a particular format.

Table 2-15

Mean Percent Recalled in the And Shift Category for Consistent and Inconsistent Sentences

	Conjunct Movement	Active/ Passive	Word Substitute	Dative Movement
Consistent	2.34	0.0	1.17	0.0
Inconsistent	9.77	0.0	1.17	0.0

Errors and Omissions. As indicated previously, 24.61% of the recall responses were scored as errors. In an analysis of the pattern of responses of the error data, only Sentence Type was a significant effect, $F_1(3,180)=14.715$, $p < .001$; $F_2(3,12)=1.908$, $p < .1$; $\underline{\min} F'(3,15)=1.689$, $p < .1$. More errors were made on Conjunct Movement and Dative Movement sentences (30.08% and 29.88%, respectively) than Active/Passive or Word Substitution sentences (17.77% and 19.73%, respectively). This difference was significant in a post-hoc Newman-Keuls test.

Only 4.24% of the total response set was omitted. Analyses of the omission data revealed no effects to be significant in both participants and materials analyses.

Recall Results Summary. Among NP Order Preserving recall, it was found that if a participant had sufficient memory of sentence surface structure to recall a sentence verbatim, topic consistency only had an effect on Active/Passive sentences. Specifically, more Active/Passive inconsistent sentences were recalled verbatim than consistent ones.

In the absence of specific surface structure information, consistency was found to have a wider scope of influence on NP Order Preserving recall. Across all other scoring categories more consistent sentences were recalled than inconsistent sentences, as predicted.

Of the NP Shift recall results, it can be said that in general, topic-theme inconsistent sentences were more prone to thematically consistent shifts in recall than were consistent

sentences (to theme inconsistent shifts). More detailed analyses of the data suggested that the Conjunct Movement and Dative Movement sentence types were most susceptible to NP shifts in recall in inconsistent conditions.

Counterbalancing Variables. It was the case in a number of analyses that the counterbalancing variables of Passage and List interacted with the variables of interest, Consistency and Sentence Type. However, in the twelve analyses previously discussed in this chapter, there were only two such interactions which were significant in both the participants and materials analyses. These were the Passage x List interaction in the reading time analysis, and the four-way Passage x List x Consistency x Sentence Type interaction in the And Shift analysis. No further discussion will be made of these variables.

Discussion

In Chapter 1, it was argued that comprehension would be facilitated when a sentence topic referenced the passage theme, for it would serve as a sign to the comprehender that 'what was being talked about before' was 'what was being talked about now'. Moreover, it was maintained that the repeated thematic referent would be highly activated and readily available in short term memory. Therefore, it was proposed that in comprehension, one could easily identify the referent of a sentence topic when it referenced the passage theme. Finding antecedents of less

thematized and therefore presumably less activated passage constituents was thought to be a more time consuming process which would be reflected in slower reading times in inconsistent cases.

Another argument for the proposed facilitating effect of sentence topic and passage theme came from the parallel roles of the sentence topic and passage theme. Chafe (1976) had argued that the sentence subject (or topic, in the case of Experiment 1) acted as a peg to which all other sentence information was attached. The same appeared to be true of a passage theme, but at a more global level. The passage theme was viewed as a peg to which incoming passage information was attached. It was hypothesized that comprehension and integration of information into a thematic framework would be facilitated if a sentence topic referenced a passage theme, for information could be directly transferred from the sentence topic node to the passage thematic framework.

The reading time results of Experiment 1 warrant a reappraisal of this framework. In Experiment 1, it appeared that as long as a topic's antecedent could be easily identified, the referent of the sentence topic did not have an effect on the time to read and comprehend a sentence. In Experiment 1, the referent of the inconsistent sentence topic was referenced just prior to the target sentence. Due to the recency (Kintsch & van Dijk, 1978) of the second referent, it is likely that the inconsistent topic's antecedent was already activated in short term memory, and therefore, easily identifiable in comprehension.

The fact that the Consistency effect was significant among sentences of the Active/Passive type, however, suggests that under certain circumstances, the sentence topic-comment structure will make a difference in passage reading comprehension. Of the sentence types used, only the passive sentence structure specifically marks the topic of a sentence (Hornby, 1972). If the sentence topic refers to 'what I am talking about now', and is typically old or given information, the choice of the passive construction in the inconsistent case may have caused some confusion for readers. Readers may have realized that the 'old' 'what I am talking about now' was not really the focus of the previous passage. Such confusion may have produced the increased reading times in the inconsistent condition. It may also have been the case that the specific alerting to 'what is being talked about now' signalled to the reader the possibility that some change in passage focus was coming; in other words, that the passage theme was changing. This too may have produced an increment in sentence reading times in the inconsistent condition. Regardless of the underlying reason, one is left with a view of a thematic framework which can integrate incoming sentences rather easily, provided that the structure of the incoming utterances does not call attention to something which was not expected within the thematic framework.

Evidence for the expected effect was only found for the Active/Passive sentence type: Consistent active Active/Passive sentences took less time to read than inconsistent active

Active/Passive sentences. One possible explanation of this exception is the nature of the information conveyed in the target sentences. In the active consistent cases, the information conveyed by the target sentence is perfectly reasonable given the prior contexts of the passage. For example, consider the case of Barbara (see Appendix A). In the experimental passage in which Barbara was the theme, Barbara was depicted as an incorrigible child. It is not surprising that she would be kicking her brother, Paul. Such behavior is consistent with what one knows about incorrigible children. This would be an expectation generated by the thematic framework.

In the active inconsistent case, however, Paul becomes the theme and has bully traits associated with him. In this case it is rather surprising that Barbara kicks Paul. One is not expecting the bully to be the object of an attack. In the active inconsistent case, then, the information provided is less expected given the thematic framework which is activated. It was not surprising that active sentences in this sentence type did not behave similarly to the remaining active sentences.

The question must then be asked whether this analysis would apply to passive sentences as well. In other words, was the Consistency effect observed among passive sentences truly a function of sentence type or simply due to confounding a pragmatic anomaly with sentence type? If it were simply due to a pragmatic anomaly, one would have expected the passive inconsistent sentences to be read more rapidly than passive consistent sentences. That is, given the context that Barbara was the

incorrigible child, understanding the inconsistent sentence Paul was kicked by Barbara required a smaller inferential leap than understanding the same sentence when it appeared in the consistent context in which Paul was the incorrigible child. The former is structurally inconsistent but pragmatically consistent; the latter is structurally consistent but pragmatically anomalous. Since passive inconsistent sentences still took longer to read than passive consistent sentences, evidence exists for an independent sentence structure contribution to reading comprehension. Moreover, there was an overall reading time difference between active and passive consistent and inconsistent sentences. The mean reading time difference between active consistent and inconsistent sentences was 135 msec.; the mean reading time difference between passive consistent and inconsistent sentences was 255 msec. The reading time findings of Experiment 1 suggest then that reading rates may be slowed in sentences in which a marked topic does not agree with the passage theme. A tentative conclusion to be drawn from Experiment 1 then is that a thematic framework can interact with sentence structure when a referent inconsistent with the theme is specifically topicalized.

The role of the thematic framework was larger in the reproduction of passage information in Experiment 1. If the exact surface structure of a sentence could be recalled (Verbatim recall), consistency was found to have no effect on recall, except among Active/Passive sentences. In this case, however, inconsistent sentences were more likely to be recalled verbatim than consistent sentences. One possible reason for this was that

participants spent more time reading inconsistent passive sentences than consistent sentences. The greater effort spent in comprehending the sentences might have resulted in a stronger, more accurate memory trace. Among active Active/Passive sentences, an inconsistent form was more pragmatically acceptable than a consistent form given the expectations of the thematic framework. The preferred form in recall might have been the pragmatically acceptable version--the inconsistent version.

Once the surface structure of sentences had been lost, the thematic framework appeared to be directing the form a recalled sentence would take, particularly in the case of Conjunct Movement and Dative Movement sentences. This effect yielded accurate recall of consistent sentences in which the thematized NP preceded a less thematized NP. NP Shifts in recall were observed in inconsistent sentences, such that thematic NPs were moved leftward in recall.

It would appear, based on the findings of Experiment 1, that without specific surface structure information available, NP ordering in Conjunct Movement sentences was difficult to maintain. This may have been fostered by the fact that in the Conjunct Movement sentences used, the positions of the NPs could freely vary without changing the implications of the sentence. Moreover, in each case, the Conjunct Movement sentences described a joint act in which both NPs were actors. Since a NP shift in Conjunct Movement sentences would not have altered NP roles or sentence implications, it is possible that in the absence of surface structure information, the most highly activated referent, the

passage theme, would be output first in recall. This would produce the pattern of results seen in Experiment 1: NP order preserved in consistent sentences, and NP shift in inconsistent sentences.

The fact that Dative Movement sentences displayed the desired thematized effects argues for a broader definition of topicalization. In Dative Movement sentences, the sentence topic was not at issue. Rather, an attempt was made to develop contexts in which NP_1 was the main thematic constituent of the passage and some other NP was a subtheme. It was hoped that thematization effects expected to apply to sentence topic themes would apply to proposed subthemes as well. Based on the results of the Dative Movement sentences, it would appear that 'topicalization', defined broadly, is not restricted to subject position, but is a continuous variable that operates throughout a sentence (Firbas, 1966). In Experiment 1, the most important factor affecting NP position in Dative Movement sentence recall appeared to be thematization (or activation of a NP): The more highly thematized a NP was, the earlier it was output in recall. Regardless of position, the role of the NP was not changed--a recipient remained a recipient, an instrument remained an instrument. As with Conjunct Movement sentences, as long as NP roles and sentence intent did not change, the effect of a thematic framework could be seen in recall.

Why were Active/Passive and Word Substitution sentences less likely to be affected by the thematic framework? Among Active/Passive sentences, it is likely that sentence preferences

dictated the form recall took. Among active sentences, recall was very accurate regardless of consistency form (80.5% of the responses preserved NP order), while such accuracy was low among passive sentences (14.5%). The majority of passive sentences shifted to actives regardless of consistency (59.4%) while among active sentences, few shifts were recorded (2%). Participant preferences appeared to override any effects of the thematic framework.

Preferences may also have been operating with Word Substitution sentences. In order to exchange NP positions in Word Substitution sentences a participant had at least two alternatives: either s/he could use a passive sentence, or s/he could substitute an entirely new verb and maintain an active structure. The first alternative is unlikely, given the passive findings. The second alternative is also not likely if in the substitution shift the roles of the NPs would be substantially changed.

Some shifts did occur with three Word Substitution sentences under both consistent and inconsistent conditions: Roger lost to Cindy at chess., recalled as Cindy beat Roger at chess. (19/32 times); Deborah inherited a million dollars from Harry., recalled as Harry left Deborah a million dollars. (17/32 times); and Nancy borrowed five dollars from Frank., recalled as Frank loaned Nancy five dollars.(16/32 times). Participants' preferences again may have influenced recall. In these three cases, the winner (Cindy), the donor (Harry), and the loaner (Frank), are the actors in the situation (Fillmore, 1968). There may have been a tendency to

prefer actors or agents before passive recipients in the given contexts.

In sum, topic-theme consistency effects could most easily be seen in recall among sentences whose NP constituents could freely vary and not change the intent of the sentence or the roles of the NPs. Thematization effects were not found to override participants' preferences for a particular surface structure form, or where sentence intent and NP roles might be altered.

CHAPTER 3

Experiment 2

In Experiment 1, the effects of thematization on passage sentence comprehension, memory and reproduction were examined. The results of Experiment 1 indicated that reading comprehension was slowed for Active/Passive sentences when the sentence topic did not match the passage theme. This result was interesting, for of the sentences used, only the passive sentence structure explicitly marks topic information.

Experiment 1 also provided evidence that theme referencing expressions tended to occur earlier in recalled sentences (for Conjunct Movement and Dative Movement sentence types) than non-theme referencing elements. Consistent topic-theme sentences were generally recalled in a manner which preserved the original NP order; inconsistent topic-theme sentences were recalled in a manner which shifted the positions of the NPs. It could generally be said then that thematization of a passage interacted to some extent with the structure of individual passage sentences in both comprehension and reproduction.

In Experiment 1, sentence production (and sentence topicalization) was based on information previously read and held in some form in memory. Experiment 2 addressed a slightly different production issue. In Experiment 2, thematization

effects upon sentence topicalization were investigated in the absence of such constraints. Participants were given passages of varying lengths (one sentence or six) and asked to continue the passages. No restrictions were placed on what participants wrote other than that the topic of their first sentence production had to reference one of two people mentioned in the last (or only) sentence of the prior context. The people mentioned always appeared as the subject or object of the last sentence. For those cases in which prior context occurred, the last sentence's topic (sentence subject) referenced the passage theme only half the time. In the other cases, the sentence object referenced the theme.

Of key interest in Experiment 2 was how participants would choose to topicalize their initial continuation. If thematization was directing how participants chose to develop a story, one would expect continuations to begin by topicalizing the passage theme. In terms of the conditions of Experiment 2, when the topic of the last sentence of the passage referenced the passage theme, one would expect the sentence continuation to begin with the same subject, i.e., the passage theme. However, when the subject of the last sentence did not reference the theme, one would expect continuations to begin by repeating the object of the previous sentence. If thematization was not affecting the topicalization of productions, one would expect no biasing toward either the sentence subject or sentence object in the two conditions.

The sentence in isolation condition was a special condition of Experiment 2. In the absence of a prior context, one might expect sentence subject continuations to be as likely as sentence object continuations, for no thematic biasing has been introduced. On the other hand, one might expect to see a majority of sentence subject continuations. If, as Chafe (1976) maintained, a sentence subject plays a particularly important role in language processing as a point to which new information is added, one might expect to find continuations which topicalize the same referent as the topic of the single sentence.

In sum, Experiment 2 was an attempt to assess the effects of thematization on productions using contexts which thematized the subject or object of a target sentence. It was further hoped that Experiment 2 would provide information as to how themes might be established in the absence of prior thematizing contexts.

Method

Participants

Seventy-two Michigan State University undergraduates enrolled in an introductory psychology class participated in the experiment for extra credit.

Materials

Twenty-four target sentences used in the experiment were of the form 'NP_1 verbed NP_2 prep NP_3', where NP_1 and NP_2 were the names of people. The corresponding NP-reversed active sentences 'NP_2 verbed NP_1 prep NP_3' were also generated for

each verb base. This created a target sentence pool of 48 sentences.

For each sentence pair, two six sentence passage contexts were constructed. The passage pairs were identical except that in one version, NP_1 was the NP thematized, while in the alternate version, NP_2 was thematized (Passage factor). The passage theme was defined as the most frequently occurring argument in the passage. As in Experiment 1, the designated passage theme was a proper name. However, roles were associated with the names which were expected to activate expectations appropriate to that role. The passage theme was referenced a mean number of 9.1 times in each passage; the median occurrence was 9 times, with a range of 6-13.

Passages were constructed such that either form of the verb base sentences 'NP_1 verbed NP_2 prep NP_3' or 'NP_2 verbed NP_1 prep NP_3' were acceptable continuations of the passages. The target sentences and accompanying contexts used in Experiment 2 appear in Appendix D.

Test booklets containing one version of the target sentence were constructed. The target sentences could appear in one of three forms (Thematic Condition factor) in the booklet. Eight of the target sentences appeared in isolation, acting as the first sentence of a passage (Beginning Condition). The remaining target sentences appeared with their appropriate contexts. In eight of the context + sentence stimuli, the subject of the target sentence referenced the passage theme (Middle Consistent Condition); in the remaining eight context + sentence stimuli, the object of the

target sentence referenced the passage theme (Middle Inconsistent Condition).

Three lists of stimulus materials (List factor) were constructed so that all target sentences were tested in all three context conditions (Beginning, Middle Consistent and Middle Inconsistent Conditions). Alternate versions of the passages (Passage) insured that any given target sentence was tested under both theme consistent and inconsistent conditions.

Each list contained 24 target stimuli, eight in the Beginning Condition, eight in the Middle Consistent and eight in the Middle Inconsistent Conditions. Verb bases were randomly assigned to one of the three conditions, but on any given list, only appeared in one condition. Across all list versions, the verb base was tested under all possible conditions.

Design

Experiment 2 was designed as a 3 x 2 x 3 factorial experiment in which the independent variables were List (1, 2, or 3), Passage (1 or 2), and Thematic Condition (Beginning, Middle Consistent, or Middle Inconsistent). List and Passage were counterbalancing, between-subjects factors. Thematic Condition was the primary factor of interest and was a within-subjects factor.

Procedure

Twelve participants were randomly assigned to each of the List x Passage conditions. Participants were tested in small groups. Each participant received a test booklet containing the 24 test stimuli. Participants were instructed to read the passages in the test booklet and to assume the role of the passage

narrator. Participants were then instructed that they were to generate two sentences continuing the passage. Continuations were to be plausible developments of the passages. Participants were instructed that the only constraint on what they produced was that their first continuation had to begin by referencing one of the two people mentioned in the last sentence of the passage. In the case of the single sentence, participants were instructed to treat this sentence as the beginning of a passage and to continue the passage as they had been instructed for the context passages. The actual instructions read to Experiment 2 participants appear in Appendix E.

Approximately one-half of the participants received an illustration of the experimental task in which the participants were instructed to continue with the subject or object of the sentence (e.g., "Given the sentence, ...John sent Mary to the store., ...You would begin your first sentence with John or Mary"). The remaining participants were given the choice of continuing with the sentence object or subject in the example (e.g., again, given the example, "John sent Mary to the store., ...You would begin your first sentence with Mary or John."). This was simply a precaution taken to guard against biasing participants to continue with either the subject or object of the target sentences.

Analysis

Only the results of the participants' initial continuations were considered in the analysis. Passage continuations were scored as to whether continuations began with the subject or

object of the preceding target sentence. Percentage of the subject and object continuations in each condition were then tabulated. These percentages were separately analyzed using a 3 x 2 x 3 ANOVA with participants treated as a random effect, and a 2 x 3 x 72 (Passage x Thematic Condition x Materials) ANOVA with materials treated as a random effect. The List variable was collaped across conditions for the materials analyses in order to examine the effect of the Thematic Condition factor. The *min F'* statistic was then computed for each significant condition (Clark, 1973b). As in Experiment 1, the significance criterion was set at $p < .05$.

Results

Only the results of the sentence subject analyses will be discussed. The scoring category used (sentence subject vs. object) was dichotomous so that the results of the sentence object analyses will of necessity complement the results of the sentence subject analyses. Significant results of the object analyses are presented in Appendix F.

Sentence Subject Data

The mean percent of sentence subject responding was 34% in Experiment 2. Thus, it appeared that overall, participants were not strongly biased to continue with a previous sentence's subject.

The results of the sentence subject data analyses indicated that Thematic Condition had little effect on participants'

selection of the target sentence subject as the topic of later continuations, as indicated by the nonsignificant effect of Thematic Condition, $F_1(2,132) = 4.974$, $p = .008$, $F_2(2,46) = 2.661$, $p < .1$, $\underline{\min} F'(2,99) = 1.734$, $p < .25$. In the Beginning Condition, 36.16% of the continuations topicalized a target sentence subject; in the Middle Consistent Condition, where a large number of subject continuations were expected, only 37.14% of the continuations topicalized a sentence subject. In the Middle Inconsistent Condition, where few target sentence subjects were expected to be topicalized, 28.87% of the continuations topicalized sentence subjects. Planned comparisons of condition means indicated that significantly fewer subjects were topicalized in the Middle Inconsistent Condition than in either the Beginning or the Middle Consistent Conditions. The Middle Consistent Condition did not differ significantly from the Beginning Condition. Participants gave the impression overall of being biased toward the target sentence object in their continuations.

The results of the analyses were thus inconclusive. Failure of the Thematic Condition main effect to reach significance in the materials random analysis suggested that all the materials used in the experiment were not behaving in the same manner. Support for this conclusion also comes from the fact that the only other significant effect in the experiment was the Passage x Thematic Condition interaction, $F_1(2,132) = 3.643$, $p < .05$, $F_2(2,46) = 4.071$, $p < .05$, $\underline{\min} F'(2,144) = 1.923$, $p < .25$. Table 3-1 contains the mean percent of subject continuations in each of the Passage x Thematic Condition combinations. A post-hoc

Table 3-1

Mean Percent Subject Topicalization in the Passage x Thematic Condition Combinations

	Beginning	Middle Consistent	Middle Inconsistent
Passage 1	33.14%	37.22%	33.53%
Passage 2	39.19%	37.06%	24.21%

Newman-Keuls analysis of the mean differences indicated that the Condition effect previously described occurred for only one level of the Passage factor. In other words, alternate versions of the materials did not always act the same way.

Discussion

It is clear from Experiment 2 that a thematic framework (or establishing a thematic framework) did not generally or consistently result in the topicalization of the designated passage theme in an unconstrained production task. Since the majority of continuations began with the previous sentence object, the recency of a referenced NP seems to have been a potent factor in sentence topicalization.

It is possible that the effects of thematization were obscured by the fact that there were no time constraints or information restrictions placed on what participants produced. Time constraints may be necessary if one wishes to test whether a

thematic element is more highly activated and therefore more readily available in short term memory for production.

In summary, while Experiment 2 did not provide support for the role of a thematic framework in language production, the proposed role of the thematic framework cannot as yet be ruled out.

CHAPTER 4

Experiment 3

In Experiment 1, active consistent Active/Passive sentences were read more rapidly than active inconsistent Active/Passive sentences. This calls to mind another important hypothesis about the thematic framework suggested in Chapter 1: namely, that the thematic framework produces expectations about the incoming or outgoing information. In other words, activating a thematic framework is hypothesized to place limits on the scope of the information relevant to a particular theme.

Evidence supporting this proposal comes from work on semantic flexibility, reported by Anderson and Ortony (1975), and Barclay, Bransford, Franks, McCarrell and Nitsch (1974). Barclay et al. reported that if an unambiguous word (e.g., piano) appeared in sentences which referenced different aspects of its meaning (e.g., The man tuned the piano.--musical instrument; vs. The man lifted the piano.--piece of furniture), a retrieval cue was only effective in recall if it was consistent with the aspect of the word referenced in the sentence. In terms of the above examples, the cue "Do you remember hearing about something that makes nice sounds?" was only an effect cue in the case of The man tuned the piano.

At the beginning of a discourse, a speaker has many options available to him/her: What the rest of the story will be, how it will be developed, the mood that will be conveyed, etc. But as the speaker progresses through the discourse, having firmly established a thematic framework, options narrow. In terms of the thematic framework of the passage, most of the framework has been developed by that point. What remains to be conveyed is much smaller in scope than at the beginning of the passage. Butterworth (1975) has in fact shown that the beginning of a monologue on a particular topic is more disfluent than later portions.

A similar approach has been adopted in the story grammar literature (Thorndyke, 1977; Rumelhart, 1975; Mandler, 1978). While each of the approaches have slightly different analyses of stories, all agree that stories contain specific structure. The beginning of a story provides a setting which introduces the main characters in the story and sets the stage for events to come. While a variety of episodes or events may occur in a story, they are all aimed at setting up the plot. Once this base has been established, the alternatives available to actors within the story are limited--that is, the plot can only be resolved in a limited number of ways leading to the final story outcome. So, in terms of the content of the story as well as its structure, alternatives become limited as one progresses through the story.

The idea that invoking a thematic framework brings with it certain expectations about the type and range of information which

is to follow (that is, in effect, limiting the scope of passage information), suggests an interesting experiment. In an early study of production latencies, Reynolds and Paivio (1968) reported that it took longer to initiate a definition of abstract words than concrete words. Taylor (1968) reported a similar concrete-abstract word production latency difference. In Taylor's study, it took longer to generate sentences containing abstract nouns than to generate sentences containing concrete nouns. If thematization places constraints on the range of information to be included in a passage, and the thematic element and thematic framework are highly activated in short term memory, one might expect the difference between production latencies of sentences including abstract and concrete words to be eliminated or at least minimized in the presence of a preceding thematized context. In Experiment 3, this hypothesis was examined.

Abstract words should have much more to gain by being placed in a constraining context than concrete words. Concrete concepts may by their very nature be viewed as more tightly constrained concepts than abstract concepts: necessary and sufficient conditions for their use may be more readily apprehended, as evidenced by their earlier appearance in the vocabularies of language-learning children (Nelson, 1974). Further since the denotative range of a hierarchically high (abstract) word is by definition larger than the denotative range of a hierarchically low (concrete) word, the thematic instantiation of an abstract concept temporarily increases its concreteness or conceptual

richness to a greater degree than the thematic instantiation of a concrete concept.

Prior to conducting Experiment 3, several issues needed to be resolved. In the Reynolds and Paivio (1968) experiment, participants' responses were generally tapping the generic uses of words. That is, participants' definitions were conveying information pertaining to the noun as a class or a concept (e.g., Honor is a virtue.; College is a place of higher learning.). In Taylor's (1968) experiment, there was no control over how a word was treated: either generically (as in the Reynolds and Paivio study), or specifically (Lyons, 1977), referring to a particular instance of a noun (e.g., The honor that I received..., The college that I attended...). It was therefore necessary to first determine whether the abstract-concrete production latency difference was a genuine word type difference, a usage difference, or some combination of the two. The outcome of this investigation would affect the choice of stimuli used in Experiment 3's attempt to study the effects of a theme-related context on production latency differences.

In the first pilot study to be reported, a set of frequent concrete and abstract words appeared in isolation or paired with the indefinite (A/An) or definite (The) articles. Participants generated sentence completions for each NP presented. Of interest was whether or not particular forms of words would reliably elicit particular usages of those words (i.e., Would words in isolation

consistently elicit a generic interpretation; and words in the The+NP condition consistently elicit a specific interpretation?).

Pilot 1

Method

Participants

Sixty undergraduates enrolled in an introductory psychology course at Michigan State University participated in the experiment for extra credit.

Materials

The lists of stimuli used in the experiment were composed of 48 high frequency nouns, 24 high concrete nouns and 24 low concrete nouns (abstract), and 24 filler nouns of medium concreteness. The nouns used were taken from the Paivio, Yuille, and Madigan (1968) noun norms. Appendix G lists the noun stimuli and their concreteness values. Filler items were included to minimize the possibility that the participants would adopt a particular strategy (or strategies) in producing sentences containing the stimulus words.

In each list of stimuli, all 24 filler items appeared preceded by the indefinite article A(n). Of the remaining stimuli, one-half were preceded by the definite article The (e.g., The duty); the remaining half appeared in isolation (e.g., Safety). Nouns were presented in isolation with the expectation that they would be interpreted generically. As Lyons (1977)

notes, the indefinite article A/An is ambiguous: it can be interpreted either in terms of a particular instance (e.g., An apple hit me on the head.) or generically (e.g., An apple is a fruit.). While the definite article and noun (e.g., The apple...) can also be interpeted generically, this is a less frequent usage. It was expected that in the pilot study, The+NP would not be interpreted in this manner, but rather with respect to specific instances of the noun.

Two lists of stimuli were constructed so that all concrete and abstract nouns appeared in the definite and isolation conditions. In summary, on each list, the stimuli consisted of 24 filler items, 24 high concrete nouns (12 in isolation and 12 paired with the definite article The), and 24 low concrete nouns (12 in isolation and 12 paired with the definite article The). On any list, a noun only appeared once.

Test booklets of the lists of stimuli were constructed and distributed to participants in the experiment.

Procedure

All participants were tested in groups ranging from five to thirteen participants. Participants were randomly assigned to one of the lists. Test booklets containing the 72 items were distributed to the participants. Participants were instructed that they were to treat each noun phrase appearing in the booklet as the subject of a sentence. The task assigned to the participants was to generate a completion to that noun phrase which would form a good, complete sentence. The actual

instructions read to the participants in Pilot 1 are contained in Appendix H.

Scoring

Only participants' responses to the abstract and concrete nouns were considered. Participants responses were scored as belonging to one of four categories: Intended Generic-Interpreted Generic; Intended Generic-Interpreted Specific; Intended Specific-Interpreted Specific; and Intended Specific-Interpreted Generic. In the Intended Generic-Interpreted Generic category, the original noun had appeared in isolation; the participant's response was judged as generic if the response referred to the class aspects of the noun. An example of such a response would be Gold is a basic metallic element., generated in response to Gold. Responses in the Intended Generic-Interpreted Specific category reflected a specific interpretation of the noun in isolation. Into this category would have fallen a response to Gold such as the following: Gold is what my watch is made of. Responses in the Intended Specific-Interpreted Specific category made reference to particular instances of the stimulus noun, as expected. An example of a response in this category would be The cattle grazed lazily in the field., generated in response to the NP The cattle. For the Intended Specific-Interpreted Generic category, while the NP was expected to elicit a response which would reference a particular object, responses in this category treated the noun generically. An example of responses in this category would be The grass is a member of the food chain., generated in response to the NP The grass.

Results

Eighty-five percent of all nouns appearing in isolation were continued with phrases which indicated a generic interpetation of the noun, as expected. For the The+NP stimuli, 91.83% of the responses were continuations with phrases which made reference to a particular object. Since nouns in isolation and The+NP consistently elicited generic and specific responses, respectively, it was felt that the manipulation could be used in a production latency test between generic and specific, concrete and abstract words.

Pilot 2

In the second pilot study, an attempt was made to replicate the concrete-abstract production latency differences reported in other research. Furthermore, using the stimuli of Pilot 1, it was possible to determine whether the difference between concrete and abstract words was a word dimension difference or simply a difference in usage or usage x word type phenomenon.

Method

Participants

Twenty-four undergraduates enrolled in an introductory psychology course at Michigan State University participated in the experiment for extra credit.

Materials

The stimuli used in Pilot 2 were identical to those in Pilot 1. As in Pilot 1, the high frequency abstract and concrete words could appear in isolation or paired with the definite article The. The filler nouns always appeared with the indefinite article A(n). All stimuli were presented on a screen using positive image Kodak slides. The original stimuli were typed in capital elite lettering on bond paper using a carbon ribbon. The stimuli were centered on the slides. Slide presentation activated a Klokcounter timer measuring participants' response latencies. A voice onset key (VOK) sensitive to speech was used to measure the onset of the participants' vocal responses. Activation of the VOK stopped the Klokcounter timer.

Procedure

Participants were randomly assigned to one of the two lists of test stimuli. Participants were tested individually. All participants were instructed that individual nouns or noun phrases would be flashed on the screen in front of them. Their task in the experiment would be to generate a continuation to the word to form a complete sentence. Participants were instructed not to repeat the word on the screen as they began their continuations, but to only say those words which were part of their continuations. Participants were to begin their continuations as soon as possible after the stimulus noun appeared. The actual instructions read to participants in Pilot 2 are contained in Appendix I.

As soon as the participant began responding, a shutter on the slide projector closed. Approximately three seconds elapsed between trials. For each trial, timing began when the shutter opened for the next stimulus presentation. Timing was stopped when the participant initiated a vocal response. The experimenter recorded all response times.

Analysis

The response times to filler items were not considered in the data analysis. The experiment as described was a 2 x 2 x 2 design, where Concreteness (Concrete vs. Abstract), Definiteness (*The* vs. Isolation), and List (1 or 2) were the independent variables. List was a counterbalancing, between-subjects factor. Concreteness and Definiteness were within-subjects factors.

Mean latencies per participant and per item were computed in each case. These response times were submitted to two ANOVAs in which participants and materials were random variables, respectively. The *min F'* statistic was computed for the effects of interest. The significance level was set at $p < .05$.

Results

The results of Pilot 2 were in agreement with previous production latency research: it was easier to generate continuations to concrete words (mean production latency = 3516 msec.) than to abstract words (4574 msec.) as indicated by the Concreteness main effect, $F_1(1,22) = 31.002$, $p < .001$,

$F_2(1,44) = 38.545$, $p < .001$, $\underline{\min}\ F'(1,54) = 17.182$, $p < .001$. The results also indicated that it was easier to produced specific continuations to specific NPs (mean production latency = 3852 msec.) than to generic nouns (4238 msec.), as indicated by the Definiteness main effect, $F_1(1,22) = 8.989$, $p < .01$, $F_2(1,44) = 3.768$, $p = .059$, $\underline{\min}\ F'(1,66) = 2.655$, $p < .25$. The Concreteness x Definiteness interaction was not significant. Thus, regardless of usage, abstract nouns had longer production latencies than concrete nouns.

The only other effect to reach significance in either the participants random or materials random analysis was the counterbalancing variable of List. In general, the subjects who were randomly assigned to List 1 had slightly longer production latencies (4330 msec.) than those assigned to List 2 (3760 msec.). However, since the List variable did not interact with either factor of interest, Concreteness or Definiteness, it was concluded that the generic-specific, concrete-abstract production latency differences reported in the experiment were general production effects across all items used.

Experiment 3

The results of the second pilot study indicated that either generic or specific, abstract and concrete nouns could serve as stimuli in the investigation of the effects of a related context upon production latencies. In Experiment 3, production latency

differences between abstract and concrete generic nouns (nouns in isolation) were examined in the presence of contexts of varying lengths. Theme-related contexts of one or four sentences were generated for a set of abstract and concrete nouns used in the pilot study. In this experiment, these contexts preceded each noun and participants were asked to generate a plausible sentence continuation. If the earlier discussion about the role of a thematic framework in comprehension and production is valid, it is possible to predict how longer contexts should influence production latency for concrete and abstract words.

Recall that the data from Pilot 2 replicated previous findings reported by Taylor (1968) and Reynolds and Paivio (1968): namely, that continuations involving abstract words take longer than continuations involving concrete words. Taylor and Reynolds and Paivio argued that this difference was an absolute difference in the availability and ease of accessing information on the basis of which sentence productions could be composed. The view proposed here is that the concrete and abstract word difference should be attenuated when continuations are made in thematically-related contexts. This is because thematically-related contexts are hypothesized to activate and narrow the scope of options for developing the passage in a sentence continuation. Since abstract nouns are expected to benefit more than concrete nouns from a narrowing of passage scope, the latency difference between abstract and concrete nouns should be minimized.

Experiment 3 also examined whether the hypothesized effect of thematization on production latency is dependent upon the thematic

relations among sentences in a passage or simply due to lexical repetition. The importance of repeating particular arguments across a passage in order to establish the coherence of the passage has been emphasized by Kintsch (1974), Kintsch and van Dijk (1977), Perfetti and Goldman (1974, 1975), and the results of Experiment 1. But argument repetition, while necessary to thematic coherence, is not sufficient for it. Several studies have shown that comprehension and memory performance are considerably different for sentences that can be integrated in some way, as compared to sentences that cannot. DeVilliers (1974), for example, showed that a set of sentences that made repeated references to a set of objects was treated as a coherent passage only when the objects were modified by definite articles throughout the passage. When indefinitie articles were used, subjects regarded the sentences as composing an unrelated list. A related phenomenon has been reported for recognition memory. Anderson (1977) and Anderson and Bower (1973) have reported the somewhat surprising finding that the more facts one knows about some concept, the longer it takes to recognize a sentence involving that concept (i.e., the so-called "fan effect"). Smith, Adams, and Schorr (1978), however, in a further investigation of this effect, presented facts about people in a theme-related context where the facts could be integrated into a cohesive framework, or in a list context where the facts could not be integrated. Smith et al. reported that the fan effect was only found where information could not be integrated--i.e., in the list context. Sentence cohesion was found to eliminate the difference

in time to recognize sentences that contained concepts associated with different numbers of facts. They interpreted their findings in terms of Schank and Abelson's (1977) theory of scripts. Incoming information in the theme-related context was hypothesized to activate a corresponding script in memory into which new information could be integrated. No such integration was possible in the unrelated list.

The preceding findings suggested the possibility of a similar manipulation in the current experiment. In Experiment 3, productions were elicited not only when to-be-continued words were preceded by theme-related contexts, but also when words were preceded by contexts consisting of lists of sentences. Each sentence referred to the to-be-continued word, but the sentences as a whole did not form an overall coherent theme. While both theme-related and list contexts repeated arguments across propositions expressed in the sentences, only the theme-related context results in the activation of a thematic framework. This framework should make available expectations about how the sentences in the context might continue as well as constrain the scope of information that might be relevant to continuing the thematically-related ideas expressed in the context. In contrast, a list of sentences should not provide such thematic constraints.

If a thematic framework limits the scope of information relevant to continuations of the theme-related context as well as making such information more generally available, then one should expect to find a smaller difference in production latency for

continuations of concrete and abstract to-be-continued words in theme-related contexts, as compared to list contexts. One would expect this attenuation to be even greater with longer contexts insofar as longer contexts serve to develop thematic frameworks to an even greater extent. Longer list contexts might also be expected to result in overall shorter production latencies, as compared to shorter list contexts, even though no thematic framework is elicited by the context. This follows from the hypothesis that with longer lists item repetition may increase the level of activation of the to-be-continued item, as well as potential information associated with it that might be used in a continuation. However, continuations of concrete to-be-continued words should still be faster than abstract words as no differential narrowing of passage scope has occurred.

In summary, the major prediction of this experiment is that differences in latency of productions for abstract and concrete to-be-continued words will be attenuated in thematically-related contexts, as compared to unrelated list contexts, and this attenuation should be greater with longer contexts than for shorter contexts.

Method

Participants

Forty undergraduates enrolled in an introductory psychology course at Michigan State University participated in the experiment for extra credit.

Materials

Target Items. The 36 target abstract and concrete nouns used in the experiment were drawn from the stimulus pool of the pilot studies and are listed in Table 4-1. All to-be-continued target nouns appeared in isolation in the experiment (that is, with no article).

Contexts of one or four sentences were generated for each target noun. Contexts were of two types: Thematically-related or List. In the four sentence thematically-related contexts, each context sentence referenced the to-be-continued word. It was intended that the repeated word reference the thematized element of the passage. Each sentence added new information about the thematic referent, based upon what had previously been mentioned. In the four sentence list contexts, each sentence contained the to-be-continued word. However, each sentence provided new information not related to any of the information previously presented. The

Table 4-1

Target Stimuli Used in Experiment 3

Abstract Nouns		Concrete Nouns	
Glory	Strength	Home	Soil
Happiness	Pleasure	Skin	Wheat
Safety	Hope	Grass	Butter
Trouble	Fate	Blood	String
Advise	Shame	Fur	Steam
Pride	Freedom	Meat	Flesh
Joy	Victory	Money	Clothing
Knowledge	Virtue	Water	Coffee
Justice	Truth	Cattle	Gold

list context could be described as an unrelated collection of sentences which just happened to contain the to-be-continued word. Sentences 4 in the thematically-related and list contexts were identical. Sentence 4 was also the single sentence used in the one sentence thematically-related and list context conditions. The thematically-related and list contexts generated for each target word contained the same number of words. The structure and length of the list contexts were modeled after those of the thematically-related contexts in order to avoid introducing any other variables. The mean number of words in abstract word contexts was 32.51 words; the mean number of words contained in concrete word contexts was 31.7 words.

Filler Items. In order to minimize the possibility that participants would begin formulating their response while reading the contexts, on 25% of the trials an abstract or concrete context was not followed by a word contained in the previous passage. On these trials, long or short abstract and concrete contexts were followed by a filler item of medium concreteness in the form A(n)+NP. The filler items used were drawn from the items used in the pilot experiments. Given the contexts with which these items were paired, the A(n)+NP item could be related to the prior context, given to-be-related instructions (in other words, the filler target item and its context while not explicitly related, were also not totally anomalous). A complete list of the target items, filler items and their accompanying thematically-related and list contexts is contained in Appendix J.

Two lists or versions of the 48 items were constructed so that each to-be-continued word appeared in both the short and long versions of the thematically-related and list contexts. On each list for each context type there were nine short abstract, nine long abstract, nine short concrete, and nine long concrete items. Items were randomly assigned to list. The remaining 12 items were filler trials, divided equally among these four conditions.

The stimuli were typed on white bond paper in capital elite lettering using a carbon ribbon. The contexts appeared on separate sheets from the target or filler items. Context sentences were left justified and each sentence appeared on a separate line. The target or filler items were centered on each page. Positive image slides were made of each of the contexts and items. The slides were used as the stimulus materials in the actual experiment.

Apparatus. A Kodak carousel projector was used to display the stimuli. Attached to the projector was a shutter which opened and shut with each stimulus presentation. A Klokcounter timer was used to measure reading and response times in the experiment. The timer was activated with the opening of the shutter for each stimulus presentation. In the context reading portion of the experiment, the timer was stopped when a participant depressed a lever indicating he was through reading a passage. Pressing the lever also advanced the slide projector and then opened the shutter. The timer was then reactivated. A VOK was used to record participants' vocal response time. When a participant initiated a response, the timer was stopped.

Procedure

Participants were tested individually and were assigned to one of four conditions: Thematically-related contexts, Version 1; Thematically-related contexts, Version 2; List contexts, Version 1; or List contexts, Version 2. There were ten participants in each group. Participants in all groups were instructed that the experiment was concerned with the amount of time it took to complete sentences. Participants in the thematically-related groups were read instructions which emphasized sentence interrelatedness. Participants were instructed that they would be reading pairs of slides. The first slide was a context slide of one or four sentences. This slide provided information about some theme. Of the longer contexts, participants were told that all the sentences were related. Participants were instructed that when they had finished reading the slide, they should press the button in front of them. The next slide would then come on. The next slide contained a single word. Participants were informed that the word may or may not have been contained in the previous context. The task given to participants was to generate a completion to the word which would be related to and based on the information previously read in the context. Participants were instructed not to repeat the word on the slide but to begin speaking with only their continuations. They were further instructed that they could begin composing their continuation as soon as the single word slide appeared. Appendix K contains the instructions emphasizing relatedness used with the thematically-related materials.

Participants in the list versions were read instructions which emphasized the lack of relatedness of the simulus materials. Participants were instructed that their first slide would contain one or four sentences which were part of a list. After reading the list sentence(s), they were instructed to press the button in front of them. When the single word slide appeared, they were instructed to generate a continuation which would produce just another list sentence. Participants were instructed that in keeping with the list structure, their sentence continuations should not relate the generated sentence to the information which preceded the word. As in the thematically-related versions, participants were instructed to say only their continuations, and that they could begin as soon as the word appeared. Appendix L contains the instructions used with list contexts.

Design

The design of the experiment was a 2 x 2 x 2 x 2 factorial consisting of Context Type (Thematically-related or List), Version (List 1 or List 2), Context Length (Long or Short), and Concreteness (Abstract or Concrete). Context Type and Version were between-subjects variables; Context Length and Concreteness were within-subjects variables. In Experiment 3, the apparent confounding of context type and instructions was used in an attempt to emphasize the differences between the experimental materials. In what follows, it should be pointed out that the label Context Type not only refers to the materials used but to the instructional set, as well.

Scoring

Responses were scored as errors if the equipment malfunctioned, the participant either repeated the stimulus word or stopped the timer prior to responding, or if the participant took an unusually long time to complete a response (i.e., longer than 1 sec.; this time was at least three or more standard deviations above the mean response times to complete the sentences.). These trials were not included in any further analyses.

Results and Discussion

Error rates in the thematically-related and list context conditions were 4.2% and 2.4% respectively. Overall, then, participants seemed to be able to perform the task without too much difficulty.

Mean response times to begin producing the continuations were computed. These means were submitted to separate ANOVAs in which both participants and materials were treated as random effects, and *min F'* statisitics were computed for the significant results, where $p < .05$ (Clark, 1973b).

As can be seen in Table 4-2, the analysis of production latencies revealed significant main effects of Context Length, Concreteness, and Version. In general, productions that followed long passages were generated faster than productions that followed short passages, 2945 msec. versus 3328 msec., respectively. Abstract words produced slower continuations overall than concrete

Table 4-2

Significant Effects of Production Latency Analyses

Effect	F Value	p
Context	$F_1(1,36) = 15.548$	***
Length	$F_2(1,16) = 7.899$	*
	$\underline{\min}\ F'(1,33) = 5.228$	*
Concreteness	$F_1(1,36) = 28.621$	***
	$F_2(1,16) = 24.338$	***
	$\underline{\min}\ F'(1,41) = 13.15$	**
Version	$F_1(1,36) = 1.768$	
	$F_2(1,16) = 23.415$	***
	$\underline{\min}\ F'(1,41) = 1.644$	

* Significant at $p < .05$
** Significant at $p < .01$
*** Significant at $p < .001$

words, 3483 msec. versus 2790 msec., respectively. Version is a counterbalancing variable which did not interact with any other variables. Hence, it will not be discussed further. Apart from these main effects, no other effects were significant.

In Experiment 3 it was hypothesized that a thematized context (and its related instructional set) would attenuate the production latency differences between abstract and concrete words. Specifically, it was predicted that the difference in latencies for abstract and concrete words would be attenuated in thematically-related contexts as compared to the latency difference for these word types in list contexts. The mean latency for these four conditions are shown in Table 4-3. Despite the failure of the Context Type x Concreteness interaction to

Table 4-3

Mean Production Latencies to Abstract and Concrete Nouns Following Theme-related and List Contexts

	Theme-related Contexts	List Contexts
Abstract	3296 msec.	3671 msec.
Concrete	2806 msec.	2774 msec.

achieve significance it seems legitimate to test the planned comparison corresponding to this specific a priori hypothesis (e.g., Keppel, 1973). The comparison tested whether the difference in latency for abstract and concrete nouns in thematically-related contexts was smaller than that for list contexts. This comparison indicated that the latency difference was not significantly different for the two context types. This result taken alone does not support the hypothesis that producing a continuation for abstract words is easier in a thematically-related context, as compared to a non-thematized context.

A second prediction of Experiment 3 was that the length of prior context would affect abstract and concrete production latencies, and in particular, interact with type of context (and instructional set). The difference between abstract and concrete production latencies in the long thematic condition was compared with the three abstract and concrete differences for the short theme condition and the long and short list conditions. The mean production latencies for each of these conditions are listed in

Table 4-4. The comparison was not significant, $F(1,36) = 3.382$, $p < .1$. Thus, while there was a tendency in the data for long thematized contexts to make the production of abstract continuations more similar to concrete productions with respect to latencies, this tendency was statistically unreliable.

Production latencies of filler items occurring after the introduction of an abstract theme or list word were also analyzed. Analyses of the filler item data yielded no significant main effects or interactions. The mean production latencies following abstract and concrete contexts in the theme-related and list conditions are plotted in Figure 4.1. As the figure suggests, abstract- and concrete-paired filler items were treated similarly in theme-related and list conditions.

Table 4-4

Mean Production Latencies in msec. to Abstract and Concrete Words in Long and Short, Theme-related and List Contexts

	Long Theme-related Contexts	Short Theme-related Contexts	Long List Contexts	Short List Contexts
Abstract	2815	3552	3464	3878
Concrete	2629	2905	2649	2900

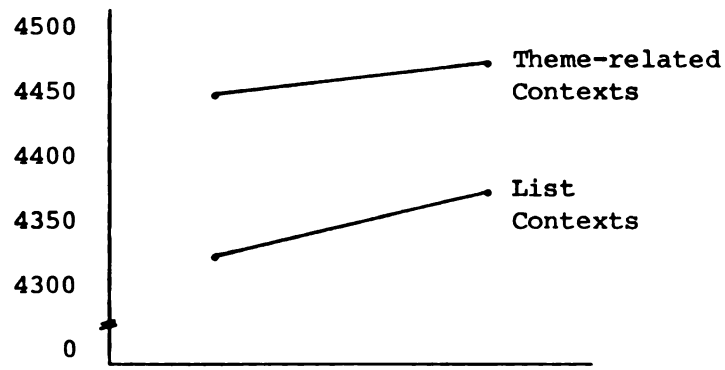

Figure 4.1. Mean Production Latencies in msec. to Filler Items

While a trend was found suggesting that inducing a thematic framework (via materials and instructions) limits the scope of a discourse. It was still the case that overall, abstract words were slower than concrete words. One possible reason for this production latency difference might have been that more was said about abstract words than concrete words. It is possible that abstract words may not denote their referents as directly as concrete words, so that one must say more about them to get a message across. Evidence has been produced indicating a positive correlation between production latency and length of utterance (Meyer, Sternberg, Knoll, & Wright, 1978). Perhaps, then, the trend toward a production latency difference observed in

Experiment 3 was simply due to the number of words produced in continuations.

Table 4-5 lists the significant results of an analysis of the lengths of continuations to abstract and concrete nouns in the two context conditions. Since the main effect of Version did not interact with any of the effects of interest, it will not be considered further in this discussion. The relevant results are that theme-related continuations (5.13 words) were generally longer than List continuations (4.56 words), and abstract continuations (4.97 words) were longer than concrete continuations (4.72 words). It was also the case that the more exposure one had to a particular context, the longer were the lengths of continuations (Long context, 4.99 words, Short context, 4.69 words).

The effect of chief interest was the significant Context Type x Concreteness interaction. Table 4-6 contains the mean length of utterance for each of the Context Type x Concreteness conditions. As can be seen in the table, there was no difference between abstract and concrete continuations following theme-related contexts with relatedness instructions. However, continuations were longer for abstract nouns than concrete nouns following list contexts with list instructions. A Newman-Keuls test indicated that this difference was significant. In general, then, abstract and concrete continuations were more similar following theme-related contexts than list contexts. What this finding suggests is that in the absence of a theme-related set (context and instructions), the concrete-abstract production latency difference

Table 4-5

Significant Effects of the Response Length Analyses

Effect	F Value		p
Context	$F_1(1,36)$ =	1597.118	***
Type	$F_2(1,16)$ =	31.885	***
	min $F'(1,17)$ =	31.261	***
Context	$F_1(1,36)$ =	11.65	**
Length	$F_2(1,16)$ =	18.362	**
	min $F'(1,50)$ =	7.128	*
Version	$F_1(1,36)$ =	8.729	**
	$F_2(1,16)$ =	156.888	***
	min $F'(1,40)$ =	8.269	**
Concreteness	$F_1(1,36)$ =	15.071	**
	$F_2(1,16)$ =	9.314	**
	min $F'(1,36)$ =	5.756	*
Concreteness x Context Type	$F_1(1,36)$ =	22.811	***
	$F_2(1,16)$ =	7.642	*
	min $F'(1,27)$ =	5.724	*

* Significant at $p < .05$
** Significant at $p < .01$
*** Significant at $p < .001$

Table 4-6

Mean Length of Continuation in
Context Type x Concreteness Conditions

	Theme-Related Context	List Context
Concrete	5.16 words	4.2 words
Abstract	5.1 words	4.8 words

may in part be due to planning longer productions for abstract words. On the other hand, a related set appears to reduce the difference between these word types.

Another factor which may affect production latency is how much time is spent reading a passage. Thus, times to read list and thematically-related contexts were also examined to determine whether this variable might have affected production latency results. Since abstract nouns took longer to respond to in general, it may have been the case that people spent less time comprehending sentences containing abstract words. Poorer comprehension may have introduced additional processing time into the production task.

The results of analyses examining the times taken to read abstract and concrete, thematically-related and list contexts appear in Table 4-7. Contexts referring to words that represented abstract concepts took longer to read overall (7844 msec.) than concrete contexts (7341 msec.), indicated by the Concreteness main effect. However, the differrence in the time taken to read abstract and concrete contexts was a function of the length of the passage, indicated by the two-way Context Length x Concreteness interaction. Table 4-8 contains the mean reading times for long and short, concrete and abstract contexts. A post-hoc Newman-Keuls test indicated that the abstract-concrete dimension only made a difference in the reading of long contexts. In summary, long abstract contexts took longer to read than long concrete passages. There was no difference in times taken to read single abstract or concrete sentences.

Table 4-7

Results of Experiment 3 Reading Time Analyses

Effect	F Value	p
Context	$F_1(1,36) = 558.084$	***
Length	$F_2(1,16) = 1688.541$	***
	$\underline{\min}\ F'(1,51) = 419.45$	***
Concreteness	$F_1(1,36) = 34.519$	***
	$F_2(1,16) = 3.476$	
	$\underline{\min}\ F'(1,19) = 3.158$	
Concreteness	$F_1(1,36) = 31.222$	***
x Context	$F_2(1,16) = 8.701$	**
Length	$\underline{\min}\ F'(1,25) = 6.805$	*
Concreteness	$F_1(1,36) = 5.109$	*
x Context	$F_2(1,16) = 4.703$	*
Type	$\underline{\min}\ F'(1,43) = 2.449$	
Context	$F_1(1,36) = 1.739$	
Type	$F_2(1,16) = 48.677$	***
	$\underline{\min}\ F'(1,39) = 1.679$	
Version	$F_1(1,36) = 2.807$	
	$F_2(1,16) = 69.408$	***
	$\underline{\min}\ F'(1,39) = 2.698$	

* Significant at $p < .05$
** Significant at $p < .01$
*** Significant at $p < .001$

Table 4-8

Mean Reading Times in msec. for Long and Short Concrete and Abstract Contexts

	Long Contexts	Short Contexts
Abstract	11,032.7	4,654.8
Concrete	10,061.6	4,621.2

Figure 4.2 illustrates the reading time difference in abstract and concrete noun contexts in the different context type conditions. As can be seen in the figure, there was a greater difference between reading abstract and concrete noun contexts when the contexts and instructions were thematically-related than when the contexts and instructions were list oriented. This result was reinforced by the significant Concreteness x Context Type interaction. A Newman-Keuls analysis of the condition means indicated that the concreteness dimension only affected the reading times of thematically-related contexts. The three-way interaction of Context Type x Context Length x Concreteness was not significant. The conclusion to be drawn then is that reading abstract contexts was slower when the contexts were long, or comprised related sentences and instructional sets.

The only other variables which were significant in the reading time analyses were Version and Context Type. Since the main effect of Version did not interact with any of the effects of interest, it will not be discussed here. As for the effect of

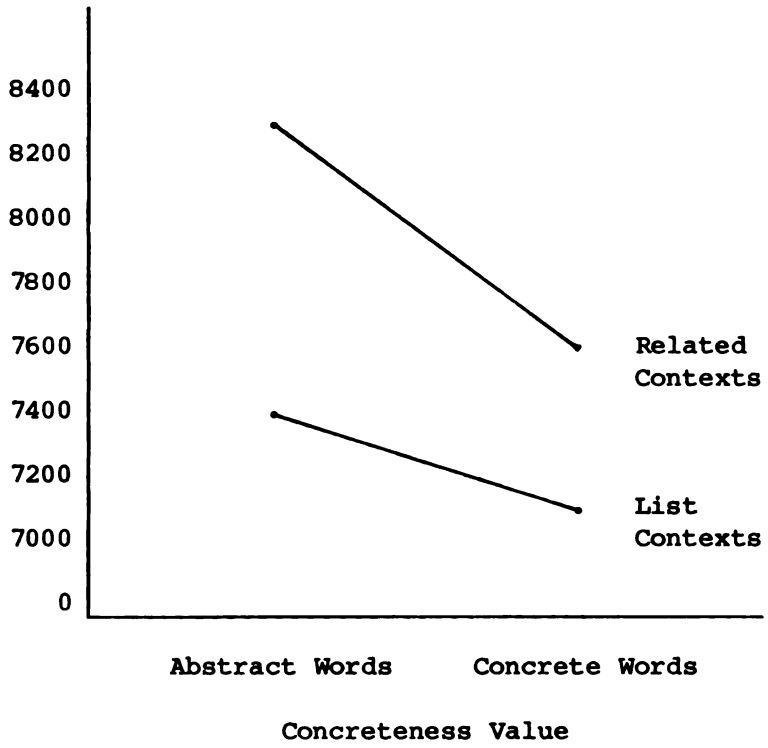

Figure 4.2. Mean Reading Time in msec. of Concrete and Abstract, Related and List Contexts

Context Type, there was some tendency for thematically-related contexts (7949 msec.) to be read more slowly than list contexts (7266 msec.). This effect is not surprising if, in fact, relations were made across sentences during the comprehension of thematically-related contexts. No such connections would have been necessary in the reading of list contexts. In sum, the The results of the reading time analyses indicated that abstract related contexts required more reading time than concrete related contexts.

Having presented the major results of Experiment 3, what can one say about the effect of the thematic framework in production? The prediction made for a thematic framework effect on production latencies received little support. An experimental design with more precision might enhance the significance of the predicted pattern of latency differences. Although not predicted, the thematic framework did appear to affect the length of productions, such that more was said following a related context (with related instructions) than a list context (with list instructions), and there was little difference between the lengths of abstract and concrete continuations.

One can also interpret these results in terms of the overall task differences between the related and unrelated conditions. Consider first, performance in the list conditions. In the list conditions, contexts consisting of references to abstract words were read no slower than contexts consisting of references to concrete words. On the other hand, continuations based on

abstract words took longer to begin than those for concrete words and the continuations contained fewer words.

In the list contexts, it would appear that some sort of trade-off between reading time, production time, and length of productions was occurring. Since abstract lists were read as rapidly as concrete lists, it does not appear that participants were planning what they were going to say in their continuations while they were reading. It is not surprising, then, that when continuations were asked for, the traditional effect was found: abstract words took longer to continue than concrete words. Since abstract noun continuations were also longer than concrete noun continuations, it may have been the case that the longer time interval was used in planning and constructing longer continuations. In other words, more time was needed to plan a longer continuation. Since the denotations of abstract words are less specific than those of concrete words, this finding may reflect a difficulty (relative to concrete words) in accessing the proper words to describe an abstract concept and to describe it adequately, if a thematic framework has not been activated.

Turning to performance in the theme-related conditions, here contexts consisting of references to abstract words took longer to read than those consisting of concrete words. On the other hand, the difference in latency for continuations based on abstract words was only marginally different from those for concrete words. Moreover, the length of these productions did not differ.

Does the trade-off approach apply to the theme-related conditions as well? Participants spent more time reading the

contexts of abstract words than the contexts of concrete words. Furthermore, there is some evidence that the production latency difference between concrete and abstract words was attenuated in the presence of a long thematic context. Thus, participants may have been using the extra time in the reading time portion of the task for abstract words to prepare for the continuations. This would explain the trend toward an attenuation of production latency differences. Moreover, if production latency reflected time to plan a response, the absence of the production latency difference would be consistent with the absence of length of production differences between abstract and concrete words.

At a surface level, one could argue that both the list and theme-related context results were the result of reading and production task trade-offs. However, there are two short-comings with the trade-off approach for performance with theme-related contexts.

First, if time to initiate a response is indicative of the response planning process, the prediction is that the more one has to produce, the longer it should take to initiate a response. In the thematically-related conditions, significantly more words were produced to abstract and concrete nouns than in the list conditions. This, however, was <u>not</u> accompanied by overall longer production latencies in the theme-related conditions. Indeed, there was no correlation between the two variables.

Second, the trade-off explanation makes specific predictions as to the pattern of production latencies for filler items in

abstract and concrete contexts. Recall that the filler items were items of medium concreteness. Now, the trade-off explanantion would predict no differential effects of concreteness in the list conditions. If one is only superficially processing the list texts, as suggested by the absence of abstract and concrete differences in reading times, there should be no difference in production latencies when medium concreteness stimulus items are substituted. However, if participants are using reading time in the theme-related contexts as an opportunity to prepare for abstract continuations, then one would expect differential effects in performance in the theme-related conditions. Specifically, one would expect production latencies of filler items occurring after the introduction of an abstract theme or list word to be slowed compared with filler items occurring after a concrete theme or list word.

As was indicated earlier, filler items paired with abstract and concrete contexts were treated similarly in the theme-related and list conditions (See Figure 4.1). This evidence does not support the trade-off explanation of theme-related context condition performance.

A more reasonable explanation of the pattern of results is that participants were, in fact, invoking a thematic framework in the theme-related conditions. The absence of the Context Type x Concreteness interaction in the filler item analyses is compatible with a thematic framework interpretation. Provided that a framework had been activated, it should have been equally easy to

integrate a related word into the framework for abstract and concrete nouns.

At this point, a brief summary of the results of Experiment 3 is in order. For context reading times, it was discovered that the concrete-abstract dimension had no effect on time to read a list context, while for theme-related contexts, abstract contexts were read more slowly than concrete contexts. In production, differences in production latency for abstract and concrete words in long theme-related contexts were less than production latencies of the other length x context conditions for abstract and concrete words. The length of continuations was also found to be affected by concreteness and context type. Abstract and concrete productions following thematically-related contexts were more similar in length than abstract and concrete productions following list contexts.

These results support a view of thematization in which a thematic framework or thematic set activates certain expectations about information which is expressed in text or which might be output in continuations. As a result, the scope of the information relevant to the thematized element is restricted. In the theme-related context conditions, once a thematic referent or set had been firmly established, there was a tendency for production latencies not to be affected by the abstractness of the discourse topic. The results of Experiment 3 suggest then that thematization plays an active role in the processing and production of information when it contributes to an ongoing thematic framework.

CHAPTER 5

Summary

The research presented in the previous chapters examined two proposed functions of thematization: as a discourse device which directs the structure of and expectations about the structure of sentence information, and as a discourse device which limits the scope of discourse information. Experiments 1 and 2 investigated the former role in discourse comprehension. Experiment 3 investigated the latter.

The comprehension findings of Experiment 1 suggest that the thematic framework is a relatively flexible mechanism with respect to the structure of incoming information. Provided that the content of incoming information was consistent with the expectations of the activated thematic framework, and the sentence topic was not specifically highlighted, the value of the sentence topic (whether it referenced the designated passage theme) did not affect passage sentence comprehension times for most sentence types used. It was only when information was not expected given the activated thematic framework, or when a non-thematized sentence topic was specifically marked (in inconsistent passive sentences) that reading comprehension was slowed.

In the recall task of Experiment 1, thematization did affect the topicalization of sentence types whose major NP constituents could be exchanged without altering sentence intent or NP roles: the Conjunct Movement and Dative Movement sentence types. Among these sentence types, there was a general tendency to place more highly thematized information earlier in the sentence. The effects of thematization, however, did not override preferences for certain sentence forms (e.g., the preference for an active surface structure over a passive surface structure).

Unfortunately, little can be said about the effects of the thematic framework on production in an unconstrained setting. The design of Experiment 2 simply was not sensitive enough to assess the role of the thematic framework in discourse development and sentence structure.

In summary, then, thematization was found to interact with sentence structure in comprehension when a sentence was specifically marked. In recall, thematization was found to interact with sentence structure among sentence types whose sentence NP constituents could be easily exchanged without altering the intent of the sentence and the NPs' sentence roles.

Experiment 3 examined the hypothesis that the activation of a thematic framework limits the scope of information relevant to a discourse. One finding of Experiment 3, central to a discussion of the role of thematization in discourse processing, was that performance with thematically-related materials and instructions was different from performance with list materials and instructions. There was a trend in the data indicating that

production latency differences between abstract and concrete nouns were less following related materials and instructions than were the production latency differences following list materials and instructions.

Thematization of a passage thus appears to invoke a thematic framework, which is more highly activated or firmly established as a passage progresses. The thematic framework narrows the scope of information relevant to the discourse theme; that is, it specifies the information domain of the passage theme. In activating a thematic framework, expectations about the information to be comprehended or produced are also generated. In thematizing a passage, the relations across the passage are of utmost importance. As Experiment 3 suggested, thematization serves to make the relations across a passage meaningful--one is producing or comprehending information about some theme, conveying or taking in information which builds upon previous information.

In conclusion, one can view a thematic framework as being a very active, flexible mechanism in many dimensions of discourse processing. While narrowing the scope of information relevant to the theme and increasing the meaningfulness of the passage relations, it can affect how long it takes to say something about and how much one will say about a discourse theme. Furthermore, it can direct expectations about the content of information produced or comprehended relevant to the theme, and to some extent direct expectations about the structure through which that information will be conveyed or received.

APPENDICES

APPENDIX A

APPENDIX A

Stimuli of Experiment 1

Conjunct Movement Sentence Stimuli:

1. A. Joan was an active little child. She was always into one thing or another. She never sat still for a moment. As soon as she got home from school, she went out to play. One afternoon, on her way to the park, she saw her friend, Jimmy. She decided to take him with her.
*
She had a great time. She couldn't wait to come back and play again tomorrow.

B. Jimmy was an active little child. He was always into one thing or another. He never sat still for a moment. As soon as he got home from school, he went out to play. One afternoon, on his way to the park, he saw his friend, Joan. He decided to take her with him.
*
He had a great time. He couldn't wait to come back and play again tomorrow.

*Joan played with Jimmy in the park.
*Jimmy played with Joan in the park.

2. A. Amanda was in charge of this year's cut flower exhibition. It was a sign of professional respect that her peers had selected her. She hoped nothing would go wrong. She decided to hire someone to take care of the actual arrangement of the entries. She commissioned Jeff, a florist, to take care of the details. When she heard what he had planned, she was not at all pleased.
*
She figured if she was paying for it, she would get what she wanted. She was definitely going to have a word with his boss the next day.

B. Jeff was in charge of this year's cut flower exhibition. It was a sign of professional respect that his peers had selected him. He hoped nothing would go wrong. He decided to hire someone to take care of the actual arrangement of the entries. He commissioned Amanda, a florist, to take

Conjunct Movement Sentence Stimuli:

2. B. care of the details. When he heard what she had planned, he was not at all pleased.
*
He figured if he was paying for it, he would get what he wanted. He was definitely going to have a word with her boss the next day.

*Amanda argued with Jeff about the arrangements.
*Jeff argued with Amanda about the arrangements.

3. A. Dave's life was just beginning. He had taken care of his sickly parents for 20 years. Now at 45, he was finally on his own. He thought he could now lead a normal existence. One evening, he dined with Sylvia, his parents' physician. After dinner, he suggested they take in some fresh air.
*
He wished the evening would never end. He knew the love he had found tonight would never end.

B. Sylvia's life was just beginning. She had taken care of her sickly parents for 20 years. Now at 45, she was finally on her own. She thought she could now lead a normal existence. One evening, she dined with Dave, her parents' physician. After dinner, she suggested they take in some fresh air.
*
She wished the evening would never end. She knew the love she had found tonight would never end.

*Dave walked with Sylvia in the moonlight.
*Sylvia walked with Dave in the moonlight.

4. A. Allan was really irritable. He had been pressured into a blind date. He despised blind dates. He feared the evening would be a complete disaster. He met his date, Jennifer, at eight o'clock. He took her to "The Musicale", a local disco.
*
He decided this was one of the best evenings in his life. He resolved to see more of this woman in the future.

B. Jennifer was really irritable. She had been pressured into a blind date. She despised blind dates. She feared the evening would be a complete disaster. She met her date, Allan, at eight o'clock. She took him to "The Musicale", a local disco.
*
She decided this was one of the best evenings in her life. She resolved to see more of this man in the future.

Conjunct Movement Sentence Stimuli:

4. *Allan danced with Jennifer until dawn.
*Jennifer danced with Allan until dawn.

5. A. Peter was a terrible driver. He never paid attention to other drivers. He was always too busy watching the scenery. One day, on his way home from work, he sped around a corner. Suddenly he realized he was heading straight for Lois, his neighbor. Before he knew it, he had smashed into her.
*
He was given a $500 fine and a week behind bars. As he sat in his cell, he resolved never to be so careless again.

5. B. Lois was a terrible driver. She never paid attention to other drivers. She was always too busy watching the scenery. One day, on her way home from work, she sped around a corner. Suddenly she realized she was heading straight for Peter, her neighbor. Before she knew it, she had smashed into him.
*
She was given a $500 fine and a week behind bars. As she sat in her cell, she resolved never to be so careless again.

*Peter went with Lois to the police station.
*Lois went with Peter to the police station.

6. A. Lynn thought she had a lot of potential as an actress. She was quite good at singing and dancing as well. What she needed was a big break. One day she heard about a talent contest sponsored by a local TV station. Much to her chagrin, she ran into her worst enemy, Fred; at the registration table. She hoped he wouldn't be bad luck.
*
She was positive she was going to win. Her career hopes were dashed, though, when she was awarded the booby prize.

6. B. Fred thought he had a lot of potential as an actor. He was quite good at singing and dancing as well. What he needed was a big break. One day he heard about a talent contest sponsored by a local TV station. Much to his chagrin, he ran into his worst enemy, Lynn, at the registration table. He hoped she wouldn't be bad luck.
*
He was positive he was going to win. His career hopes were dashed, though, when he was awarded the booby prize.

*Lynn competed with Fred in the contest.
*Fred competed with Lynn in the contest.

Conjunct Movement Sentence Stimuli:

7. A. Martha was in the dog house. She had just said some nasty things in her English class. Now she was sorry she had ever opened her mouth. She may have cost herself a passing grade. On her way to another class, she bumped into her English teacher, Steve. There was no way she could avoid him.
*
She said she was sorry for being so rude. She hoped her apology would be enough to save herself from summer school.

B. Steve was in the dog house. He had just said some nasty things in his English class. Now he was sorry he had ever opened his mouth. He may have cost himself a passing grade. On his way to another class, he bumped into his English teacher, Martha. There was no way he could avoid her.
*
He said he was sorry for being so rude. He hoped his apology would be enough to save himself from summer school.

*Martha spoke with Steve in the hallway.
*Steve spoke with Martha in the hallway.

8. A. Don had recently begun a new job in a new city. He hadn't made many friends yet. He hoped things would get better soon. One day he was feeling really lonely. In desperation, he asked his secretary, Kim, to have lunch with him. He led her out to a big old shade tree.
*
He had a wonderful time. He hoped they would have lunch together again soon.

B. Kim had recently begun a new job in a new city. She hadn't made many friends yet. She hoped things would get better soon. One day she was feeling really lonely. In desperation, she asked her boss, Don, to have lunch with her. She led him out to a big old shade tree.
*
She had a wonderful time. She hoped they would have lunch together again soon.

*Don ate with Kim under the elm tree.
*Kim ate with Don under the elm tree.

Active/Passive Sentence Stimuli:

1. A. Kevin was having a fabulous time. He hadn't been dancing in years. He thought he could dance all night. Disco was definitely his forte. His date, Rita, a stewardess, was as energetic as he was. However, he knew that she had to catch a 7 A.M. flight.
*
He hated having to leave. However, he made a date with her to go dancing the following weekend.

   B. Rita was having a fabulous time. She hadn't been dancing in years. She thought she could dance all night. Disco was definitely her forte. Her date, Kevin, a steward, was as energetic as she was. However, she knew that he had to catch a 7 A.M. flight.
*
She hated having to leave. However, she made a date with him to go dancing the following weekend.

*Kevin reminded Rita of the time.
*Rita was reminded of the time by Kevin.

2. A. Stu was taking his first trip in years. He had won a trip to Hawaii. He couldn't wait to walk along the beach at Wakiki. He was thrilled at having such good luck. He had invited his secretary, Meg, to go with him. He told her to be ready at least two hours before their flight.
*
He got there with plenty of time to spare. As the plane took off, he looked forward to the exciting days ahead.

   B. Meg was taking her first trip in years. She had won a trip to Hawaii. She couldn't wait to walk along the beach at Wakiki. She was thrilled at having such good luck. She had invited her secretary, Stu, to go with her. She told him to be ready at least two hours before their flight.
*
She got there with plenty of time to spare. As the plane took off, she looked forward to the exciting days ahead.

*Stu drove Meg to the airport.
*Meg was driven to the airport by Stu.

Active/Passive Sentence Stimuli:

3. A. Rick was the butler of a rich old man. Late one night he heard a blood-curdling scream. He was in a state of panic. Escape was the first thing that crossed his mind. As he fled the mansion, he ran into Beth, the old man's maid. He spoke to her about what had happened.
*
He couldn't be considered a suspect, as he had a sound alibi. His story would have no trouble standing up in court.

B. Beth was the maid of a rich old man. Late one night she heard a blood-curdling scream. She was in a state of panic. Escape was the first thing that crossed her mind. As she fled the mansion, she ran into Rick, the old man's butler. She spoke to him about what had happened.
*
She couldn't be considered a suspect, as she had a sound alibi. Her story would have no trouble standing up in court.

*Rick was accused of the murder by Beth.
*Beth accused Rick of the murder.

4. A. Maureen was in charge of the church social this year. She was looking forward to it, but was a little worried. She hadn't found a date yet. She didn't know what she was going to do. Her last possibility was Joe, the church organist. She bumped into him after church the following Sunday.
*
She had a wonderful time with him. She was happy, too, that the social went smoothly as planned.

B. Joe was in charge of the church social this year. He was looking forward to it, but was a little worried. He hadn't found a date yet. He didn't know what he was going to do. His last possibility was Maureen, the church organist. He bumped into her after church the following Sunday.
*
He had a wonderful time with her. He was happy, too, that the social went smoothly as planned.

*Maureen was invited to the dance by Joe.
*Joe invited Maureen to the dance.

Active/Passive Sentence Stimuli:

5. A. Ed was a swinging single. He loved to party. He was always a hit with the girls. Each weekend, he dated someone new. This week, he wanted to go out with a young woman, Sandra. He happened to run into her at the gas station.
*
He was certain they would have a smashing time. In fact, he so enjoyed her company that they made plans to see each other again.

B. Sandra was a swinging single. She loved to party. She was always a hit with the fellows. Each weekend, she dated someone new. This week, she wanted to go out with a young man, Ed. She happened to run into him at the gas station.
*
She was certain they would have a smashing time. In fact, she so enjoyed his company that they made plans to see each other again.

*Ed asked Sandra for a date.
*Sandra was asked for a date by Ed.

6. A. Paul was an incorrigible child. He was always starting fights. No one liked to play with him anymore, since he was such a bully. One afternoon, he decided to play inside. He happened to see his sister, Barbara, playing with his blocks. He quietly walked over to her.
*
He picked up his blocks and left the room. He had shown her who was boss.

B. Barbara was an incorrigible child. She was always starting fights. No one like to play with her anymore, since she was such a bully. One afternoon, she decided to play inside. She happened to see her brother, Paul, playing with her blocks. She quietly walked over to him.
*
She picked up her blocks and left the room. She had shown him who was boss.

*Barbara kicked Paul in the shin.
*Paul was kicked in the shin by Barbara.

Active/Passive Sentence Stimuli:

7. A. Mike was on his first date. He was very nervous. He wasn't quite sure how to act with a girl. He hoped it was just a phase he was going through. He dearly wanted to impress his date, Patty. After dinner, he strolled along the beach with her.
*
He was overwhelmed by how beautiful she was. He quickly decided that his awkward phase was over.

B. Patty was on her first date. She was very nervous. She wasn't quite sure how to act with a boy. She hoped it was just a phase she was going through. She dearly wanted to impress her date, Mike. After dinner, she strolled along the beach with him.
*
She was overwhelmed by how handsome he was. She quickly decided that her awkward phase was over.

*Patty kissed Mike in the moonlight.
*Mike was kissed in the moonlight by Patty.

8. A. Matt was a riot squad policeman. He was called in whenever it looked like trouble was brewing. Early one morning, he was summoned to a problem area. Before he knew it, a major riot had erupted. When things died down, he called his partner, Susan, aside. He argued with her over the cause of the riot.
*
He requested an immediate investigation of the riot. He would not tolerate any troublemakers on the squad.

B. Susan was a riot squad policewoman. She was called in whenever it looked like trouble was brewing. Early one morning, she was summoned to a problem area. Before she knew it, a major riot had erupted. When things died down, she called her partner, Matt, aside. She argued with him over the cause of the riot.
*
She requested an immediate investigation of the riot. She would not tolerate any troublemakers on the squad.

*Matt blamed Susan for the trouble.
*Susan was blamed for the trouble by Matt.

Word Substitution Sentence Stimuli:

1. A. Cindy loved to play games. Her most recent interest was chess. She would play for hours, testing new strategies. The time finally came to test her skills on an opponent. Cindy challenged her brother, Roger, to a game. She knew he would put up a good fight.
*
Even so, she realized she had used more skills than ever before. She immediately challenged him to a rematch, to further improve her talents.

   B. Roger loved to play games. His most recent interest was chess. He would play for hours, testing new strategies. The time finally came to test his skills on an opponent. Roger challenged his sister, Cindy, to a game. He knew she would put up a good fight.
*
Even so, he realized he had used more skills than ever before. He immediately challenged her to a rematch, to further improve his talents.

*Cindy beat Roger at chess.
*Roger lost to Cindy at chess.

2. A. Big Edith was a professional rollerskater. She had worked hard to get where she was. She did not wish to lose her professional standing. So, she practiced every morning on the city rink. One morning, though, she saw Bradley, another skater in her spot. She skated over to him.
*
She read him the rules and told him the rink was reserved for her. Within minutes, she had the rink to herself.

   B. Bradley was a professional rollerskater. He had worked hard to get where he was. He did not wish to lose his professinal standing. So, he practiced every morning on the city rink. One morning, though, he saw Big Edith, another skater, in his spot. Timidly, he skated over to her.
*
He read her the rules and told her the rink was reserved for him. To his surprise, within minutes, he had the rink to himself.

*Big Edith frightened Bradley.
*Bradley was afraid of Big Edith.

Word Substitution Sentence Stimuli:

3. A. Arthur was a used-car salesperson. He was constantly on the lookout for a good deal. A good deal always meant more money in his pocket. His latest interest was a '76 Rabbit. His neighbor, Valerie, had expressed some interest in purchasing it. He discussed the car's price with her.
*
He was very happy with the deal. He had made out like a bandit.

B. Valerie was a used-car salesperson. She was constantly on the lookout for a good deal. A good deal always meant more money in her pocket. Her latest interest was a '76 Rabbit. Her neighbor, Arthur, had expressed some interest in selling it. She discussed the car's price with him.
*
She was very happy with the deal. She had made out like a bandit.

*Arthur sold Valerie the Rabbit.
*Valerie bought the Rabbit from Arthur.

4. A. Walter was a heavy drinker. He never knew when to quit. He was always making a fool of himself at parties. One time, at a company picnic he pretended he was a gorilla all day long! This year, he took his tee-totaling wife, Gail, with him to the picnic. He became annoyed when she would not play Cowboys and Indians with him.
*
As a joke, he soaked her with ice water. Then, with a twinkle in his eyes, he kissed the boss' wife and was off.

B. Gail was a tee-totaler. She hated even thinking about alcoholic beverages. In keeping with her beliefs, she had campaigned several times for prohibition. She truly thought liquor was a curse. Surprisingly, her husband, Walter, was a heavy driver. This year, she brought him along to her company's picnic.
*
As a joke, she had been soaked with ice water. With tears in her eyes, she said good-bye to all and was off.

*Walter embarrassed Gail at the party.
*Gail was ashamed of Walter at the party.

Word Substitution Sentence Stimuli:

5. A. Carol was a treasure seeker. She was presently searching for lost Incan gold. One day, she stumbled upon an oddly marked tablet. She decided it must be a map. She called to her assistant, Nick. She showed him where she thought the treasure should be.
*
There she found riches beyond her wildest dreams. She knew she would go down in history as a great anthropologist.

B. Nick often assisted on treasure hunts. He was presently on a hunt for lost Incan gold. He had heard that this hunt could uncover the biggest treasure yet. So far though, he hadn't uncovered any clues. One day, he saw his supervisor, Carol, waving excitedly to him. He saw that she had discovered a secret map!
*
There he gazed upon riches beyond his wildest dreams. He knew he would go down in history as a great adventurer.

*Nick followed Carol to the hidden treasure.
*Carol led Nick to the hidden treasure.

6. A. Lisa was a Broadway chorus dancer. Dancing was her life. She practiced everyday so that her form would be perfect. She hoped eventually to get a chorusline lead. She often worked out with Dennis, another dancer. One day, she wanted to work with him on some changes in a disco number.
*
She thought the new steps were difficult. However, she felt the changes added an interesting new dimension to the dance.

B. Dennis was a Broadway chorus dancer. Dancing was his life. He practiced everyday so that his form would be perfect. He hoped eventually to get a chorusline lead. He often worked out with Lisa, another dancer. One day, he wanted to work with her on some changes in a disco number.
*
He thought the new steps were difficult. However, he felt the changes added an interesting new dimension to the dance.

*Dennis learned the steps from Lisa.
*Lisa taught Dennis the steps.

Word Substitution Sentence Stimuli:

7. A. Harry had been a business tycoon. He had had wealth beyond belief. He hadn't trusted many people, though. He feared they were always after his money. However, he had become especially attached to his visiting nurse, Deborah. He had decided to remember her in his will.
*
He had known she would be well taken care of with that money. He was glad he could give some of his money to a deserving soul.

B. Deborah was a visiting nurse. She tended people who were too sick to help themselves. She enjoyed bringing happiness into their lives. In turn, her patients were generous with her. Her last patient, Harry, had been a rich tycoon. She knew he had grown quite fond of her before his death.
*
She would be well taken care of with that money. She knew she would put the money to good use.

*Deborah inherited one million dollars from Harry.
*Harry bequeathed Deborah one million dollars.

8. A. Frank was an apprentice mechanic. Each week, he bought himself more tools. He felt a great mechanic could always use more tools. His dream was to become the best mechanic in the shop. One day, he ran into Nancy, a fellow mechanic, at the tool store. He saw that she didn't have enough money to buy a wrench.
*
He said she could pay him back at work. He was happy he had come to the rescue of another mechanic.

B. Nancy was an apprentice mechanic. Each week, she bought herself more tools. She felt a great mechanic could always use more tools. Her dream was to become the best mechanic in the shop. One day, she ran into Frank, a fellow mechanic, at the tool store. She told him that she didn't have enough money to buy a wrench.
*
She said she would repay him at work. She was thankful she had bumped into him.

*Nancy borrowed five dollars from Frank.
*Frank loaned Nancy five dollars.

Dative Movement Sentence Stimuli:

1. A. Anne was a cheese connnisseur. She spent hours in gourmet shops looking for new imports. Her latest find was a wine-soaked Gouda. It had recently been imported from Europe. She thought it was the finest cheese she'd ever eaten. She asked her husband, Doug, if he cared for a piece of it.
*
She hated to see it being gobbled down so fast. She thought that such a cheese should be savored in petite bites.

B. Anne was tired. She was not used to being so busy. She had to wait on her husband, Doug, hand and foot. She thought that if he had just skied more carefully he wouldn't be in a body cast. Now she had to do everything. She heard him call for a piece of cheese.
*
She then told him that she had had enough. She was going to hire a practical nurse for him until the cast came off.

*Anne brought Doug the cheese.
*Anne brought the cheese to Doug.

2. A. Carl was a songwriter. He had won numerous awards for his songs. His latest song was rapidly becoming a hit. The song meant a lot to him. It conveyed all of his feelings on fatherhood. Late one evening, he put his little daughter, Ellen, to bed.
*
Tears welled up in his eyes. He knew the song would touch every father's heart.

B. Carl was a romantic. He was courting his girlfriend, Ellen, like they did in the old days. He took her canoeing and biking every weekend. He thought something was missing, though. Perhaps he needed a profession of his love. So, he wrote her a song telling her of his love.
*
He could see how enchanted she was. He knew she would be his forever more.

*Carl sang Ellen the song.
*Carl sang the song to Ellen.

Dative Movement Sentence Stimuli:

3. A. Ginny was a cleaning lady for the CIA. One evening, she noticed an unusual envelope in the garbage. She picked it out and read its contents. She realized that the letter contained top-secret information. She decided to get the letter to Greg, the man in charge of internal security.
*
She was relieved to be rid of it. She knew that possession of the letter could have cost her her job.

B. Ginny was in basic training at Fort Polk. She missed her boyfriend, Greg, desperately. Before she had enlisted, she had spent every evening with him. Now she thought of him incessantly. When she got out, she was going to marry him. She pulled out a piece of paper and wrote him of her plans.
*
She knew he would be pleased. She hoped they would have a happy life together.

*Ginny sent Greg the letter.
*Ginny sent the letter to Greg.

4. A. Rose was an enthusiatic shopper. She had all of her Christmas shopping done early this year. Her favorite purchase was a CB radio. Now she just had to figure out whom to give it to. She wanted to keep it close to home, so she could use it too. On Christmas Eve, she brought the radio over to her fiance, Charlie's, house.
*
She was glad it was a hit. She hoped she could borrow it soon.

B. Rose was an enthusiastic shopper. She shopped high and low for exotic unique gifts. This year, she had bought her fiance, Charlie, a special present for Christmas. On Christmas Eve, she went over to Charlie's for dinner. Afterwards, she sat with him in front of the fire. She pulled out a CB wrapped in beautiful silver paper.
*
She was glad that he was pleased. Each year, she was finding it more difficult to find something nice for him.

*Rose gave Charlie the radio.
*Rose gave the radio to Charlie.

Dative Movement Sentence Stimuli:

5. A. John had grown quite fond of knitting. His doctor had recommended it for his nerves. Within three months, he had become an ace knitter. His pride and joy was an afghan he had recently finished. It was a work of art. He asked his neighbor, Mary, over one day to see his masterpiece.
*
He was so proud of it. He hoped to put it on display at the next American Handicrafts Exhibition.

B. John was very upset. He had been trying everything to get his neighbor, Mary, to notice him. He had sent her flowers and candy. Yet, he was still given nothing but a cool hello. He decided he would have to be crafty. John asked Mary over one night to see a new afghan he had bought.
*
He realized that she was onto his scheme. He apologized, and promised he would leave her alone from then on.

*John showed Mary the afghan.
*John showed the afghan to Mary.

6. A. Alice was a poet. She was quite well-known for her published works. Recently, she was working on an epic of the Vietnam war. The poem expressed all of her hatred for bloodshed and violence. She hoped it would be well-received in literary circles. She scheduled a reading of the poem with her agent, George.
*
Her voice conveyed the terror and grief of someone who had been there. She knew that this poem was by far the best she had yet created.

B. Alice was having marital problems. She and her husband, George, were always arguing. Even so, she loved him dearly. She wished she could convince him of her good intentions. She needed to give him some sort of sign. One evening, she stumbled upon a poem she knew he would love.
*
She could tell in his eyes that he understood. She knew she would share the rest of her life with him.

*Alice read George the poem.
*Alice read the poem to George.

Dative Movement Sentence Stimuli:

7. A. Bob was a minor league baseball player. He hoped to make it to the major leagues someday. His prize possession was a ball autographed by Willie Mays. His father had given it to him the day he made the league. One day, he was outside practicing pitching it. He asked his sister, Cathy, to catch it.
*
He felt his arm hurl the ball with speed and accuracy. Whenever he used his lucky ball, he knew his form was at its peak.

B. Bob was a minor league baseball player. He hoped to make the major leagues soon. His wife, Cathy, gave him all the encouragement he needed. He knew that she would do anything to help him succeed. One day, he was outside practicing pitching. He asked his wife to come play catch with him.
*
He was so grateful for her help. He hoped that one day he could return the support she eagerly gave.

*Bob threw Cathy the ball.
*Bob threw the ball to Cathy.

8. A. Tom was an Italian chef. He had studied for many years in the great kitchens of Rome. His specialty was spaghetti a la Giovonni. People came from all across the country to eat his spaghetti. One could not eat at his restaurant without tasting his spaghetti. One evening, he saw his new neighbor, Laura, in his restaurant.
*
He knew it was especially good that night. He gave her a special discount on her meal when she asked for a second helping.

B. Tom was in love. Tonight, he was having his girlfriend, Laura, over to dinner. He was determined to capture her heart. When she arrived, he made cocktails. He spoke with her for a long time. Suddenly, he remembered the food.
*
He knew he could win her heart through her stomach. He was so delighted when he gave her seconds.

*Tom offered Laura some spaghetti.
*Tom offered some spaghetti to Laura.

APPENDIX B

APPENDIX B

Reading Time Instructions Used in Experiment 1

"In this experiment, we are investigating the amount of time it takes people to comprehend or understand short passages. In the experiment, you will be given 32 stories to read. The stories concern events or activities in the lives of particular individuals.

"Each story will be preceded with a slide with the word READY printed on it. When you are ready to proceed with the story, you should press the lever on the far left.

"Each sentence of the story will be presented individually. After you have read each sentence and fully understand it, you should press the lever on the far left. The next slide will then be presented. The time it takes you to read each of the sentences will be recorded by a computer in the next room. The end of each story will be signalled by a slide with the word END written on it. When the slide appears, please press the far left lever. There will be a short interval between each of the stories.

"Do you have any questions? We will begin the experiment with a story practice trial. To begin the experiment, please depress the lever on your right.

"(Practice Trial) Do you have any questions? To begin again, please press the lever on your right. Thereafter, only the lever on your far left need be pressed."

APPENDIX C

APPENDIX C

Recall Instructions Used in Experiment 1

"In this portion of the experiment, we are investigating your ability to remember certain portions of the stories you read.

"You have been given a test booklet containing the 32 stories that you read. The stories appear in a different order than you read them. There is one sentence missing from each story. The sentence missing is indicated by the star.

"Your task in this portion of the experiment, is to write down next to the star in the space provided the sentence that is missing. Your should try to be as accurate as possible in recalling the missing sentences. Please try to provide a response to each of the stories. Do you have any questions?"

APPENDIX D

APPENDIX D

Stimuli Used in Experiment 2

1. A. Roger was having a fabulous time. He hadn't been dancing in ten years. He thought he could go on all night. He had specifically chosen a dusk-till-dawn disco. He thought his date, Bonnie, was beginning to show signs of fatigue. With that, he swept her on to the dance floor, hoping he could wake her up with one fast number.
   *

   B. Bonnie was having a fabulous time. She hadn't been dancing in ten years. She thought she could go on all night. She had specifically chosen a dusk-till-dawn disco. She thought her date, Roger, was beginning to show signs of fatigue. With that, she swept him onto the dance floor, hoping she could wake him up with one fast number.
   *

      *Roger reminded Bonnie of the time.
      *Bonnie reminded Roger of the time.

2. A. Barbara was the maid of a famous billionaire. She provided total care for the old man. Late one evening, she heard a blood-curdling scream. She was in a state of panic. She ran into Paul, the butler, as she fled the house. She spoke with him about the incident.
   *

   B. Paul was the butler of a famous billionaire. He provided total care for the old man. Late one evening, he heard a blood-curdling scream. He was in a state of panic. He ran into Barbara, the maid, as he fled the house. He spoke with her about the incident.
   *

      *Barbara accused Paul of the murder.
      *Paul accused Barbara of the murder.

3. A. Adam was in love. He couldn't believe it had happened to him. He had been sure he was a confirmed single. In the past, the thought of marriage and responsibility had scared him. Now he had met Cheryl and his whole life was different. He asked her to be his wife.
*

B. Cheryl was in love. She couldn't believe it had happened to her. She had been sure she was a confirmed single. In the past, the thought of marriage and responsibility had scared her. Now she had met Adam and her whole life was different. She asked him to be her husband.
*

*Adam married Cheryl in the fall.
*Cheryl married Adam in the fall.

4. A. Carol was running for student council president. She knew she stood a good chance of winning. She had taken a popular stand on the issues. She was afraid, though, that the race might be close. Her only real competitor was her friend, Brad. A public forum was the answer.
*

B. Brad was running for student council president. He knew he stood a good chance of winning. He had taken a popular stand on the issues. He was afraid, though, that the race might be close. His only real competitor was his friend, Carol. A public forum was the answer.
*

*Carol challenged Brad to a debate.
*Brad challenged Carol to a debate.

5. A. Lisa was a successful businesswoman. She had attracted several million dollar deals to the company this year. She was now being considered for the company vice-presidency. Despite her expertise, she wasn't sure she deserved the job, though. She knew that a more experienced senior employee, Tim, was also being considered. On the day of the meeting, she accompanied him into the boardroom.
*

B. Tim was a successful businessman. He had attracted several million dollar deals to the company this year. He was now being considered for the company vice-presidency. Despite his expertise, he wasn't sure he deserved the job, though. He knew that a more experienced senior employee, Lisa, was also being considered. On the day of the meeting, he accompanied her into the boardroom.
*

5. *Tim recommended Lisa for the job.
*Lisa recommended Tim for the job.'

6. A. Matt was a young city doctor. He was unhappy with the hustle of city life. He wanted to become a country doctor. He knew just the position he wanted. He contacted his friend, Sue, who had a rural practice and suggested a temporary job switch. Over lunch, they ironed out all the details.
*

B. Sue was a young city doctor. She was unhappy with the hustle of city life. She wanted to become a country doctor. She knew just the position she wanted. She contacted her friend, Matt, who had a rural practice and suggested a temporary job switch. Over lunch, they ironed out all the details.
*

*Matt thanked Sue for the new medical practice.
*Sue thanked Matt for the new medical practice.

7. A. Ginny was in charge of organizing the church dance this year. She was looking forward to it, but was a little worried. She hadn't found a date yet. She didn't know what she was going to do. One day she heard that Greg, the organist, was also looking for a date. She spoke with him after church the following Sunday.
*

B. Greg was in charge of organizing the church dance this year. He was looking forward to it, but was a little worried. He hadn't found a date yet. He didn't know what he was going to do. One day he heard that Ginny, the organist, was also looking for a date. He spoke with her after church the following Sunday.
*

*Ginny invited Greg to the dance.
*Greg invited Ginny to the dance.

8. A. Doug was an actor. He was soon to audition for a part in a play put on by a local theatre group. He always practiced very hard, for he really loved the theatre. Finally, the day of the auditions arrived. Doug picked up Anne, another aspiring actress, and together they went to the theatre. He sat with her as each awaited their turn.
*

8. B. Anne was an actress. She was soon to audition for a part in a play put on by a local theatre group. She always practiced very hard, for she really loved the theatre. Finally, the day of auditions arrived. Anne picked up Doug, another aspiring actor, and together they went to the theatre. She sat with him as each awaited their turn.
*

*Doug applauded Anne for a superb audition.
*Anne applauded Doug for a superb audition.

9. A. Rita was in low spirits. She had recently gotten a pay raise. She thought she would be able to get back on her feet again. But no matter how much she earned, her expenses were always more than her income. After getting her paycheck one day, she walked to the bank with Kevin, a fellow employee. On the way out, Rita noticed that Kevin was standing very close to her.
*

B. Kevin was in low spirits. He had recently gotten a pay raise. He thought he would be able to get back on his feet again. But no matter how much he earned, his expenses were always more than his income. After getting his paycheck one day, he walked to the bank with Rita, a fellow employee. On the way out, Kevin noticed that Rita was standing very close to him.
*

*Rita robbed Kevin in the bank.
*Kevin robbed Rita in the bank.

10. A. Mary was an assistant defense attorney. Her most recent case was a complicated murder case. The presentations were over now and she was anxiously awaiting the jury's decision. On her way to the office one morning, she learned that a verdict had been reached. She drove directly to see John, the assistant D.A. When she arrived, she raced into his office.
*

B. John was an assistant defense attorney. His most recent case was a complicated murder case. The presentations were over now and he was anxiously awaiting the jury's decision. On his way to the office one morning, he learned that a verdict had been reached. He drove directly to see Mary, the assistant D.A. When he arrived, he raced into her office.
*

10. *Mary informed John of the decision.
*John informed Mary of the decision.

11. A. Peter was a swinging single. He loved to party. He was always a hit with the girls. He believed that relationships should be free and open. Of late, he had had his eye on Eileen, a clerk at Meijer's. One Sunday, he ran into her at the checkout counter.
*

B. Eileen was a swinging single. She loved to party. She was always a hit with the fellows. She believed that relationships should be free and open. Of late, she had had her eye on Peter, a clerk at Meijer's. One Sunday, she ran into him at the checkout counter.
*

*Peter asked Eileen for a date.
*Eileen asked Peter for a date.

12. A. Maureen was a riot squad policewoman. She was called in whenever trouble was brewing. Early one morning she was summoned to a seedy part of town. Before she knew it, a major riot had begun. When things died down, she called her partner, Joe, aside. They exchanged heated words.
*

B. Joe was a riot squad policeman. He was called in whenever trouble was brewing. Early one morning he was summoned to a seedy part of town. Before he knew it, a major riot had begun. When things died down, he called his partner, Maureen aside. They exchanged heated words.
*

*Maureen blamed Joe for the trouble.
*Joe blamed Maureen for the trouble.

13. A. Meg was busily studying for the law boards. She hoped she would do well on them. Her life ambition was to be a lawyer. She knew that with the proper coaching, things would work out. So every afternoon, she studied under a young lawyer, Stu. She walked over to his office early one day.
*

13. B. Stu was busily studying for the law boards. He hoped he would do well on them. His life ambition was to be a lawyer. He knew that with the proper coaching, things would work out. So every afternoon, he studied under a young lawyer, Meg. He walked over to her office early one day.
*

*Meg noticed Stu in the doorway.
*Stu noticed Meg in the doorway.

14. A. Larry was a treasure seeker. His latest adventure was searching for gold. Early one morning, he came across a tablet with odd markings on it. He examined the markings carefully and decided it must be a map. He called to his assistant, Janet. He showed her where he thought the treasure should be buried.
*

B. Janet was a treasure seeker. Her latest adventure was searching for lost Incan gold. Early one morning, she came across a tablet with odd markings on it. She examined the markings carefully and decided it must be a map. She called to her assistant, Larry. She showed him where she thought the treasure should be buried.
*

*Larry followed Janet to the hidden treasure.
*Janet followed Larry to the hidden treasure.

15. A. Rose ran a sizable used-car business. She had been very upset of late. All the new government regulations were taking their toll on her business. She looked over the current day's mail. She called to her general business manager, Charlie. She handed him a thin envelope.
*

B. Charlie ran a sizable used-car business. He had been very upset of late. All the new government regulations were taking their toll on his business. He looked over the current day's mail. He called to his general business manager, Rose. He handed her a thin envelope.
*

*Rose advised Charlie of the latest regulation.
*Charlie advised Rose of the latest regulation.

16. A. Bob was an avid skier. He was invigorated by the fresh air and the excitement. He tried to ski at least once a day. He rarely skied alone, though, in the event of trouble. One day, he and his sister, Cathy, found a new trail in the mountains. He showed her the ominous overhangs of snow up ahead.
*

B. Cathy was an avid skier. She was invigorated by the fresh air and excitement. She tried to ski at least once a day. She rarely skied alone, though, in the event of trouble. One day, she and her brother, Bob, found a new trail in the mountains. She showed him the ominous overhangs of snow up ahead.
*

*Bob warned Cathy of the impending danger.
*Cathy warned Bob of the impending danger.

17. A. Beth was an incorrigible child. She was always starting fights. No one liked her for she was such a bully. One afternoon, she decided to play inside. When she came indoors, she saw her brother, Jeff, playing with her blocks. She quietly walked over to him.
*

B. Jeff was an incorrigible child. He was always starting fights. No one liked him for he was such a bully. One afternoon, he decided to play inside. When he came indoors, he saw his sister, Beth, playing with his blocks. He quietly walked over to her.
*

*Beth kicked Jeff in the shin.
*Jeff kicked Beth in the shin.

18. A. Rick was on his first date. He was very nervous. He wasn't quite sure how to act with a girl. He hoped this was just a phase he was going through. His only hope was that he could impress his date, Lynn, with his charm. After dinner, they strolled arm in arm along the beach.
*

B. Lynn was on her first date. She was very nervous. She wasn't quite sure how to act with a boy. She hoped this was just a phase she was going through. Her only hope was that she could impress her date, Rick, with her charm. After dinner, they strolled arm in arm along the beach.
*

18. *Rick kissed Lynn in the moonlight.
*Lynn kissed Rick in the moonlight.

19. A. Jill was an active little girl. She was constantly on the go. She played from morning till night. The park was her favorite place to be. Today, she was going to play with her little friend, Andy. She met him at the corner.
*

B. Andy was an active little boy. He was constantly on the go. He played from morning till night. The park was his favorite place to be. Today, he was going to play with his little friend, Jill. He met her at the corner.
*

*Jill took Andy to the park.
*Andy took Jill to the park.

20. A. Mike was very nervous. He had a big date that night. He hoped everything would go alright. He thought this could be a very special evening. He picked his date, Patty, up at eight. He took her to an ice cream parlor.
*

B. Patty was very nervous. She had a big date that night. She hoped everything would go alright. She thought this could be a very special evening. She picked her date, Mike, up at eight. She took him to an ice cream parlor.
*

*Mike treated Patty to a sundae.
*Patty treated Mike to a sundae.

21. A. Jim loved to cook. He was always being invited to potluck suppers. His specialty was international entrees. From time to time, he would even bring his own concoctions. For this week's dinner, he and his friend, Laura, were teaming up to make burritos. He told her they would need some tabasco sauce to make the dish.
*

B. Laura loved to cook. She was always being invited to potluck suppers. Her specialty was international entrees. From time to time, she would even bring her own concoctions. For this week's dinner, she and her friend, Jim, were teaming up to make burritos. She told him they would need some tabasco sauce to make the dish.
*

21. *Jim sent Laura to the store.
*Laura sent Jim to the store.

22. A. Ellen was a poor bank employee. She barely made enough money to get by. She hoped someday she would earn enough money to live on. One day she was told that the bank would be temporarily storing five million dollars in its safe. She spoke with a co-worker, Dave, about what she had learned. The time had come to take action.
*

B. Dave was a poor bank employee. He barely made enough money to get by. He hoped someday he would earn enough money to live on. One day he was told that the bank would be temporarily storing five million dollars in its safe. He spoke with a co-worker, Ellen, about what he had learned. The time had come to take action.
*

*Ellen begged Dave for the safe's combination.
*Dave begged Ellen for the safe's combination.

23. A. Ed was not happily married. He longed to be single again. He hated the responsibility marriage brought with it. One evening, he walked down to the treacherous river that ran by his house. He came upon his wife, Sandra, at the river's edge. He mentioned to her how deadly dangerous the frothy rapids were.
*

B. Sandra was not happily married. She longed to be single again. She hated the responsibility marriage brought with it. One evening, she walked down to the treacherous river that ran by her house. She came upon her husband, Ed, at the river's edge. She mentioned to him how deadly dangerous the frothy rapids were.
*

*Sandra pushed Ed in the river.
*Ed pushed Sandra in the river.

24. A. Tom was the anchorman of the Channel 5 evening news. He tried to report the news as neutrally as possible. This year he had been nominated for the "Distinguished Newscaster" award. He arrived at the awards dinner early. At the bar, he ran into his main competitor, Alice, of the Channel 7 news. He told her he didn't think he stood a chance of winning.
*

B. Alice was the anchorwoman of the Channel 5 evening news. She tried to report the news as neutrally as possible. This year she had been nominated for the "Distinguished Newscaster" award. She arrived at the awards dinner early. At the bar, she ran into her main competitor, Tom, of the Channel 7 news. She told him she didn't think she stood a chance of winning.
*

*Tom assured Alice of the award.
*Alice assured Tom of the award.

APPENDIX E

APPENDIX E

Instructions Used in Experiment 2

"This experiment investigates how people tell stories. You have been given a test booklet containing the beginnings of 24 passages. In some cases, only the first sentence of the passage appears. In other cases, the passages have been partially developed for you. What I would like you to do is to pretend that you are the one who is actually telling or writing the passages. Then, for each passage, I would like you to write two sentences continuing the passages. The only constraint on what you write is that the first sentence you write must begin referring to one of the two people mentioned in the last sentence of the passages.

"For example, if the last sentence of the story was John and Mary went to the store., you would write two sentences developing the passage. You would begin your first sentence with John or he, or Mary or she.* You may begin your second sentence any way you like.

"Your continuations should be plausible continuations of the passages. You should not try to end the stories in your two sentences, but rather, only try to further develop the passages.

"Do you have any questions?"

---

*Approximately one half of the participants received the example in the form where John preceded Mary as possible choices for continuation. The remaining participants were read the following instructions:

"You would begin your first sentence with Mary or she, or John or he."

The rest of the instructions remained the same for the groups of participants.

APPENDIX F

APPENDIX F

Sentence Object Analysis Results in Experiment 2

Analysis	Effect	F Value		p
Overall	Thematic	F_1 (2,132) =	4.974	**
	Condition	F_2 (2, 46) =	2.661	
		min F' (2, 99) =	1.734	
	Passage x	F_1 (2,132) =	3.643	*
	Thematic	F_2 (2, 46) =	4.071	*
	Condition	min F' (2,144) =	1.923	

* Significant at $p < .05$
** Significant at $p < .01$

APPENDIX G

APPENDIX G

Stimuli of Pilot 1 and Concreteness Values

High Concrete		Low Concrete		Fillers	
Fire	6.66	Knowledge	1.56	Answer	4.49
Gold	6.76	Pleasure	2.10	Assault	4.19
Grass	6.96	Trouble	2.25	Background	4.10
Home	6.25	Honor	1.75	Citation	4.42
Meat	6.93	Joy	1.66	Deed	4.19
Material	6.10	Strength	2.90	Deluge	4.38
Money	6.63	Love	1.80	Disaster	4.12
College	6.38	Hope	1.18	Dynasty	4.14
Blood	6.82	Duty	2.32	Errand	4.21
Water	6.96	Power	2.73	Form	4.08
Skin	6.96	Truth	1.69	Graduation	4.28
Soil	6.97	Advice	2.08	Interview	4.34
Flesh	6.90	Glory	1.77	Lord	4.18
Fur	6.69	Happiness	1.94	Patent	4.05
Furniture	6.83	Pride	1.49	Preview	4.14
Prison	6.62	Fate	1.46	Reflex	4.08
Steam	6.64	Shame	1.70	Revolt	4.05
String	6.90	Freedom	1.98	Unit	4.33
Butter	6.96	Confidence	1.52	Ceremony	4.58
Wheat	7.00	Safety	2.25	Code	4.53
Cattle	6.79	Justice	2.18	Decree	4.58
Clothing	6.63	Anger	1.70	Lecture	4.50
Coffee	6.89	Virtue	1.46	Murder	4.60
Corn	6.90	Victory	2.95	Edition	4.64

APPENDIX H

APPENDIX H

Instructions Used in Pilot 1

"This experiment investigates how people complete sentences. You have been given a test booklet containing the beginnings of 72 sentences. For each beginning, you should provide a continuation which will complete the sentence. You should treat each beginning as a noun which will be the subject of your sentence.

"For example, suppose the word John appeared on your list. In this case you could write 'ate his supper' to form the complete sentence 'John ate his supper.'.

"In some cases, the words that appear could be used as some other part of speech, such as adjectives or verbs. However, please remember that you are to treat each beginning as a noun which is to be the subject of your sentence.

"When you have completed your booklet, you will be given an explanation of the experiment. Do you have any questions?"

APPENDIX I

APPENDIX I

Instructions Used in Pilot 2

"This experiment investigates how people continue sentences. In the experiment, you will be shown 72 slides with nouns printed on them. You should interpret what is printed on the slides as the subject of a sentence. Your task will be to generate a continuation which will make a good, complete sentence.

"For example, if the words A star appeared on the screen, you could continue with shone brightly last night. This would produce the complete sentence 'A star shone brightly last night.'.

"Do not begin your continuations by repeating the word or words on the slide. Rather, only say the words that are part of your continuations. As soon as the sentence subject appears, you may begin your continuations. You should do this for each of the 72 sentence subjects.

"In doing the experiment, there are several things to keep in mind. First, the words that appear are to be treated as the subjects of your continuations and are nouns. You should not produce continuations which treat the words as some other parts of speech. For example, suppose the word Praise was presented. The continuation is heaped upon successful people for their accomplishments would be appropriate, for Praise is being treated as a noun in the sentence 'Praise is heaped upon successful people for their accomplishments.'. However, the continuation the Lord which produces the sentence 'Praise the Lord' would be inappropriate for Praise is being used as a verb. Similarly, if the words The chimney were presented, the continuation sweeper was covered with soot would be inappropriate, for in the sentence 'The chimney sweeper was covered with soot.', chimney is being used as an adjective.

"Second, please refrain from producing stock phrases or proverbs. If the words A stitch appeared, the continuation in time saves nine would be inappropriate, for 'A stitch in time saves nine.' is a proverb.

"Third, please be sure to generate continuations which when paired with the words on the slides, form complete sentences.

Finally, please try not to make random noises or move the microphone around unnecessarily; the equipment is sensitive to noise and will produce error in the data collection.

"Now, as a reminder, let's review the procedure. When the slide appears, you are to generate a sentence continuation. Do not begin your response by repeating the word or words on the slide. As soon as the slide appears, you may begin your response.

"We will begin the experiment with 12 practice trials to familiarize you with the procedure. Do you have any questions?"

APPENDIX J

APPENDIX J

Stimulus Materials Used in Experiment 3

Thematized Contexts: Abstract Words

1. Glory

   Throughout history, glory has accompanied success. In ancient Rome, glory was heaped upon successful warriors. Making a warrior a god was one expression of glory. Glory could be showered upon a warrior throughout eternity.

2. Happiness

   Happiness is never the product of selfish behavior. Happiness only comes when we give of ourselves. We work towards happiness with other people. As we make others happy, happiness will be returned to us.

3. Safety

   Safety is the chief concern of highway planners. Well-lit roads and visible signs maximize safety. The responsibility for safety is not wholly the planner's. Safety can only be guaranteed by careful driving.

4. Trouble

   Trouble is experienced by all at one time or another. Sometimes, trouble arises for no apparent reason. Trouble of this sort can be frustrating. Trouble cannot be blamed on any one person or thing.

5. Advice

   Parents always give advice to children. Advice usually becomes a sore point between them. Parents offer advice for their children's welfare. Advice is ignored by children who know better than their parents.

Thematized Contexts: Abstract Words

6. Pride

Pride is the root of all sin. Pride limits our range of awareness. Pride can make us overly interested in ourselves. Pride may blind us to the needs of others.

7. Joy

Joy comes with being a loving parent. All parents experience joy as their children grow. Seeing a baby's first step always brings joy to a mother's heart. Fathers feel joy when their baby says 'Daddy' for the first time.

8. Knowledge

Knowledge comes from our experiences. Knowledge is a precious gift we give ourselves. For knowledge is one possession no one can deprive us of. Knowledge gained from our lives stays with us forever.

9. Justice

All legal systems attempt to administer justice. Justice is founded in truth and evidence. Justice ensures that wrong-doers are punished. Justice guards the innocent from being mistreated.

10. Strength

Strength is bodily power. Months of workouts are needed to develop strength. To reach peak strength, one's diet must be regulated, too. To maintain strength, one must exercise daily.

11. Pleasure

Pleasure is frowned upon in some religions. Pleasure is viewed as being the work of the devil. Pleasure may be a temptation. Pleasure may lead one away from the straight and narrow path.

Thematized Contexts: Abstract Words

12. Hope

Hope is a sign of optimism. Though sometimes difficult to find, hope is a blessing. In difficult times, hope keeps us going. Hope gives us something to strive for and believe in.

13. Fate

Fate was a great concern of the Puritans. They believed that fate had unpleasant things ahead for man. Fate demanded retribution for man's evil ways. For the Puritans, fate could only be avoided by prayer.

14. Shame

Shame is a humbling human emotion. People feel shame when feeling guilty about their actions. Shame arises when a person has wronged himself or another. Shame reminds people of what is morally right.

15. Freedom

American revolutionaries fought for freedom. Many first colonists had not enjoyed freedom in England. They sailed to the colonies seeking freedom. Freedom was repeatedly denied to the colonists.

16. Victory

Victory is important to all competitors. Victory provides the incentive to continue improving oneself. With victory comes the knowledge that the winner was the best. Victory gives the winner a growing sense of confidence.

17. Virtue

A sign of a good strict life is virtue. Virtue depends on moral decency. Virtue can only be attained if one knows right from wrong. Virtue entails doing what is right even when it is difficult.

Thematized Contexts: Abstract Words

18. Truth

Truth is sought in all courtrooms. Truth, in fact, is fundamental to the legal process. Truth is a necessity if justice is desired. If truth prevails in court, a fair trial is guaranteed.

Thematized Contexts: Concrete Words

1. Home

Home is a place of peace and security. Home provides a shelter from the cold cruel world. Home is filled with love for the family. Home is one place where we are free to be ourselves.

2. Skin

Skin is the external part of the body. Skin serves an important function. Skin protects all the internal organs. Skin prevents germs from directly attacking the internal organs.

3. Grass

Grass is a green plant. Like other plants, grass absorbs sunshine. With solar energy, grass makes the food it needs to live. Grass is a self-sustaining member of the food chain.

4. Blood

Blood is a bodily fluid which sustains life. Blood circulates throughout our bodies. Blood carries to the internal organs essential materials. Body cells receive needed oxygen from blood.

5. Fur

Fur is the hairy covering of an animal. Fur protects animals from the elements. In winter, fur keeps animals warm. Fur insulates animals from the snow and wind.

Thematized Contexts: Concrete Words

6. Meat

Meat is a vital source of nourishment. Meat contains needed vitamins and proteins. Meat helps maintain our strength and health. Meat builds up our resistance to disease.

7. Money

Money is an economic medium of exchange. Today, money appears as coins or paper bills. Indian money often took the form of beads, or wampum. Regardless of its form, money had always provided buying power.

8. Water

Water is essential to all forms of life. Water provides living things with nutrients for growth. Water also aids in maintaining a steady cellular activity level. Water contains atoms which are used in normal bodily processes.

9. Cattle

Cattle were an important part of the Old West. Cattle were valuable pieces of property. Cattle barons owned huge ranches on which cattle grazed. Each fall, cattle were rounded up by cowboys.

10. Soil

Green plants grow in an earthen mixture called soil. Soil contains certain nutrients necessary to plant life. When combined with water, soil supports plant life. Soil itself is not a living organic material.

11. Wheat

The staple grain of western civilization is wheat. Wheat may be refined into flour. Wheat then is the basic ingredient in all bread products. Carbohydrates essential to our diets are found in wheat.

Thematized Contexts: Concrete Words

12. Butter

A well-liked dairy product is butter. Butter is a fatty component of cow's milk. As such, butter is very high in cholesterol. Butter should be avoided by those with high blood pressure.

13. String

String is very thin cord. String is made from jute fibers. String is not quite as coarse as twine. String is thicker and stronger than thread.

14. Steam

Steam is just one source of energy. Steam can be harnessed and changed into electricity. Steam, however, has limitations as a major energy source. Steam can only be produced at very high temperatures.

15. Flesh

Flesh covers the bones of the body. Flesh includes the body muscles but not fat. Through exercising, flesh can be made firm. Flesh becomes sleeker as fat cells melt.

16. Clothing

Clothing is a man-made covering for the body. In hostile environments clothing protects the body from harm. Clothing provides warmth in cold weather. Clothing guards toes and fingers against frostbite.

17. Coffee

Coffee is a beverage containing caffeine. Coffee is often drunk first thing in the morning. Coffee is also drunk when one must stay up late studying. Coffee aids in helping people stay awake.

Thematized Contexts: Concrete Words

18. Gold

Gold was discovered in California in 1849. Gold was thought to be everywhere in the mountains. Gold was searched for in mines and rivers. Prospectors dedicated their lives to the search for gold.

Thematized Contexts: Abstract Fillers

1. A lord

Honor was the guiding virtue of medieval knights. A knight could not live without honor. It was a knight's duty to bring honor to the homeland. Honor was to be seen in a knight's every action.

2. An errand

All individuals are bound by moral duty. Duty involves always being true to oneself. Personal duty must be tempered with duty for others. Duty entails helping others whose needs are great.

3. An assault

Anger is a sign of frustration. Short bursts of anger are good for people. Releasing anger can clear the air. Keeping anger inside can be destructive.

4. A citation

Confidence is the key to success. If one has confidence, one can tackle the world. Confidence is particularly important to businessmen. Without confidence, business promotions cannot be expected.

5. A form

The only solution to the world's problems is love. Love must start with the individual. The first step is love of oneself. Love entails feeling good about oneself.

Thematized Contexts: Abstract Fillers

6. A revolt

Power is a corruptive force in governments. Once nice men will do unethical things for power. People lay their standards aside when power is at stake. Power seems to distort politicians' sense of justice.

Thematized Contexts: Concrete Fillers

1. A background

Furniture can cause many problems for home decorators. Since it is used regularly, furniture must always be functional. However, its use is not furniture's sole purpose. Furniture selected should artistically decorate a given room.

2. A patent

Material can be found in New York's garment district. Material of many varieties is seen there. Material is wrapped on bolts and shown to customers. All day long, merchants buy and sell material.

3. A lecture

College is a many-faceted experience in living. College is a place of higher learning. College gives one the chance to possess a broad education. College is a social learning experience.

4. A ceremony

Corn is a native American crop. Corn dates back to the first Thanksgiving. Indians gave corn to the white man then. The gift of corn was a sign of a good harvest.

5. An answer

Prison is a place of confinement for lawbreakers. Prison is designed to punish legal offenders. Prison, however, also hopes to reform and rehabilitate individuals. Prison can be a useful experience for first-time offenders.

Thematized Contexts: Abstract Fillers

6. A disaster

Fire destroys millions of dollars worth of property each year. Fire is usually the result of carelessness. Fire is easily sparked by discarded cigarette butts. Fire often begins with young children playing with matches.

List Contexts: Abstract Words

1. Glory

Throughout life, glory belongs to victors. In religions, glory is given to God at services. Receiving an engraved award is just one expression of glory. Glory could be showered upon a warrior throughout eternity.

2. Happiness

Happiness comes when we buy a new pet. Happiness is never seen without a big grin. We look for happiness in drugs sometimes. As we make others happy, happiness will be returned to us.

3. Safety

Safety is taught in all grammar schools today. The smoke alarm was installed to maximize safety. The girl felt relieved when she reached safety. Safety can only be guaranteed by careful driving.

4. Trouble

Trouble always results when little boys and girls play together. Sometimes, trouble comes in packages of three. Trouble can result from overdrawing one's account. Trouble cannot be blamed on any one person or thing.

List Contexts: Abstract Words

5. Advice

Quacks offer advice to unsuspecting patients. Advice from lawyers is expensive these days. Bachelors often give advice on chasing women. Advice is ignored by children who know better than their parents.

6. Pride

Pride is important to a business executive. Pride is a learned human emotion. Pride is a virtue some people are lacking. Pride may blind us to the needs of others.

7. Joy

Joy comes with the opening of fancy birthday presents. The robbers felt joy when they eluded the police. Bagging a deer on his own brought joy to the hunter. Fathers feel joy when their baby says 'Daddy' for the first time.

8. Knowledge

Knowledge comes in many forms. Knowledge is often associated with universities and teachers. For knowledge to be acquired, at least minimal attention is required. Knowledge gained through our lives stays with us forever.

9. Justice

All tyrants ignore the virtues of justice. Justice is impossible in some foreign courts. Justice is defiled by breaking laws. Justice guards the innocent from being mistreated.

10. Strength

Strength is a trait. Bulging muscles are just one measure of strength. To exert strength, one can push against a stuck door. To maintain strength, one must exercise daily.

List Contexts: Abstract Words

11. Pleasure

Pleasure is expressed by big broad smiles. Pleasure is sought by those people having a difficult time. Pleasure may be something new. Pleasure may lead one away from the straight and narrow path.

12. Hope

Hope is a virtue in Catholicism. Though quite similar, hope and faith are still different. On good days, hope is often forgotten. Hope gives us something to strive for and believe in.

13. Fate

Fate was a concern of the Greek oracles. Some people believe that fate is a totally random event. Fate demanded retribution for Hitler's evil ways. For the Puritans, fate could only be avoided by prayer.

14. Shame

Shame is a behavior control mechanism. Violent revolutionaries bring shame to the nations they represent. Shame only arises when people are caught in the act. Shame reminds people of what is morally right.

15. Freedom

People have died for freedom. Many people have never enjoyed freedom in South America. Sailors sail the high seas seeking freedom. Freedom was repeatedly denied to the colonists.

16. Victory

Victory is important to poor losers. Victory provides the basis for competing again. With victory comes all the added excitement of receiving a trophy. Victory gives the winner a growing sense of confidence.

List Contexts: Abstract Words

17. Virtue

The mother of Christ is a model of virtue. Virtue is a personal matter. Virtue can rarely be found in the lives of today's Americans. Virtue entails doing what is right even when difficult.

18. Truth

Truth is appreciated in all friendships. Truth, in fact, is rarely told by chronic liars. Truth is a necessity in all newspaper reporting. If truth prevails in court, a fair trial is guaranteed.

List Contexts: Concrete Words

1. Home

Home provides me with a waterproof roof over my head. Home is where I wish I were right now. Home is a place where a family gathers. Home is one place where we are free to be ourselves.

2. Skin

Skin can be damaged from too much sun. Skin comes in different colors. Skin is very attractive to mosquitos. Skin prevents germs from directly attacking the internal organs.

3. Grass

Grass can make people sneeze. Like other plants, grass is green. With lawn mowers, grass can be cut to any desired length. Grass is a self-sustaining member of the food chain.

4. Blood

Blood turns bright red when exposed to air. Blood comes in four types. Blood oozes out when we have cut ourselves. Body cells receive needed oxygen from blood.

List Contexts: Concrete Words

5. Fur

Fur often collects burrs and other irksome things. Fur is hunted by Canadian traders. In summer, fur isn't very expensive. Fur insulates animals from the snow and wind.

6. Meat

Meat is a delicacy to primitive man. Meat comes from animals, not plants. Meat is often served with red wine. Meat builds up our resistance to disease.

7. Money

Money often causes people to behave ruthlessly. Often, money is found in an old matress. To increase its value, money is often invested in property. Regardless of its form, money has always provided buying power.

8. Water

Water can be purchased in bottles at stores. Water covers more than half the earth. Water naturally occurs in three states: solid, liquid or gas. Water contains atoms which are used in normal bodily processes.

9. Cattle

Cattle are the primary source of meat in America. Cattle are usually slaughtered in stockyards. In 1976, cattle in Michigan were affected by PBB. Each fall, cattle were rounded up by cowboys.

10. Soil

Green plants grow in an earthen mixture called soil. Soil turns to mud when it rains hard. When by the beach, soil is usually sandy. Soil itself is not a living organic material.

List Contexts: Concrete Words

11. Wheat

In the far east, wheat is not eaten. Wheat is grown in the plain states. Wheat may be harvested in the spring or fall. Carbohydrates essential to our diets are found in wheat.

12. Butter

A well-liked toast spread is butter. Butter can easily leave grease stains on paper. Sometimes, butter is used as a good burn soother. Butter should be avoided by those with high blood pressure.

13. String

String is found in hardware stores. String is used to pull out teeth. String should be stored in a handy place. String is thicker and stronger than thread.

14. Steam

Steam fiercely whistled out of the kettle. Steam was a source of energy which powered locomotives. Steam carrying radioactive particles leaked from the nuclear plant. Steam can only be produced at very high temperatures.

15. Flesh

Flesh can be bruised if not careful. Flesh does not include any body fluids or bones. In church, flesh should not be exposed. Flesh becomes sleeker as fat cells melt.

16. Clothing

Clothing is not worn after entering a nudist colony. In all public meeting places clothing must be worn. Clothing is purchased in a store. Clothing guards toes and fingers against frostbite.

List Contexts: Concrete Words

17. Coffee comes from a roasted bean. Coffee has been known to turn people's teeth brown. Coffee may be drunk black or served with cream and sugar. Coffee aids in helping people stay awake.

18. Gold

Gold is used to fill some cavities. Gold was used to honor the late King Tut. Gold was a metal of interest to alchemists. Prospectors dedicated their lives to the search for gold.

List Contexts: Abstract Fillers

1. A lord

Honor is usually felt by award winners. It is a child's duty to pay honor to his parents. Some conceited people cannot live without honor. Honor was to be seen in a knight's every action.

2. An errand

All GI's are bound by military duty. Duty refers to being on the job. Personal duty is expected when one makes a promise. Duty entails helping others whose needs are great.

3. An assault

Anger is a waste of energy. Bursts of anger are signs of hot tempers. Building anger is particular to humans. Keeping anger inside can be destructive.

4. A citation

Confidence is a trait of stars. If a baby has confidence, a baby can walk. Confidence is missing among wall flowers. Without confidence, business promotions cannot be expected.

List Contexts: Abstract Fillers

5. A form

The marital bond between men and women is love. Love comes to mind in springtime. A momentous occasion is falling in love. Love entails feeling good about oneself.

6. A revolt

Power is domination over less fortunate people. A large body frame seems to imply great power. People become very excited when power is within their grasp. Power seems to distort politicians' sense of justice.

List Contexts: Concrete Fillers

1. A background

Furniture comes in a wide variety of sizes. Furniture is often moved from place to place in rooms. Furniture can be bought in most department stores. Furniture selected should artistically decorate a given room.

2. A patent

Material can be cut or sewn into any shape. Material may be carried in department stores. Material may shrink if dried in a clothes dryer. All day long, merchants buy and sell material.

3. A lecture

College is much too difficult for some. College is the goal of many students. College is becoming ever more important for later career decisions. College is a social learning experience.

4. A ceremony

Corn tastes especially good when roasted. Corn is the ear of a stalk. Consumers buy corn at the market in season. The gift of corn was a sign of a good harvest.

List Contexts: Concrete Fillers

5. An answer

Prison is not usually missed by former inmates. Prison is a deserved punishment for lawbreakers. Prison is a sentence usually reserved for serious felony offenses. Prison can be a useful experience for first-time offenders.

6. A disaster

Fire was first discovered by rubbing two sticks together. Fire provides heat and light in winter. Fire has destroyed much of South Bronx. Fire is often the result of children playing with matches.

APPENDIX K

APPENDIX K

Thematic Context Instructions Used in Experiment 3

"In this experiment, we are investigating how long it takes people to continue sentences.

"In the experiment, you will be presented with pairs of slides. The first slide of each pair is a related context slide. This slide will either have one or four sentences printed on it. The sentences will provide you with related information about some topic. When you are through reading this slide, you should press the button in front of you. (Please let go of the button as soon as you press it, as the button advances the slide projector. Holding it for too long will make the projector advance too far.) The next slide will then be presented. This slide will have a single word printed on it.

"Your task in this experiment is to generate a continuation to the word to form a good, complete sentence. The word is to be treated as a noun and should be used as the first word or subject of your continuation. However, you should not begin your continuation by repeating the word. Rather, only say the words which are part of your continuations.

"Your continuations should not just be random continuations. Rather, they should continue, that is, build upon the information which is presented in the context slide. Your goal should be to produce a sentence which is consistent with all the information previously presented.

"For example, suppose the word Stars followed the context sentence 'Stars light the heavens.'. An appropriate continuation in this case would be guided ancient mariners with their light. Notice that the noun subject of the sentence was Stars, but that I did not repeat it in my own continuation.

"The single words which you continue will not always be contained in the preceding context. Therefore, please do not think about your continuations while you are reading; wait until the word has been presented.

"We will begin the experiment with eight practice trials to familiarize you with the procedure. Remember: The first slide you see is a related context slide. When you are through

reading the slide, press the button in front of you. The next slide will then be presented. Remember, you should not say the word on the slide, only your continuation. Finally, remember that your continuation should form a complete sentence developing the prior context.

"Do you have any questions?"

APPENDIX L

APPENDIX L

List Context Instructions Used in Experiment 3

"In this experiment, we are investigating how long it takes people to continue sentences.

"In the experiment, you will be presented with pairs of slides. The first slide of each pair is a context slide. This slide will either have a short or long list of sentences printed on it. The list of sentences just provides you with examples of the kinds of sentences you might produce in this experiment. When you are through reading this slide, you should press the button in front of you. Please release it right away so that only one slide advances at a time. The second slide will then be presented. This slide will have a single word printed on it.

"Your task in this experiment is to generate a continuation to the word to form a good, complete sentence. This word is to be used as a noun and as the first word or subject of your continuation. However, you should not begin your continuations by repeating the word. Rather, only say the words which are part of your continuation. Your continuations should just be another sentence added to the context list sentence or sentences. Please do not relate your sentence to any of the sentences that came before.

"For example, suppose the word Stars followed the context sentence 'Stars light the heavens.'. An appropriate continuation in this case would be are often wished upon. Notice that the subject of the sentence is Stars and is a noun, but that I did not repeat it in my continuation.

"You should not be thinking about your continuation as you read the context slide. It will not always be the case that the word to be continued has appeared in the context list sentences.

"We will begin the experiment with eight practice trials to familiarize you with the procedure. Remember: The first slide you see is a list context slide. When you are through reading this slide, press the button in front of you. The next slide will then be presented. Your task is to generate a continuation to the word. Remember, you should not say the word on the slide, only

your continuation. Finally, remember that your continuations should form a complete sentence to be added to the list.

"Do you have any questions?"

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