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The Moses Illusion in reading comprehension

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THE MOSES ILLUSION IN READING COMPREHENSION

BY

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DISSERTATION

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DEDICATION

This dissertation is dedicated in memory of Captain Jon D. Cook.

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ABSTRACT

THE MOSES ILLUSION IN READING COMPREHENSION

by

Anne E. Cook

University of New Hampshire, May, 2000

The Moses Illusion refers to participants' failure to detect distortions in questions such as, "How many animals of each kind did Moses take on the Ark?" although it was actually Noah's Ark. The Illusion is thought to depend on the semantic relation between the distorted term (e.g., Moses) and the correct term (e.g., Noah). The Illusion literature has been limited mostly to investigations of semantic memory and to a single-question format. The experiments reported in this dissertation examined whether the Illusion extends to longer passages of text and whether it is influenced by the presence of the correct term in the episodic representation of the text.

Passages in which an anaphor was either correct, incorrect but highly related, or incorrect but low-related with respect to its antecedent were presented. Experiments 1a and 1b were rating and priming studies that demonstrated that the incorrect - high overlap antecedent shared higher featural overlap with the correct antecedent than the incorrect - low overlap antecedent did. In Experiments 2a and 2b, passages focused on the similarities between the incorrect - high overlap and correct antecedents. In Experiment 3, the passages focused on the dissimilarities between the incorrect -high overlap and correct antecedents. In Experiment 4, syntactic focus was used to highlight the incorrect - high

overlap antecedent. In Experiments 2a - 4, reading time differences demonstrated that readers failed to detect the distortion more often when the distorted anaphor and its antecedent shared high featural overlap. Thus, the Moses Illusion does extend to reading comprehension, and more specifically, to antecedent retrieval. In addition, semantic information about the relation between the antecedent and anaphor appeared to be more available during integration than episodic information about the antecedent. These results are discussed in terms of the memory-based view of text processing.

INTRODUCTION

When asked the question, "How many animals of each kind did Moses take on the Ark?", most people will respond, "Two," even though they know that the Biblical Ark was sailed by Noah and not Moses. That is, individuals will often fail to detect the obvious distortion in the question, even in the presence of the knowledge of what the question should be. Erickson and Mattson (1981) referred to this phenomenon as the Moses Illusion. In order to answer the question, participants must somehow map the information from the question onto the relevant knowledge in long-term memory, resulting in the reactivation of the correct answer, "two." In the Moses Illusion, this mapping process appears to proceed flawlessly – that is, participants generally answer the question quickly and with confidence of the accuracy, when in fact they have missed an important inconsistency. The goal of this dissertation is to examine this mapping process and the factors that influence it in discourse processing. In order to do so, some assumptions about the reactivation and mapping processes that occur during reading must first be made.

The reactivation and mapping processes in reading are geared toward allowing the reader to map recently read information onto information from earlier in the text, as well as general world knowledge. That is, reactivation and mapping are geared towards allowing the reader to maintain both local and global coherence. Local coherence refers to connecting information that is currently being processed with the immediately preceding

text, or the concepts currently active in working memory. Global coherence refers to making connections between information that is currently being processed and relevant concepts from the text that are no longer active in memory. One way that researchers have examined how readers maintain local and global coherence is by presenting inconsistencies in texts, in which the contradictory information is separated by several sentences of text (e.g., Albrecht & O'Brien, 1993; Cook, Halleran, & O'Brien, 1998; Myers, O'Brien, Albrecht, & Mason, 1994; O'Brien & Albrecht, 1992; O'Brien, Rizzella, Albrecht, & Halleran, 1998). For example, Albrecht and O'Brien (1993) found that when readers were presented with a passage in which the protagonist was described early on as a vegetarian and a health nut, comprehension difficulty occurred when the passage later stated that the character ordered a cheeseburger and fries. Proponents of the memory-based view of text processing (e.g., Gerrig & McKoon, 1998; McKoon, Gerrig, & Greene, 1996; Myers & O'Brien, 1998; O'Brien, 1995; O'Brien & Myers, 1999) have suggested that a signal emanates from the conceptual features of the information currently held in working memory (e.g., "ordered a cheeseburger and fries"). This signal activates concepts already in memory that share many features in common (e.g., vegetarian). It is when the reader attempts to integrate the reactivated information (e.g., vegetarian) with the current contents of working memory (e.g., ordered a cheeseburger and fries) that comprehension difficulty occurs.

The primary mechanism for reactivation employed by the memory-based view of text processing is the resonance process described by Myers & O'Brien (1998; O'Brien, 1995; O'Brien & Myers, 1999). According to Myers and O'Brien's resonance model, the

contents of active memory continuously send a signal to all of long-term memory in parallel, including both inactive portions of the episodic representation of the text, as well as general world knowledge. This reactivation of information is accomplished through a fast-acting passive resonance process similar to those described in other bottom-up models of memory retrieval (e.g., Gillund & Shiffrin, 1984; Hintzman, 1986; Kintsch, 1988; Ratcliff, 1978; Ratcliff & McKoon, 1988). The intensity of the signal can be mediated to the extent to which the reader attends to or focuses on specific aspects of the contents of active memory, but the signal is unrestricted and autonomous. Any information that shares features in common will resonate in response (cf. Ratcliff, 1978) as a function of the degree of the match with the contents of working memory. Concepts in memory that resonate in response to the signal will in turn send a signal to other concepts in memory. As this cyclical process continues, activation builds on some concepts and decays on others. When the process stabilizes, the most active elements become a part of working memory. There is no specific constraint on the degree of match between episodic and semantic features and the contents of working memory. However, the general principle is that those concepts that resonate the most are the most likely to be reactivated in working memory.

An important characteristic of the resonance process is that it is "dumb" – information is reactivated only on the basis of the features it contains, and not on whether it will help or hinder processing. The resonance process is only a mechanism for reactivation. There is no "active" search component. Also, the model is not designed to address how reactivated information is integrated with the current contents of working

memory. Reconsider the example described earlier. When readers encode the sentence, "Mary ordered a cheeseburger and fries," a signal is automatically sent to all of long-term memory. Information about Mary's eating habits will resonate in response, including the fact that Mary is a vegetarian (see Myers et al., 1994, for direct evidence for reactivation of this concept). When the information about Mary being a vegetarian is integrated with the contents of working memory (i.e., that she had ordered meat), readers experienced comprehension difficulty. Myers and O'Brien (1998) raised possibilities for what might occur when the resonance process either fails or results in the reactivation of contradictory information; readers may refocus on the contents of working memory and reinitiate the resonance process, they may engage in problem solving activities, or they may go on to the next sentence. These types of choices are made based on the readers' standards of coherence (e.g., van den Broek, Risden, & Husebye-Hartman, 1995). Either of the first two options (i.e., refocusing or problem solving) should result in longer reading times, consistent with findings by O'Brien and his colleagues (Albrecht & O'Brien, 1993; Cook et al., 1998; Myers et al., 1994; O'Brien & Albrecht, 1992; O'Brien et al., 1998) – reading times on the sentence, "Mary ordered a cheeseburger and fries," were longer when she had previously been described as a vegetarian than in a control condition.

One attempt to model the latter integration phase of comprehension is illustrated in Kintsch's (1988) construction-integration (C-I) model. Kintsch proposed that the first (construction) phase consists of the development of an associative network of concepts from the text and general world knowledge. This occurs through four steps: forming the concepts and propositions directly from the linguistic input; elaborating this information

with its closest associates from semantic memory; inferring additional propositions; and assigning connection strengths to all pairs of elements constructed. The construction phase is thought to be passive and automatic. Kintsch argued that this process may result in the construction of a representation that includes relevant, irrelevant, and even contradictory information (such as Mary being a vegetarian and ordering a cheeseburger and fries). As he stated, "Instead of precise inference rules, sloppy ones are used, resulting in an incoherent, potentially contradictory output" and, "The integration phase is the price the model pays for the necessary flexibility in the construction process" (p. 164). During the second (integration) phase, activation spreads throughout the network developed in the construction phase until the system stabilizes. Kintsch argued that stabilization usually occurs quickly, but if it does not, new constructions can be added through problem-solving activities, and the integration process starts over again. The C-I model shares many similarities with the resonance model, particularly the assumption that construction and integration phases are both continuous and automatic and that a fast-acting pattern-matching mechanism can serve to explain most of comprehension (see also Sanford, 1990). It is only when this pattern-matching process fails that more active or controlled processes are necessary. Both the C-I model and the resonance model are consistent with the memory-based view, in which comprehension is viewed as a mostly passive process on the part of the reader.

Bottom-up models like the resonance model and Kintsch's (1988) C-I model can also be used to explain effects in which readers FAIL to detect inconsistencies over a large proportion of trials, such as in the Moses Illusion. The Moses Illusion is centered around

the idea that distorted concepts in questions grow increasingly difficult to detect as the number of features that they share with undistorted concepts increases. Many other instances in which participants disproportionately fail to detect inconsistencies also rest on the semantic relation between the correct and incorrect information. Chapters Two and Three will describe several instances of failures to detect inconsistencies and explain how assumptions such as those underlying the memory-based view of text processing can account for these effects. Chapter Two will focus on the Moses Illusion, and Chapter Three will describe a variety of other failures to notice inconsistencies.

The experiments in this dissertation extend the Moses Illusion to reading comprehension, and more specifically, to the processes involved in antecedent retrieval. As discussed in Chapter Four, the relation between an anaphor and its antecedent is an important factor in reinstatement. The experiments presented in Chapter Five manipulate both the episodic and semantic relations between an antecedent and its distorted anaphor to determine the effects of distorted information on antecedent reinstatement. The resonance process has been found to successfully explain many effects in antecedent retrieval (see Myers & O'Brien, 1998; O'Brien & Myers, 1999 for explanations), and it will be applied to the experiments presented in this dissertation.

CHAPTER I

THE MOSES ILLUSION

As described earlier, the Moses Illusion refers to participants' failure to detect the inconsistency in questions such as, "How many animals of each kind did Moses take on the Ark?", in spite of the knowledge that it was actually Noah that sailed the Ark. Erickson and Mattson (1981) asked participants to read aloud questions similar to the example above and then respond within a limited amount of time. They found that participants failed to detect distortions in such questions as much as 81% of the time. (See Table 1 for more examples of items used to induce the Moses Illusion.)

Erickson and Mattson (1981) argued that the Moses Illusion might be due to the fact that the focus of each of the questions used in the task was on something other than the incorrect name (e.g., *How many animals*...). They changed the same questions into statements (e.g., Moses/Noah took two animals of each kind on the Ark) and asked participants to indicate whether the statements were true, false, or distorted. Again, participants often failed to detect distortions, on as many as 41% of the trials. Had the focusing effects of the questions been solely responsible for producing the effect, any differences between the distorted and control conditions (e.g., Moses and Noah, respectively) should have been eliminated, but they were not. These findings indicated that the Moses Illusion is not due exclusively to the effect of the questions focusing on

Table 1.

Additional Examples of Items Used to Induce the Moses Illusion*

What kind of tree did *Lincoln* chop down? (cherry)
Who found the glass slipper left at the ball by *Snow White*? (prince)
On what holiday do children go door to door, dressed in costume, *giving out* candy? (Halloween)
What statue given to us by *England* symbolizes freedom to immigrants arriving in New York Harbor? (Statue of Liberty)
What hero does Clark Kent become when he changes in a *toll* booth?
What small animal hides the acorns that fall from *elm* trees for his winter food supply? (squirrel)
Who said, "Ask not what *you can do for your country*, but what *your country can do for you*?" (Kennedy)
When did the *Germans* attack Pearl Harbor? (Dec. 7, 1941)
In which state did General *Grant* surrender to bring an end to the Civil War? (Virginia)

*Similar distorted names are italicized, and answers appear in parentheses.

information other than the distorted information (i.e., "Moses" may have been substituted for "Noah").

Erickson and Mattson (1981) next examined the relation between the inconsistent name and the correct name in the Illusion. They proposed two hypotheses: the phonological similarity hypothesis and the semantic similarity hypothesis. According to the phonological similarity hypothesis, the more phonologically similar the incorrect name is to the correct name, the more likely it is that the Illusion will occur. Parallel to this was the semantic similarity hypothesis, under which the more semantically similar the incorrect name is to the correct name, the more likely it is that the Illusion will occur. Erickson and Mattson compared items such as, "How many animals of each kind did Nixon take on the Ark?" (nigh phonological similarity but low semantic similarity) with, "How many animals of each kind did Moses take on the Ark?" (low phonological similarity but high semantic similarity). They found evidence supporting the semantic similarity hypothesis - the Illusion occurred when participants read the question about Moses but not when the question was about Nixon, because "Moses" is presumably more semantically related to the correct term "Noah" than "Nixon" is.

van Oostendorp and de Mul (1990) extended Erickson and Mattson's (1981) work in two ways. First, Erickson and Mattson's findings were based on only four items. In addition, those items did not systematically examine the effects of semantic relatedness. van Oostendorp and de Mul had participants generate the features of the correct name and either the high-related incorrect name (e.g., Noah and Moses, respectively) or the correct name and the low-related incorrect name (e.g., Noah and Nixon, respectively) and

calculated an overlap score for each of 25 correct-incorrect name pairs. This procedure enabled them to show that the high-related incorrect name (e.g., Moses) and the correct name shared a greater degree of semantic overlap than the low-related incorrect name (e.g., Nixon) and the correct name, or that Moses was more related to Noah than Nixon was. This provided additional support for Erickson and Mattson's claim that the more semantically related the distorted and correct names were (e.g., Moses and Noah, respectively), the more likely subjects were to fall for the illusion.

A second way in which van Oostendorp and de Mul (1990) extended the work of Erickson and Mattson (1981) was by collecting response times for items. They argued that not only would more illusions occur for the high-related incorrect items, but (incorrect) "true" judgment times for those statements should also be faster than in the low-related incorrect condition. When participants did detect the distortion, however, van Oostendorp and de Mul argued that "false" responses should take longer to make in the high-related incorrect condition than in the low-related incorrect condition. They found evidence to support both of these hypotheses. Thus, it appears that semantic relatedness not only has an effect on whether participants will detect distortions in a statement or question, but it will also affect how quickly they are able to respond to the truth of that statement.

van Oostendorp and Kok (1990) further examined the role of the strength of relations between concepts in the Moses Illusion. While previous work on the illusion made use of relations that were presumed to exist pre-experimentally in respondents' semantic memories, van Oostendorp and Kok argued that these relations could also be induced experimentally. They presented participants with a paired associates learning task,

in which pairs consisted of the correct name (e.g., Noah) for subsequent Illusion items and a high-related incorrect name or a low-related incorrect name (e.g., Moses or Nixon, respectively). Following this part of the experiment, participants were presented with the Illusion items and asked to respond to each item with "true," "false," or "I don't know." Consistent with previous findings, they found that more Illusions were made when the correct name was replaced with a high-related incorrect name. More important, they found that strengthening the relation between the incorrect name (either high- or low-related) and the correct name experimentally through a paired associates learning task led to a higher frequency of Illusions. The fact that experimental manipulations can affect Moses Illusion detection rates suggests that the Moses Illusion is influenced by both semantic and episodic factors. Further discussion of the role of episodic knowledge in the Illusion will be postponed until later in this dissertation.

An additional factor that affects participants' susceptibility to the Moses Illusion is the amount of information known about the term to be replaced. Reder and Cleeremans (1990) translated items that Bredart and Modolo (1988) used with Belgian participants. For example, for Bredart and Modolo's item, "It was Magellan who discovered America at the end of the 15th century," Reder and Cleeremans expressed doubt that American participants would false alarm – that is, answer the question without detecting the distorted term – due to the fact that most Americans probably know a great deal about Columbus discovering America in 1492. This led Reder and Cleeremans to suggest that perhaps if too much information was known about a replaced term or name, then the Illusion would not work. In order to test this hypothesis, they had a group of participants

study a list of facts (e.g., Noah took two animals of each kind on the Ark.) before answering Illusion questions. Through this method, half of the subsequent Illusion items were primed by the correct information. While participants were more accurate and faster in their responses to the questions after having previously studied the answers, priming the questions did not increase sensitivity to distortions (see also Reder & Kusbit, 1991).

Kamas, Reder, and Ayers (1996; see also Bredart & Docquier, 1989) extended the work of Reder and Cleeremans (1990) and Reder and Kusbit (1991) by exploring how sensitivity to distortions could be improved. Kamas et al. highlighted key concepts in study sentences for Illusion items by putting them in all capital letters and found that participants' ability to detect distortions in the subsequent question task was improved. However, participants were also more likely to respond that undistorted questions were distorted if they contained highlighted words. Kamas et al. argued that these improved detection rates for distorted items were due to a shift in response bias and not due to a change in sensitivity to distortions. They argued instead that detection rates improve when the question emphasizes terms that distinguish the incorrect term from the correct term. The ability to detect distortions in questions is not improved when questions emphasize the similarities between the incorrect and correct terms. However, Bredart and Modolo (1988; see also Bredart and Docquier, 1989) found that focusing on the incorrect name with cleft sentence structures (e.g., It was Moses that took two animals of each kind on the Ark.) also reduced the frequency with which participants fell for the Illusion. In the work of both Kamas et al. and Bredart and colleagues, participants' detection rates were improved, but the Illusion was never completely eliminated.

The Moses Illusion is also affected by terms in the immediately preceding question. Kamas et al. (1996) found that if a preceding question emphasized terms that distinguished the distorted and correct terms, detection rates were improved. For example, when participants were asked, "What sea did Moses part?" before answering the question about Moses and the Ark, they were more likely to detect the distortion. However, if they answered, "What religions study the story of Moses?" before answering the Illusion question, detection rates were not affected. Kamas et al. argued that the question, "What sea did Moses part?" led to the activation of information specific to Moses in memory, while the question, "What religions study the story of Moses?" did not lead to the activation of information that distinguished between Moses and Noah. They concluded that distinguishing information not even necessary for answering the Illusion questions could affect detection rates, most likely because the distinguishing information was still active in memory when the Illusion question was presented.

Reder and Kusbit (1991) investigated whether readers would be more likely to detect distortions in Illusion items if they were explicitly told that some of the items would have errors in them. They had participants either read Illusion questions literally or for gist. In the literal condition, participants were told to look for and point out any distortions in the questions. In the gist condition, participants were instructed to just answer any distorted questions as if they were not distorted. Reder and Kusbit found that it was easier for participants to ignore distortions in the gist condition than to try to detect them in the literal condition. This indicates that not only is it easy for readers to pass over distortions, but it is in fact difficult for them to try to detect distortions even when

explicitly told to do so.

Finally, van Jaarsveld, Dijkstra, and Hermans (1997) found that the Moses Illusion is also susceptible to task-specific effects. In their first experiment, van Jaarsveld et al. found that when the instructions stressed accuracy of responses, fewer Illusions resulted. The main point that may be drawn from the work of van Jaarsveld et al., however, is that the similarity effect (i.e., Moses leads to the Illusion more than Nixon does) depends on the type of task used. They found that reaction times to sentences with dissimilar distorted terms (e.g., Nixon) varied depending on whether participants were engaged in a detection task or a question-answering task. Reaction times to sentences with dissimilar distorted terms were shorter in the detection task but longer in the question answering task, when compared to sentences with similar distorted terms. They argued that in the detection task, obvious errors (dissimilar distorted terms) cause an interruption in the interpretation process, signal an error, and result in a fast response. When the distorted term is similar, however, an interruption in the interpretation process is less likely, and participants have to spend extra time checking the relations in the sentence, resulting in slower response times. In contrast, in the question answering task, similar terms do not interrupt the interpretation process, because the focus of the task is more on finding an answer to the question, so responses are faster than when the distorted term is dissimilar and there is an interruption in the interpretation process. van Jaarsveld et al. also found that the physical position of the distorted term makes a difference in the question answering task, but not in a sentence verification task. The similarity effect was only observed when the distorted term was at the beginning of the question in the question answering task, but term position

did not make a difference in the sentence verification task. Presumably, in order to make a true/false response to a statement, readers must comprehend the entire statement. However, when answering a question, the sought-after answer may often be apparent even before reaching the end of the question, so inconsistent concepts at the end of a question may only be superficially processed, if processed at all.

As illustrated above, the Moses Illusion is a very robust effect. Erickson and Mattson's (1981) findings suggest that the Illusion is not dependent on the method of presentation (e.g., read aloud or silently), and that the Illusion occurs even in the absence of time pressure. In addition, Reder and Cleeremans (1990) suggested that even when participants study the correct answers before answering Illusion questions, they still fall prey to the Illusion at alarming rates. However, the Moses Illusion is not immune to experimental manipulations. Both Reder and Kusbit (1991) and van Jaarsveld et al. (1997; see also Bredart & Docquier, 1989; Bredart & Modolo, 1988) demonstrated that changes in the content or presentation of Illusion items reduced the frequency with which participants fell for the Illusion, although the Illusion was never completely eliminated. Nevertheless, the extent to which participants fall for the Illusion can be reduced by factors such as presenting information that distinguishes between the correct and distorted terms (Kamas et al., 1996) and highlighting the distorted terms with syntactic focus (Bredart & Docquier, 1989; Bredart & Modolo, 1988).

Several explanations for the Moses Illusion have been proposed. First, Erickson and Mattson (1981) suggested that the Illusion might be a result of the context of the question influencing the lexical access process. For example, concepts such as "took,"

"animals," "how many," and "Ark" might have influenced the lexical access process, so that the appropriate term, "Noah," was accessed instead of the actual term, "Moses." As Erickson and Mattson stated, this calls for the argument that lexical access is influenced by context, an idea which has been disputed in the lexical ambiguity literature (e.g., Forster, 1979; Swinney, 1979). However, less than half of their items "uniquely constrain(ed) the inconsistent name" (p.549). Other items had absolutely no context preceding the inconsistent name, which would not only require lexical access to be constrained by context, but this process would also have to be suspended until the end of the sentence, or at least until the rest of the context is read. This runs contrary to the idea that lexical access is a fast and automatic process (e.g., Forster, 1979). Another possible explanation for the Moses Illusion raised by Erickson and Mattson was that the incorrect terms were not properly encoded when the questions were read silently. However, they had participants read the questions aloud, ensuring that the incorrect names were encoded, and found the same effects.

Grice's (1975) Cooperative Principle has also been offered as a possible explanation for the Moses Illusion. The Cooperative Principle states that conversational exchanges are cooperative efforts and that each participant recognizes those efforts and works toward them. When applied to the Moses Illusion, the respondent views the exchange as a cooperative effort and may notice but still ignore any distortions in the question. Thus, the respondent chooses to cooperate and answer the question as if it were undistorted. However, this explanation has been ruled out in favor of a more activation-based interpretation, mainly because it implies that the distortion is actually recognized. In

fact, most of the time the distortion goes undetected, even when considerable efforts have been made to unravel this effect (e.g., Erickson & Mattson, 1981; Kamas et al., 1996; Reder & Kusbit, 1991; van Oostendop & de Mul, 1990). Reder and Kusbit (1991) argued that if the Gricean principle were the correct interpretation, participants should find it easier to detect distortions than to actually ignore them. They found, however, that it was actually easier for participants to ignore distortions (i.e., to read distorted questions for gist) than to attempt to detect them (i.e., to take distorted questions literally).

Erickson and Mattson (1981) concluded that the Illusion was due to the "way in which the semantic features of the individual words are put together to produce a description of the meaning of the sentence" (p. 550). This suggests that the combination of features of the words in the questions, and not the actual words themselves, form the meaning of the question. It is from this representation of meaning that readers derive the answer to the question (e.g., "two"). This hypothesis is compatible with their semantic similarity hypothesis, in that the features of the high-related distorted term and the correct term (e.g., Moses and Noah, respectively), in combination with other concepts from the question, may create similar representations that could be easily mistaken for one another.

Other explanations for the Moses Illusion have focused on the mapping of information in working memory onto information from long-term memory. This mapping process is not a perfect one, but relies more on global fit of features to the representation in memory than attention to specific detail. For example, van Oostendorp and his colleagues (van Oostendorp, 1994; van Oostendorp & Kok, 1990; van Oostendorp & de Mul, 1990; van Oostendorp & den Uyl, 1984) proposed "semantic cohesion monitoring,"

in which readers continually monitor the cohesion of a sentence (or other piece of text) and then regulate further processing based on how the perceived cohesion of that representation compares to some internal criterion for comprehension. The criterion for cohesion depends on the relation between features in the text – when the relation among concepts is high, the criterion for cohesion is relatively low. When the relation among concepts is low, the criterion is generally higher. So, in the context of the Moses Illusion, as long as sentences appear to make sense, criteria for cohesion may be relatively low. When high-related distorted names are presented, the distorted and correct representations may be similar enough that the criterion is reached in spite of the discrepancy. In the presence of low-related distorted names, there is probably not enough similarity between the distorted and correct representations to meet the criterion for cohesion. This, they argued, would explain why errors tend to go undetected more when the distorted names are highly related to the correct names.

Semantic cohesion monitoring and the partial matching hypothesis developed by Reder and her colleagues (e.g., Kamas & Reder, 1995; Kamas, et al., 1996; Reder & Cleeremans, 1990; Reder & Kusbit, 1991) are highly compatible. According to the partial matching hypothesis, retrieval of information from memory is based on "shared clusters of matching features" (Kamas & Reder, p. 181) between the concepts in working memory and long-term memory. For example, readers may only match key concepts from the question, such as "how many," "animals," and "Ark," to the activated memory concepts related to Noah's Ark. Reder argued that these matches of features do not have to be in the same exact relationship in the probe as in working memory, and as long as they meet

the criterion for a match, partial matches may be acceptable.

Reder and Cleeremans (1990) presented a parallel distributed processing (PDP) framework of the partial matching hypothesis. They proposed a simple network that contained three interconnected pools of units. The first pool of units represents input information, which is connected to a second hidden pool, and that is connected to a third pool which contains representations of the output. Processing is represented by presenting a pattern of activation as the input, letting that activation spread through the network, and determining what patterns are represented in the output. They first "trained" the network using series of undistorted statements (e.g., "Noah took two animals of each kind on the Ark.") until the network produced the same pattern of activation on the output. Next, they gave the network incomplete and distorted patterns in order to determine what the output might be. They argued that similar inputs would be represented by similar patterns of activation, and should result in similar outputs. Thus, the input of "Moses" and "Noah" should result in similar outputs, because there is a large degree of overlap between the patterns of activation. The smaller the amount of overlap between the patterns of activation, however, the more likely it is that the outputs will be very different and the distortion will be detected on a larger proportion of trials (e.g., as between "Nixon" and "Noah").

Recently, Shafto and MacKay (1999) presented yet another possible explanation for the Moses Illusion. They provided evidence for a related effect, the Armstrong Illusion, in which participants failed to notice distortions in questions such as, "What was the famous line uttered by Louis Armstrong when he first set foot on the moon?" (Neil

Armstrong was the astronaut who walked on the moon, not the jazz musician Louis Armstrong.) Shafto and MacKay argued that the Armstrong Illusion was caused by the phonological similarity in names (e.g., Armstrong) between the correct and distorted terms and that the Armstrong Illusion was not predicted by models such as Reder's partial matching hypothesis. They instead proposed Node Structure Theory, in which proper names are stored in lexical name nodes in memory. These nodes can be primed both semantically (as in Reder's and others' models) and phonologically (unlike Reder's theory). However, it is unclear whether this demonstration actually contradicts Reder's partial matching hypothesis. Although Reder did not discuss the possibility of partial matching on the basis of phonological features, it is likely that phonological partial matching occurs in addition to semantic partial matching, since the partial matching hypothesis is intended to be a strictly bottom-up model of memory retrieval.

All of the explanations for the Moses Illusion are consistent with the memory-based view of text processing, in which reactivation is viewed as a passive and automatic process. Within this view, Myers and O'Brien's resonance model (e.g., Myers & O'Brien, 1998; O'Brien, 1995; O'Brien & Myers, 1999) can account for the Moses Illusion. The resonance model does not have a specific constraint on the degree of match between the features of to-be-reactivated concepts in long-term memory and the active concepts in working memory. When readers encode the question, "How many animals of each kind did Moses take on the Ark?", the concepts in the question send a signal to all of long-term memory. Concepts that share featural overlap with the information in the question should resonate in response. The resulting subset of reactivated concepts might include, "two" (in

response to "how many", "animals", and "Ark") and "Biblical figure" and "water" (in response to "Ark" and "Moses"). These concepts can be easily mapped onto and integrated with the contents of the question, so comprehension is left relatively unscathed and the participant can proceed to give the answer, "two" to the question. Thus, even though the concepts "Moses" and "Noah" are not perfectly matched, they share enough featural overlap that replacing one with the other may go undetected a large proportion of the time. When the question is instead, "How many animals of each kind did Nixon take on the Ark?", reactivated concepts might include "two" (in response to "how many", "animals", and "Ark"), and "president of the U.S." and "impeached" (in response to "Nixon"). The latter concepts about Nixon share absolutely no featural overlap and would be difficult to map onto and integrate with the information presented in the question. Consequently, readers may detect the distortion more readily in this case and experience comprehension difficulty as a result.

The Moses Illusion is only one example of a failure on participants' parts to detect important discrepancies in experimental stimuli as a result of not paying close attention to detail. The next chapter will describe a number of other examples of failures to detect inconsistencies in the environment and during reading and how they can be accounted for by a bottom-up view of memory retrieval, such as those models embodied in the memory-based view of text processing.

CHAPTER II

OTHER FAILURES TO NOTICE INCONSISTENCIES

People fail to detect inconsistencies in a variety of situations. One example is the Moses Illusion, as discussed in the previous chapter. Other examples of undetected inconsistencies in our everyday environments include jokes, eyewitness reports, viewing a situation from scene to scene, and reading comprehension. While these types of situations seem quite different, they are all similar in one way. The failure to detect the inconsistency in each depends on the relation between the correct and inconsistent information. The more featural overlap the two types of information share, the more likely it is that the inconsistency will go undetected. This chapter will discuss each of the above types of undetected inconsistencies in turn, relating them to the key assumptions underlying the Moses Illusion.

Anomalies in Question Answering

The work on the Moses Illusion described in the previous chapter is a distinct subset of the larger body of research on question answering. Many models of question answering propose that respondents first do a simple processing of the question in order to determine whether a "don't know" decision can be made quickly or more work must be done to produce the correct answer. For example, Norman (1973) found that participants

do not search for the answer to the question, "What is Charles Dickens' phone number?" but can make a quick response that the question is absurd. Consistent with Norman's findings, Glucksberg and McCloskey (1981) found fast "don't know" responses to questions for which no relevant information was known, slower responses when known relevant information led to an answer, and slow "don't know" responses when some relevant information was known but upon further evaluation it was not sufficient to answer the question. Based on these findings, they offered a two-stage model for question answering. In the first stage, memory is searched for information relevant to the question. If no relevant information is found, a quick "don't know" response is made. If relevant information is found, however, it is then evaluated to determine whether a response can be made. This evaluation process results in either the answer to the question or a slower "don't know" response.

Recently, Cook, Myers, and O'Brien (2000) extended Glucksberg and McCloskey's (1981) findings to reading comprehension (see also Klin, Guzman, and Levine, 1997). They used passages containing sentences that prompted reinstatement of information from earlier in the text. For example, participants read the sentence, "She asked Terry what instrument she bought," which required reinstatement of an earlier antecedent concept, "cello." The antecedent information (e.g., cello) was either present in the text (e.g., Terry bought a cello), present but then negated (e.g., Terry saw a cello but decided against it), or absent (e.g., Terry bought an instrument). Consistent with Glucksberg and McCloskey's model, reading times were fastest in the antecedent-absent condition, in which the search yielded no relevant information and readers could quickly

conclude that they did not know what instrument Terry bought. Reading times in the antecedent-present and antecedent-negated conditions were slower, because the search resulted in the reactivation of relevant information (e.g., cello), and these newly reactivated concepts had to be evaluated. In fact, reading times were longest in the antecedent-negated condition, presumably because the relevant information (e.g., saw and decided against a cello) was reactivated, but after further evaluation it was discovered that it was not sufficient for comprehension. Cook et al. argued that the resonance model (e.g., Myers & O'Brien, 1998; O'Brien, 1995; O'Brien & Myers, 1999) provided a reasonable account of the data, and thus of the mechanism underlying the first stage of Glucksberg and McCloskey's model.

At first glance, the Moses Illusion seems inconsistent with Glucksberg and McCloskey's (1981) findings. In the Moses Illusion literature, participants did not respond, "don't know" to obviously distorted questions, but answered them as if correct and did so quickly. Under a framework in which the initial reactivation stage is viewed in terms of features of concepts, one might predict that processing the information in the question, "How many animals of each kind did Moses take on the Ark?" would result in the reactivation of "relevant information." It may be then, that the second evaluation stage of Glucksberg and McCloskey's model does not require an exact match of each concept in the question to the reactivated information in memory, but a more global or partial match of the features in both may be sufficient (Reder, 1987; cf. Kamas & Reder, 1995; Kamas, et al., 1996; Reder & Cleeremans, 1990; Reder & Kusbit, 1991).

Barton and Sanford (1993) examined the claim that a more global inspection

process is the force behind effects such as the Moses Illusion. More specifically, they evaluated the hypothesis that a global goodness of fit influences the question answering process to a greater degree than an analysis of the match of each individual word. They used variations of the following popular children's joke in their experiments:

> There was a tourist flight traveling from Vienna to Barcelona. On the last leg of the journey, it developed engine trouble. Over the Pyrenees, the pilot started to lose control. The plane eventually crashed right on the border. Wreckage was equally strewn in France and Spain. The authorities were trying to decide where to bury the survivors.

They found extremely low anomaly detection rates, indicating that participants were not performing detailed semantic analyses of the question. Even when the anomaly was explicitly stated in the text by changing the last line of the item to, "The authorities were trying to decide where to bury the *surviving dead*," participants' detection rates were still very low. Nor were there any differences in detection rates when participants were asked, "When an airplane crashes, where should the survivors be buried?" versus, "Where should the survivors be buried after an aircrash?", suggesting that participants' representations of the question were not affected by the order of the terms. However, similar to the findings of Reder and Kusbit (1991) with the Moses Illusion, Barton and Sanford found that increasing the number of terms directly relevant to the anomaly increased detection rates, although the anomaly effect was never completely eliminated.

Barton and Sanford (1993) proposed that the global fit of the terms in the item influenced processing to the degree that the terms in the item tended to fit into the scenario (e.g., airplane crash, wreckage, burying, etc.). This was of greater influence than

any processing done on a more precise local level. They argued that their results were inconsistent with an obligatory bottom-up semantic composition process. Instead, they claimed that complete processing of stimuli may not occur if a satisfactorily coherent representation can be derived from other sources, such as scenario-based expectations. Consider Barton and Sanford's findings within the context of the resonance model (e.g., Myers & O'Brien, 1998; O'Brien, 1995; O'Brien & Myers, 1999). If the features of the passage combined to form a coherent representation with which new information was easy to integrate, comprehension continued smoothly. However, as more terms that were relevant to the anomaly (e.g., surviving dead) were added, integrating this new information became increasingly difficult and detecting the anomaly was more likely.

Another example in which bottom-up processing can lead to a failure to detect an inconsistency in jokes was demonstrated by Kimble and Perlmuter (1970). They presented participants with a series of questions like the following:

Q. What do we call the tree that grows from acorns?
A. Oak
Q. What do we call a funny story?
A. Joke
Q. What sound does a frog make?
A. Croak
Q. What is another word for cape?
A. Cloak
Q. What do you call the white of an egg?
A. Yolk (sic!)

in which, by the time the last question was asked, participants almost always produced the wrong answer, "Yolk." Reason and Mackintosh (1986; see also Reason, 1990) extended this work and found that only primes related to the same specific context as the answer

(e.g., egg contents) produced the effect. However, low-related primes even within the same general context (e.g., egg parts), such as, "What is the outside of an egg called?" did not produce the effect. Although phonological priming played a role in producing the incorrect answer, the semantic "fit" of the answer to the question was more important in producing the effect. If the answer, "yolk," fit within the specific context of the question, "What is the white of an egg called?" these features were easy to integrate with the question and the incorrect answer was given quickly. Features of "yolk" were not as easy to integrate with the question, "What is the outside of an egg called?' and respondents detected the inconsistency.

Inconsistencies in the Environment

Missing obvious distortions in questions can be unfortunate at times, but missing inconsistencies in the everyday environment can have far-reaching consequences. A clear example of where this might occur comes from the research on eyewitness testimony, or more specifically, the misinformation effect. Loftus and her colleagues (e.g., Loftus, 1975; 1979; Loftus, Miller, & Burns, 1978; Loftus & Palmer, 1974) performed some of the earliest work on the misinformation effect. Those experiments typically involved participants watching a video about a specific event – a traffic accident, for example. The video would have shown a car stopping at a *stop* sign. Following the video, participants were given several questions to answer about the event. One of the questions in this series was slightly distorted to indicate that the car stopped at a *yield* sign (e.g., "Did another car pass the red Datsun when it was stopped at the yield sign?"). Later, when tested on their

memory for information from the video, participants given the misleading question were more likely to misreport that they had seen a yield sign than were participants that did not receive the misleading question. Thus, not only did participants fail to detect the inconsistency in the question, but the distortion also had an effect on their memory for the original event. More importantly, when the distorted information was highly similar to the correct information, the misinformation effect was more likely to occur. Loftus (1979) argued that participants integrate the new information (e.g., yield sign) with the existing representation in memory. When the new information shares many features in common with the representation in memory (as did yield sign with stop sign), it is more likely that the inconsistency will go undetected. Ayers and Reder (1998) argued that no single factor can be named as responsible for the complex misinformation effect. However, they did state that a model that describes the reactivation and integration process in terms of comparing the most salient features of the situation with the new information provided the best account of the existing data.

Simons and Levin (1997) described change blindness, another phenomenon in which participants fail to detect changes in a stimulus. Change blindness refers to a participant's failure to detect any difference in stimuli during saccades, blinks, or some other blank interval between the presentation of two images. Simons and Levin pointed out that the changes can even be drastic ones. For example, they found that participants did not detect changes when looking at photographs, in which from the first to the second photograph, the two men in the pictures exchanged (noticeably different) hats. Furthermore, only 50% of the participants detected the difference when the two men in

the pictures exchanged heads. Simons and Levin also found that change blindness persists in the real world. They set up situations in which a confederate went up to an individual on a college campus and asked for directions. While the two people were talking, two more individuals interrupted the conversation by carrying a door between the participant and the confederate. While the door was blocking the participant's view of the confederate, another individual took the confederate's place. Thus, even though the person that participants were talking to was replaced by a completely different individual, participants only detected the change 50% of the time. When the experiment was replicated with the (two) individual(s) asking directions dressed as construction workers, a social group distinct from college students, even fewer participants detected the change. Simons and Levin explained that participants most likely only encoded the gist of a scene and ignored or paid very little attention to specific visual details. As long as the gist remained the same from scene to scene – or the features of one scene were relatively easy to integrate with the features of the next scene – changes in smaller details went undetected. Again, it appears that participants do not normally engage in extensive processes for matching all of the details between separate stimuli, or in this case, separate scenes.

Inconsistencies in Reading Comprehension

Another area in which comprehension may proceed smoothly in spite of the presence of inconsistent information is during reading. Glenberg and his colleagues (e.g., Epstein, Glenberg, & Bradley, 1984; Glenberg & Epstein, 1985; 1987; Glenberg, Sanocki, Epstein, & Morris, 1987; Glenberg, Wilkinson, & Epstein, 1982) have found that readers

often believe they have comprehended a passage when in fact, they have missed important inconsistencies. They referred to readers in this situation as being poorly calibrated, in that readers' subjective measurements of comprehension did not match up with more objective measures taken by the experimenters. For example, Glenberg et al. (1982) presented readers with passages that contained contradictions between adjacent sentences. The final sentence of the paragraph presented the contradictory information as either given or new, following Haviland and Clark (1974)'s assumption that readers try to match up information syntactically marked as given with the preceding text, while information syntactically marked as new will simply be appended to the existing representation. (See Table 2 for a sample passage.) They proposed that the contradiction should therefore be detected more readily in the given condition than in the new condition. Participants rated their understanding of the paragraphs as high, but even when explicitly told to look for inconsistencies, they failed to detect them a large percentage of the time. Readers did detect inconsistencies more often when the final sentence was marked as given rather than new, however.

Glenberg et al. (1982) claimed that the inconsistencies went undetected because the inconsistent information in the final sentences was very similar semantically and structurally to the preceding sentence, but that devices such as syntactic markers can mediate this effect. They argued that most readers do not engage in active and completely accurate on-line comprehension monitoring. Instead, a looser criterion for comprehension is normally used (e.g., van Oostendorp , 1994; van Oostendorp & Kok, 1990; van Oostendorp & de Mul, 1990; van Oostendorp & den Uyl, 1984). If readers did engage in

Table 2.

Sample Passage Used by Glenberg, Wilkinson, and Epstein (1982)

Critical Paragraph With Continuation Sentence:
The political behavior of the American public is becoming increasingly unpredictable due to widespread uncertainty regarding salient issues, major national concerns, and candidate discriminability. Public opinion polls report unexplained vacillations in party affiliation, as well as frequent fluctuations in candidate preference. Feelings of ambiguity and confusion that discourage the American citizen from partaking in the political process may explain the erratic changes in the opinions of the electorate.

Final Sentence, Given Version:
Feelings of ambiguity and confusion that discourage the American citizen from partaking in the political process may explain this stability in the opinions of the electorate.

Final Sentence, New Version:
An explanation of these findings is that feelings of ambiguity and confusion may discourage the American citizen from partaking in the political process, thus stabilizing political opinions.

such careful processing, the contradictions should have been easily detected even when the contradictory information was syntactically marked as new. However, it should be noted that the texts used by Glenberg and his colleagues were expository texts, and it may be that the material was sufficiently difficult that the inconsistencies in the text were not highly noticeable because comprehension was low in general.

In contrast, work with narrative texts has revealed that participants often do experience comprehension difficulty when presented with inconsistencies during reading. O'Brien and colleagues (e.g., Albrecht & O'Brien, 1993; Cook et al., 1998; Myers et al., 1994; O'Brien & Albrecht, 1992; O'Brien et al., 1998) presented inconsistent information that shared featural overlap with concepts from earlier in the text, but the inconsistent information (e.g., cheeseburger and fries) was not easy to integrate with the information presented earlier (e.g., vegetarian). That is, there was a glaring mismatch of the features between the two pieces of information. Thus, detection of inconsistencies rests not only on whether the inconsistent concepts share featural overlap. The features of one concept must also be easily mapped onto the features of the other, so that unless extensive matches are made to check every detail against every other detail, inconsistencies in smaller details may not cause comprehension difficulty. The discrepancies between Glenberg et al.'s (1982) findings and those of O'Brien and his colleagues lead to the question, *why* are there such differences between expository and narrative texts? One reason may be that expository texts rely heavily on semantic memory, while narrative texts seem to depend more on the episodic representation. The Moses illusion literature has largely focused on knowledge in semantic memory. Further discussion of this issue and the role of episodic information in

the Moses Illusion will be postponed until Chapter Five.

The Moses Illusion and the experiments described in this chapter are several instances in which participants disproportionately fail to detect inconsistencies in experimental stimuli. These effects depend on how easily the features of the inconsistent information can be integrated with the features of the correct information in semantic memory. One way to push these effects further is not only to ask participants to integrate new inconsistent information with previously read information, but to do this in a situation in which full comprehension requires a full and perfect match between the new information and the earlier information in the episodic memory trace of the text. One example in which matches must be made between concepts in the episodic memory representation of a text is antecedent retrieval. This dissertation tested whether the Moses Illusion extends to episodic mismatches between concepts in antecedent retrieval. First, however, some of the basic findings in the antecedent retrieval literature are discussed in the next chapter.

CHAPTER III

ANTECEDENT RETRIEVAL

In the Moses Illusion literature, participants were not required to recall the correct term (e.g., Noah) in order to respond to the question. It may be that when reactivation of the correct term is required for comprehension, readers will be more likely to detect the error and experience comprehension difficulty as a result. One instance in which reactivation of prior information is necessary for comprehension to continue smoothly is antecedent retrieval. This dissertation examined the effects of distorted information in antecedent retrieval, the relation between the distorted and correct information, and how these factors affect reading comprehension. First, however, this chapter will review some of the major relevant findings in antecedent retrieval.

An important aspect of text comprehension is the ability to easily connect incoming information with the developing representation of the text in memory (Ericsson & Kintsch, 1995; Fletcher, 1981; 1986; Grimes, 1975; Kintsch, 1988; 1998; Kintsch & van Dijk, 1978; Kintsch, & Vipond, 1979; Sanford & Garrod, 1981; van Dijk & Kintsch, 1983). Ordinarily, text is written in a manner such that this a smooth and effortless process. Lesgold, Roth, and Curtis (1979; see also Cirilo, 1981) proposed three ways in which new information can be connected to information already in memory. First, an immediate match can be made by connecting the new information with the contents of active memory.

Second, the information needed from memory may no longer be active, and the reader may have to perform a reinstatement search, during which inactive antecedent information is reactivated from long-term memory. Finally, no explicit links to the information needed may be available in memory, and a bridging inference may be required in order for comprehension to continue (Clark, 1978; Haviland & Clark, 1974).

McKoon and Ratcliff (1980) provided evidence that readers perform reinstatement searches and that they reactivate referents during a reinstatement search. O'Brien, Duffy, and Myers (1986) extended McKoon and Ratcliff's work and concluded that not only do reinstatement searches result in the reactivation of the antecedent in working memory (e.g., faster response times following reinstatement) but that this reinstatement process actually slows reading time. This finding has been supported by others (e.g., Cirilo, 1981; Clark & Sengul, 1979; Garrod & Sanford, 1977; Haviland & Clark, 1974; O'Brien, 1987). The availability of the antecedent may also be affected by other factors in the text such as distance, theme, or syntactic roles (Clark & Sengul, 1979). However, before discussing factors that affect the ease of reinstatement, it is necessary to examine first the process of how reinstatement searches are actually made.

Many different search processes have been proposed to describe how reinstatement searches are completed. For example, Cirilo (1981) and Lesgold et al. (1983; cf. Clark & Sengul, 1979) proposed that the reinstatement search is a function of the representation of the text. That is, the text's organization in memory will dictate the manner in which the search progresses. Clark and Sengul suggested that short-term memory is searched first, and if the antecedent information is not found, then a search of

long-term memory ensues. Alternatively, Miller and Kintsch (1980) suggested that readers start with the highest level of the representational network and proceed downward, (assuming a hierarchical network like that described by Kintsch & van Dijk, 1978; Kintsch & Vipond, 1979; van Dijk & Kintsch, 1983). Finally, O'Brien (1987) found evidence in favor of a backwards parallel search process, in which activation spreads backwards through the representation of the text in memory. Consistent with this, O'Brien and Myers (1987) reanalyzed O'Brien's materials using the method of causal analysis proposed by Trabasso and his colleagues (e.g., Trabasso & Sperry, 1985; Trabasso & van den Broek, 1985) and found that the number of causal connections to an antecedent in the text was a more significant predictor of antecedent search times than measures of physical position or importance based on the Kintsch and van Dijk (1978) framework. More recently, O'Brien and colleagues (e.g., Myers & O'Brien, 1998; O'Brien, 1995; O'Brien, Albrecht, Hakala, & Rizzella, 1995; O'Brien & Myers, 1999; O'Brien, Plewes, & Albrecht., 1990) have argued that the resonance model provides a better framework for explaining antecedent retrieval. The degree of featural overlap shared by the anaphor and its antecedent is the most important factor in retrieval. Factors that have been found to affect the resonance process include number of causal connections to a concept in the text, degree of elaboration received by the antecedent, distance between the anaphor and antecedent, the number of competing candidates for the antecedent, and the conceptual relation between the anaphor and its antecedent.

O'Brien et al. (1990) demonstrated that both distance between the antecedent and the anaphor and elaboration of the antecedent affected the time to retrieve an antecedent.

They found that more recently presented antecedents were reinstated faster than more distant antecedents, and that elaborated antecedents were reinstated faster than unelaborated antecedents. O'Brien et al. also found that elaborated late antecedents were reactivated even when the early antecedent was reinstated, indicating that possible antecedents in the path of the search may become reactivated during a reinstatement search for the correct antecedent (cf. O'Brien, 1987), but only when the early and late antecedents were from the same category. Under the assumptions of the resonance model, factors such as distance and elaboration can influence how much concepts resonate, but if two concepts share little featural overlap (e.g., are members of different categories), they are less likely to resonate in response to one another regardless of elaboration or distance.

Corbett (1984) examined the effect of multiple antecedent candidates on reinstatement. He found that when a semantically related distractor antecedent was present in the text, reinstatement times were significantly longer, presumably because the correct antecedent and the distractor were conceptually very similar (i.e., shared features in common), and readers had to determine which was the correct antecedent. Others have shown that when there are two potential candidate antecedents, not only does the non-reinstated candidate interfere with reading time, but it may even be reactivated during the reinstatement search process. For example, Corbett and Chang (1983) had participants read sentences such as, "Jack threw a snowball at Phil, but he missed." They found that readers initially activated both "Jack" and "Phil" upon encountering the pronominal referent "he," although "Jack" was the only correct antecedent. However, when the sentence was changed to "Jack threw a snowball at Jill, but he missed," only "Jack" was

activated (Chang, 1980). Thus, it appears that the reinstatement search is constrained by the gender of the pronoun, or more generally, by specific (featural) information contained in the anaphor. Finally, although more than one candidate may be reactivated upon the encoding of an anaphor, O'Brien et al. (1995) found evidence that the non-reinstated candidate is ultimately rejected (cf. Gernsbacher, 1989; 1990; MacDonald & MacWhinney, 1990; but see also Cook, Myers, & O'Brien, 1999; Wiley, Mason, & Myers, 1999). Again, however, the non-reinstated candidate was only reactivated and rejected when it shared features in common with the correct antecedent and the anaphoric phrase.

Garrod and Sanford (1977) provided additional evidence that the semantic relation between the anaphor and the antecedent influences reinstatement. They found that reading time for a sentence that prompted reinstatement of an antecedent from earlier in the text was in part a function of the "semantic distance," (p. 78; i.e., featural overlap) between the anaphor and the antecedent. They had participants read sentences such as, "A robin would sometimes wander into the house," and found they were faster to read the sentence, "The bird was attracted by the larder," than if the "robin" was replaced with "goose." Garrod and Sanford argued that this was due to the fact that "robin" and "bird" share a closer semantic relation than do "goose" and "bird" (cf. Rosch, 1973; Smith, Shoben, & Rips, 1974). Again, the more features two concepts (such as robin and bird) have in common, the more likely it is that they will be easy to integrate with one another, resulting in faster reading times.

Finally, O'Brien and Albrecht (1991) demonstrated that concepts not even

explicitly mentioned in the text can be reactivated during a reinstatement search. They had participants read passages like the example presented in Table 3. When participants read passages that contained many statements that were highly related to "skunk" (e.g., terrific odor, small black animal, had a white stripe down its back, etc.), but "skunk" was never explicitly stated in the passage, naming times demonstrated that "skunk" was still reactivated in response to the anaphoric phrase (e.g., "what had run in front of her car"). Furthermore, O'Brien and Albrecht found evidence to support the idea that if the context for the unstated concept (e.g., "skunk") is sufficiently high and there is strong featural overlap between the anaphoric phrase and the unstated concept, this concept may even be instantiated in place of the correct antecedent.

If the relation between the anaphor and antecedent is so important in determining reinstatement that concepts not explicitly stated in the text can be reinstated in place of the correct antecedent (e.g., O'Brien & Albrecht, 1991), then it may be that readers can even be led to reinstate a concept that is not the antecedent nor is even a potential antecedent, if that concept shares a great deal of featural overlap with the anaphor. Recall that in the Moses Illusion literature, distortions were more likely to go undetected if the distorted and correct information shared a high degree of featural overlap. If the Moses Illusion extends to antecedent retrieval, then readers may not experience comprehension difficulty when distorted anaphors share high featural overlap with their antecedents. This issue was explored in the experiments described in Chapter Five.

Table 3.

Sample Passage Used by O'Brien & Albrecht (1991).*

Mary was driving in the country one day [when she smelled a terrific odor.][and she gazed at the setting sun as she went.] Suddenly a small black (skunk/cat) [with a white stripe down its back] [with a long furry tail] ran in front of her car. Mary knew she couldn't stop in time. However, she hoped she had managed to miss the animal and continued on her way. After a while, she noticed she was low on gas. While at the gas station, the attendant asked her what had run in front of her car.

*The high-context version is in the first set of brackets, and the low-context version is in the second set of brackets. The high-related and low-related antecedents are in parentheses.

CHAPTER IV

EXPERIMENTS

The Moses Illusion represents one instance in which participants fail to detect inconsistencies across a large number of trials. This effect, and those described in Chapter Three, depended on the semantic relation between the correct and distorted information. As described in the previous chapter, during antecedent retrieval, readers reactivate an antecedent in response to a sentence that contains an anaphor or anaphoric phrase, and this process can be affected by factors such as the relation between an anaphor and its antecedent. Thus, when it is necessary for readers to reactivate an antecedent in order for comprehension to proceed, even highly-related distortions in the anaphor may lead to comprehension difficulty. The experiments presented in this dissertation were designed to demonstrate whether the Moses Illusion will extend to one important component of the reading process, specifically antecedent retrieval.

Consider the passage presented in Table 4. Terry, the protagonist, goes to a music store and buys either a cello (correct antecedent condition), a violin (incorrect - high overlap condition), or an oboe (incorrect - low overlap condition). This information was backgrounded by several sentences of unrelated text, so that any information about Terry buying a musical instrument should no longer be active in short-term memory. This was followed by the sentence, "Terry showed her the cello she bought," which prompted

Table 4.

Sample Passage for Experiments 2a and 2b.

Introduction
Terry loved classical music. She spent most of her waking hours listening to it, either in her room or in the car.

Correct Antecedent Condition
Terry decided that it would be fun to teach herself how to play. She drove to a music shop located in the next town. As she entered the store she saw a beautiful cello. It was made of beautiful cherry-stained wood, and the strings were perfectly tuned. She imagined herself pulling the bow across the strings to create perfect notes. Terry asked the salesman for a price. After thinking for a few minutes, she decided to buy it that afternoon.

Incorrect - High Overlap Condition
Terry decided that it would be fun to teach herself how to play. She drove to a music shop located in the next town. As she entered the store she saw a beautiful violin. It was made of beautiful cherry-stained wood, and the strings were perfectly tuned. She imagined herself pulling the bow across the strings to create perfect notes. Terry asked the salesman for a price. After thinking for a few minutes, she decided to buy it that afternoon.

Incorrect - Low Overlap Condition
Terry decided that it would be fun to teach herself to play. She drove to a music shop located in the next town. As she entered the store she saw a beautiful oboe. The keys on it were bright and shiny, and the case was lined in black velvet. She imagined herself fingering the keys to create perfect notes. Terry asked the salesman for a price. After thinking for a few minutes, she decided to buy it that afternoon.

Filler
When Terry arrived home she found a message on her answering machine from her friend Jill. Because Terry hadn't spoken to Jill in over a week, she decided to invite her over for coffee. When Jill came over, she told Terry that she had a new boyfriend. After chatting about Jill's new boyfriend for a while, Jill asked Terry about what was new with her.

Reinstatement and Spillover Sentences
Terry showed her the cello she bought.
She even tried to play a few notes.

Closing
Terry told Jill that she was going to start practicing that very evening.

reinstatement of the antecedent. In the correct antecedent condition, this sentence should be easy to comprehend, and reading times should be fast. In addition, because there is a high degree of featural overlap between the antecedent, "violin," and the anaphor, "cello," in the incorrect - high overlap condition, this information may be easy to integrate and readers may not experience comprehension difficulty. If so, reading times in this condition should be fast relative to the incorrect - low overlap condition, in which there is little featural overlap between the antecedent and anaphor (e.g., "oboe" and "cello," respectively). However, the inconsistent information (e.g., cello) may not be easily integrated on all trials, and readers may experience some difficulty comprehending the reinstatement sentence. If so, reading times in the incorrect - high overlap condition may be slightly slower than in the correct antecedent condition.

Experiments 1a and 1b were norming studies designed to test and ensure that the antecedents in the incorrect - high overlap condition (e.g., violin) shared a higher degree of featural overlap with the correct antecedent (e.g., cello) than the antecedents in the incorrect - low overlap condition (e.g., oboe). Experiment 1a was a rating study, and Experiment 1b employed a semantic priming procedure. Experiments 2a, 2b, and 3 used reading time measures to investigate whether the presence of distorted information in the incorrect - high and -low overlap conditions caused comprehension difficulty. Finally, Experiment 4 was conducted to examine the role of syntactic focus on processing distorted information in antecedent retrieval.

Experiment 1a

In Experiment 1a, participants were asked to rate the similarity of the correct antecedent (e.g., cello) to the antecedent in the incorrect - high overlap condition (e.g., violin) or the incorrect - low overlap condition (e.g., oboe). It is important for later experiments in this dissertation that the correct antecedent and the incorrect - high overlap antecedent have a higher degree of featural overlap than the correct antecedent and the incorrect - low overlap antecedent. Participants should rate the correct antecedent and the incorrect - high overlap antecedent as being more similar than the correct antecedent and the incorrect - low overlap antecedent.

Method

Participants. Participants were 26 University of New Hampshire undergraduates who received course credit for their involvement in the experiment.

Materials. The materials were 40 word pairs. Each pair consisted of the correct antecedent and either the incorrect - high overlap antecedent or the incorrect - low overlap antecedent. The materials for Experiment 1a appear in Appendix A. The antecedents were concepts taken from the passages used in the remaining experiments of this dissertation. Two materials sets were constructed such that each set contained 20 items in each of the two conditions. Across both sets, each word pair appeared once in each of the two conditions.

Procedure. Participants were randomly assigned to one of the two materials sets. Participants were run in a group classroom setting, and were given a sheet of paper containing all 40 word pairs. They were asked to rate the similarity of each word pair on a

five-point scale, where 1 = "Extremely Dissimilar," and 5 = "Extremely Similar."

Results.

In all analyses reported, F_1 always refers to tests against error terms based on participants variability, and F_2 always refers to tests against an error term based on items variability. All analyses were significant at the standard alpha level of .05, unless otherwise indicated.

The mean ratings for the correct / incorrect - high overlap pairs and the correct / incorrect - low overlap pairs were 3.65 and 2.89, respectively. This difference was significant, $F_1(1, 24) = 90.24$, MSe = .08, $F_2(1, 38) = 65.43$, MSe = .18. This indicates that participants rated the correct antecedent as more similar to the incorrect - high overlap antecedent than the incorrect - low overlap antecedent. Thus, it appears that the correct and incorrect - high overlap antecedents have a higher degree of featural overlap than the correct and incorrect - low overlap antecedents.

Experiment 1b

Experiment 1b investigated the same issue with a semantic priming procedure. Participants were presented with either the incorrect - high overlap antecedent (e.g., violin), the incorrect - low overlap antecedent (e.g., oboe), or a neutral word (e.g., blank) as the prime, which was immediately followed by the correct antecedent (e.g., cello). Participants were asked to name aloud the correct antecedent target as quickly as possible. In semantic priming paradigms, the more conceptual overlap the prime and the target share in memory, the faster the response time (e.g., Meyer & Schvaneveldt, 1971). Given

the results of Experiment 1a, it is expected that naming times should be faster in the incorrect - high and - low overlap conditions than in the neutral condition, further demonstrating that each incorrect antecedent shares semantic features in common with the correct antecedent.

Method.

Participants. Participants were 51 University of New Hampshire undergraduates who received course credit for their involvement in the experiment.

Materials. The same materials from Experiment 1a were used for Experiment 1b with three exceptions. First, two additional prime - target sets were added to balance the design. Second, a third neutral condition was added so that the prime was either the incorrect - high overlap antecedent, the incorrect - low overlap antecedent, or a neutral word (e.g., blank). All prime - target pairs appear in Appendix A. The target in the experimental pairs was always the correct antecedent. Finally, there were 30 practice prime-target pairs that appeared before the experimental pairs. These practice pairs were similar to the experimental trials. Three materials sets were constructed such that each set contained 14 items in each of the three conditions. Across the three sets, each prime - target pair appeared once in each of the three conditions.

Procedure. Participants were randomly assigned to one of the three materials sets. Each participant was run individually in a session that lasted approximately 10 minutes. All materials were presented on a video monitor controlled by a Dell 386 microcomputer. Participants were instructed to rest their right thumbs on a line-advance key. Each trial began with the word "READY" on the screen. When participants were ready to see the

first word pair, they pressed the line-advance key. This erased the "READY" prompt from the screen, and then the prime appeared for 500 milliseconds. This was followed by a 50 millisecond blank interval and then the target. Participants were asked to name the target word aloud as quickly as possible but without sacrificing accuracy. This triggered a voice key that erased the probe and recorded the naming time. A "READY" prompt then appeared on the screen for the next trial. Before beginning the experimental trials, each participant went through 30 prime-target trials to ensure that they were thoroughly familiarized with and understood the procedure.

Results and Discussion.

For all remaining analyses reported in this dissertation, all scores that were two or more standard deviations from a participant's mean were eliminated. Across all experiments, this led to the exclusion of approximately 4.89% of the data from further analyses.

The mean naming times for the target words in Experiment 1b appear in Table 5. The overall effect of prime condition was significant, $F_1(2, 96) = 39.80$, MSe = 185; $F_2(2, 78) = 17.59$, MSe = 201. Planned comparisons revealed that the naming times for targets following the incorrect - high overlap primes were faster than those following the incorrect - low overlap primes: $F_1(1, 48) = 4.19$, MSe = 331; $F_2(1, 39) = 5.62$, MSe = 246; and those in the neutral condition: $F_1(1, 48) = 59.07$, MSe = 453; $F_2(1, 39) = 25.77$, MSe = 528. In addition, naming times for targets following the incorrect - low overlap primes were faster than for those following neutral primes: $F_1(1, 48) = 49.26$, MSe = 324; $F_2(1, 39) = 14.45$, MSe = 436. These results provide evidence that there is some

Table 5.

Mean Naming Times as a Function of Prime Condition in Experiment 1b.

Incorrect - High Overlap	Incorrect - Low Overlap	Neutral
476	482	499

conceptual overlap between the incorrect antecedent primes and the correct antecedent target. It also appears that there is a higher degree of overlap between correct targets and the incorrect - high overlap primes than between the correct targets and the incorrect - low overlap primes.

Combining the ratings and priming results from these two experiments, it appears that the incorrect - high overlap antecedents have a higher degree of featural overlap with the correct antecedent than the incorrect - low overlap antecedent does with the correct antecedent. In Experiment 1a, participants rated the correct and incorrect - high overlap antecedents as more similar than the correct and incorrect - low overlap antecedents. In addition, . Experiment 1b naming times were faster following an incorrect - high overlap prime than an incorrect - low overlap prime. However, it is important to note that antecedents in both incorrect overlap conditions do share featural overlap with the correct target, indicated by the fact that in Experiment 1b, naming times following both types of incorrect primes were still faster than in the neutral prime condition.

Experiments 2a and 2b

The results of Experiments 1a and 1b provided evidence that the incorrect - high overlap antecedents were more similar to the correct antecedent than were the incorrect - low overlap antecedents, although both incorrect antecedents shared featural overlap with the correct antecedent. In the Moses Illusion literature (e.g., Erickson and Mattson, 1981), when a distractor (e.g., Moses) was highly similar to (or shared a high degree of featural overlap with) the correct target (e.g., Noah), participants often failed to detect the

distortion in the question. When the distractor (e.g., Nixon) and the correct target were dissimilar (or shared a lower degree of featural overlap), however, detection rates increased. This experiment investigated whether reading times is affected when the text requires the reinstatement of a distorted anaphor. The anaphor was either a repetition of an antecedent (e.g., cello), incorrect but shared high featural overlap with an antecedent (e.g., violin), or incorrect and shared only a low amount of featural overlap with an antecedent (e.g., oboe).

Passages similar to the example presented in Table 4 were used. Each passage began with a section that introduced the story, and then one of three elaboration sections followed. This section elaborated on an antecedent that was referred to later in the passage. The correct antecedent elaboration described the same concept as that mentioned in a sentence prompting reinstatement of this antecedent near the end of the passage. The incorrect - high overlap elaboration expanded upon an antecedent that was featurally very similar to, but definitely not the same as the anaphor. For example, a violin is similar to a cello in that it is a stringed instrument and that it is played with a bow, but it is not a cello. The incorrect - low overlap elaboration described an antecedent that was less conceptually similar to the anaphor. For example, although both oboes and cellos are instruments, an oboe is a very different kind of instrument than a cello - it has keys, it is played by blowing into it, etc. The elaboration section was followed by several sentences of filler material that served to background the antecedent in memory. Following this, a sentence that prompted reactivation of the antecedent was presented (i.e., the reinstatement sentence). This was followed by a spillover sentence and then a brief closing section.

According to the memory-based view and the resonance model in particular (e.g., Gerrig & McKoon, 1998; McKoon et al., 1996; Myers & O'Brien, 1998; O'Brien, 1995; O'Brien & Myers, 1999), as well as the partial matching hypothesis (e.g., Kamas & Reder, 1995; Kamas, et al., 1996; Reder & Cleeremans, 1990; Reder & Kusbit, 1991), reactivation of information from long-term memory is a passive process. As a result of this process, concepts in long-term memory (whether they are from general world knowledge or the episodic representation of the text) that share a high degree of featural overlap with information currently in working memory are more likely to become reactivated than concepts that do not share so many features in common. When two concepts share a great deal of featural overlap, such as Noah and Moses (or violin and cello), it may be that replacing the correct target with a high-related alternative may cause less comprehension difficulty than when the two concepts do not share a high degree of featural overlap. That is, reading times may not be as affected by the distortion in the incorrect - high overlap condition as in the incorrect - low overlap condition. Thus, reading times in the incorrect - high overlap condition are expected to be slower than in the correct antecedent condition, but still faster than in the incorrect - low overlap condition.

However, it may be that processing the distorted anaphor in the incorrect - high overlap condition does cause comprehension difficulty, but that the effect may be delayed. The spillover sentence was included to investigate this hypothesis. If the inconsistency effect is delayed in the incorrect - high overlap condition, the pattern of reading times among the three antecedent conditions should differ from the pattern of reading times for the reinstatement sentence. Reading times for the spillover sentence in the incorrect - high

overlap condition should be slow relative to reading times in the correct antecedent condition and more similar to reading times for the incorrect - low overlap condition. Experiment 2a tested the above hypotheses. Experiment 2b was a replication of Experiment 2a, with the addition of eight consistent filler passages that served to balance the number of "incorrect" and "correct" passages presented during the experiment.

Method.

Participants. Sixty University of New Hampshire undergraduates participated in the experiments in exchange for course credit. Thirty students participated in Experiment 2a, and 30 participated in Experiment 2b.

Materials. The materials used were 24 passages similar to the example presented in Table 4. A full set of the materials used in Experiments 2a and 2b appears in Appendix B.

Twenty-four items from the materials tested in Experiments 1a and 1b were selected. To ensure that those 24 items met the conditions necessary for Experiments 2a and 2b, the ratings and naming times from Experiments 1a and 1b for only those items were analyzed. The mean ratings for the correct/incorrect-high and correct/incorrect-low conditions were 3.75 and 2.61, respectively. This difference was significant: $F_1(1, 24) = 71.86$, MSe = .24; $F_2(1, 22) = 170.55$, MSe = .09. The mean naming times for the same 24 items in Experiment 1b for the targets following the incorrect-high, incorrect-low, and neutral primes were 476, 480, and 498, respectively. Again, the main effect of prime condition was significant: $F_1(2, 96) = 20.40$, MSe= 346; $F_2(2, 42) = 8.03$, MSe = 211. Within these 24 items, naming times to targets following the incorrect-high condition were faster than those following the neutral condition, $F_1(1, 48) = 31.07$, MSe = 792; $F_2(1, 21)$

= 9.83, MSe = 627, as were naming times to targets following incorrect - low overlap primes, $F_1(1, 48) = 26.05$, MSe = 656; $F_2(1, 21) = 9.34$, MSe = 396. However, the difference between naming times following the incorrect - high and incorrect - low primes was not significant, $F_1(1, 48) = 1.09$, MSe = 630; $F_2(1, 21) = 1.28$, MSe = 244.

Each passage began with an introductory section that served to introduce the protagonist of the story. The introductory section was approximately 25.58 words long for each passage. This was followed by an elaboration section that introduced the antecedent. In order to ensure that the antecedent was encoded in memory, it was explicitly stated once and implicitly mentioned twice in the 2 to 3 sentences that described the concept. The mean lengths of the elaboration sections for the correct, incorrect - high, and incorrect - low antecedent conditions were 80.17, 80.17, and 79.75 words, respectively. This was followed by a backgrounding section of approximately 75.63 words that was presented to ensure that the antecedent was no longer active in memory when the reinstatement sentence was presented. The reinstatement and spillover sentences were presented immediately after the background section, followed by a brief closing section. The mean lengths of the reinstatement and spillover sentences were 38.21 and 37.63 characters, respectively. The closing section was approximately 16.13 words in length. This was followed by a comprehension question that ensured that participants were reading the passages carefully. Questions focused on information from the passage other than that surrounding the antecedent. There were an equal number of "yes" and "no" comprehension questions.

Across the three antecedent conditions, 16 of the 24 experimental passages

contained inconsistent information (eight in the incorrect - high overlap condition and eight in the incorrect - low overlap condition), while only eight of the passages were consistent. In order to ensure that readers did not develop strategies to look for inconsistent information, eight filler passages containing only consistent information were added to Experiment 2b. Filler passages were the same length and followed the same general format as experimental passages. In addition, for the filler passages, there were an equal number of "yes" and "no" questions.

For both Experiments 2a and 2b, three materials sets were constructed. Each set contained eight passages that appeared in each of the three conditions. Across the three material sets, each passage appeared once in each of the three conditions.

Procedure. For both Experiments 2a and 2b, participants were randomly assigned to one of the three materials sets. Each participant was run individually in a session that lasted approximately 30 minutes. All materials were presented on a monitor controlled by a Zenith Z100 or Dell 386 microcomputer.

Participants were instructed to rest their right thumbs on a line-advance key, their right index fingers on a "yes" key, and their left index fingers on a "no" key. Each trial began with the word "READY" in the middle of the screen. When participants were ready to read a passage, they pressed the line-advance key. Each press of the key erased the current line and presented the next line. Comprehension time was measured as the time between key presses. Each participant was instructed to read at a comfortable, normal reading pace. After the last line of the passage disappeared from the screen, the cue "QUESTIONS" appeared in the middle of the screen for 2000 ms, followed by the

comprehension question. Participants were instructed to respond to the comprehension question by pressing either the "yes" or the "no" key. Participants were also instructed that answering the comprehension questions was the most important part of the experiment, and that they should respond as quickly as possible without sacrificing accuracy. On the trials in which participants made errors, the word "ERROR" appeared in the middle of the screen for 750 ms. Before beginning the experimental passages, participants read three practice passages to ensure that they were thoroughly familiarized with and understood the procedure.

Results and Discussion.

The reading times for Experiments 2a and 2b are presented together in Table 6. In Experiment 2a, there was a significant effect of antecedent condition for both the reinstatement sentence, $F_1(2, 54) = 18.71$, MSe = 37,680; $F_2(2, 42) = 16.58$, MSe = 50,100, and the spillover sentence, $F_1(2, 54) = 2.75$, $p = .07$, MSe = 43,011; $F_2(2, 42) = 4.82$, MSe = 24,986. Experiment 2b also showed significant main effects of antecedent condition for the reinstatement sentence, $F_1(2, 54) = 16.09$, MSe = 58,958; $F_2(2, 42) = 14.21$, MSe = 59,963. However, the effect for the spillover sentence in Experiment 2b was only significant when tested against participants variability, $F_1(2, 54) = 5.17$, MSe = 36,467; $F_2(2, 42) = 1.59$, $p > .21$, MSe = 21,218.

In Experiment 2a, planned comparisons revealed that reading times for the reinstatement sentence were faster in the correct antecedent condition than in either the incorrect - high overlap antecedent condition, $F_1(1, 27) = 20.00$, MSe = 40,180; $F_2(1, 21) = 10.78$, MSe = 75,194, or the incorrect - low overlap antecedent condition, $F_1(1, 27) =$

Table 6.

Mean Reading Times as a Function of Antecedent Condition in Experiments 2a and 2b.

	Antecedent Condition		
	Correct	Incorrect - High	Incorrect - Low
	Experiment 2a		
Reinstatement Sentence	1907	2071	2214
Spillover Sentence	1880	1967	2002
	Experiment 2b		
Reinstatement Sentence	1850	1983	2202
Spillover Sentence	1781	1920	1916

31.97, MSe = 88,056; $F_2(1, 21) = 26.78$, MSe = 124,042. Reading times were also faster in the incorrect - high overlap condition than in the incorrect - low overlap condition, $F_1(1, 27) = 6.24$, MSe = 97,844; $F_2(1, 21) = 8.39$, MSe = 101,364. The results for the reinstatement sentence in Experiment 2b replicated those of Experiment 2a. The reading times for the correct antecedent condition were faster than for the incorrect - high overlap antecedent condition (but only when tested against participants variability), $F_1(1, 27) = 6.05$, MSe = 86,691; $F_2(1, 21) = 2.43$, $p = .13$, MSe = 102,728, and for the incorrect - low overlap antecedent condition, $F_1(1, 27) = 28.79$, MSe = 129,119; $F_2(1, 21) = 25.71$, MSe = 124,516. In addition, reading times for the incorrect - high overlap antecedent condition were faster than for the incorrect - low overlap antecedent condition, $F_1(1, 27) = 10.50$, MSe = 137,936; $F_2(1, 21) = 12.55$, MSe = 132,534.

The planned comparison results of the reading times for the spillover sentence showed a different pattern from those for the reinstatement sentence in both Experiments 2a and 2b. As with the reinstatement sentence, in Experiment 2a, reading times for the correct antecedent condition were faster than the incorrect - high overlap antecedent condition (although only when based on items variability), $F_1(1, 27) = 2.76$, $p = .11$, MSe = 81,435; $F_2(1, 21) = 7.29$, MSe = 38,890, and the incorrect - low overlap antecedent condition, $F_1(1, 27) = 5.66$, MSe = 79,113; $F_2(1, 21) = 7.15$, MSe = 59,426. Unlike the pattern of reading times for the reinstatement sentence, however, reading times for the spillover sentence did not differ for the incorrect - high overlap and incorrect - low overlap antecedent conditions, $F_1(1, 27) = .39$, MSe = 97,520; $F_2(1, 21) = .28$, MSe = 51,603. The results of Experiment 2b followed the same general pattern. Reading times for the correct

antecedent condition were faster than those in the incorrect - high overlap antecedent condition (but only when based on participants variability), $F_1(1, 27) = 9.09$, MSe = 64,033; $F_2(1, 21) = 1.31$, $p = .27$, MSe = 47,451, and the incorrect - low overlap antecedent condition (although only marginal when based on items variability), $F_1(1, 27) = 9.47$, MSe = 57,957; $F_2(1, 21) = 3.01$, $p = .10$, MSe = 42,502. Again, the difference between the incorrect - high and - low overlap conditions for the spillover sentence was not significant, $F_1(1, 27) = .01$, MSe = 96,816; $F_2(1, 21) = .32$, MSe = 37,354.

The combined results of Experiments 2a and 2b indicate that readers do fall prey to Moses Illusion-like effects when targeted information is embedded in text, or in the episodic memory representation of the text. When the anaphor shared a high degree of featural overlap with the antecedent, reading times were faster than when the anaphor shared low featural overlap with the antecedent. That is, integrating distorted information in the text did not appear to cause comprehension difficulty as often in the incorrect - high overlap condition as in the incorrect - low overlap condition, reading times were faster in the incorrect - high overlap condition than in the incorrect - low overlap condition. However, it appears that it may have just taken longer for the distorted information to become available and be integrated in the incorrect - high overlap condition. By the time the spillover sentence was presented, readers were experiencing comprehension difficulty in both the incorrect - high and - low overlap conditions, and there were no differences between the two conditions, and both conditions were slower than the correct antecedent condition.

As indicated earlier, according to the resonance model of memory (e.g., Myers &

O'Brien, 1998; O'Brien, 1995; O'Brien & Myers, 1999), when a concept is encoded, a signal is sent out to all of long-term memory in parallel, including both episodic and semantic information. Those concepts that share a high degree of featural overlap will resonate in response, and concepts that resonate the most will be reactivated. Thus, when readers encoded the anaphor, "cello" in the reinstatement sentence in Experiments 2a and 2b, this information should have resulted in a parallel signal to both episodic and semantic information stored in long-term memory. Information from the episodic representation of the text, including the actual antecedent (e.g., violin, in the incorrect = high overlap condition) and the concepts describing it (e.g., has strings, is made of wood, is played with a bow, etc.), should have resonated in response. In addition, information from semantic memory should also have resonated. This would have included information semantically related to "cello" (such as "violin"), as well as features of "cello" (e.g., has strings, is made of wood, is played with a bow). Thus, in the incorrect - high overlap condition, the majority of information that resonated and was reactivated in response to the anaphor, "cello," was consistent with the concept of "cello." This information should have been easy to map onto the contents of working memory, compared to when the information from the text or semantic memory did not share a great deal of featural overlap with "cello," such as in the incorrect - low overlap condition. As in many of the studies described earlier, an imperfect match between the features of concepts in working memory and those from earlier in the text seemed to be sufficient for comprehension. This is consistent with the mapping process described by the resonance model (e.g., Myers & O'Brien, 1998; O'Brien, 1995; O'Brien & Myers, 1999).

During the initial stages of the mapping process, the episodic mismatch between the antecedent and the anaphor did not appear to have as much of an effect as the semantic relation between the two concepts during processing of the reinstatement sentence. Perhaps the shared features between "cello" and "violin" in semantic memory were actually available and integrated at a faster rate than the episodic trace of the antecedent. If correct, then the mapping process in the incorrect - high overlap condition (i.e., "violin" onto "cello") should have been relatively easy, because the antecedent and anaphor shared a high degree of featural overlap. Reading times in the incorrect - high overlap condition should have been fast, relative to the incorrect - low overlap condition (e.g., "oboe"). Reading time results for the reinstatement sentence were consistent with this view - reading times in the incorrect - high overlap condition were faster than in the incorrect - low overlap condition.

If the episodic memory trace of the antecedent had become available and integrated at the same rate as semantic information, then when the reader attempted to map the distorted anaphor onto the antecedent, this should have led to comprehension difficulty in both incorrect overlap conditions; reading times between the two incorrect overlap conditions on the reinstatement sentence should have been comparable. This did not occur. One possibility is that episodic information about the antecedent becomes available at a slower rate than semantic information; information about the differences between the antecedent and anaphor in the episodic memory trace would be integrated at a later stage. Reading times on the spillover sentence were consistent with this view. When the episodic information became available in the incorrect - high overlap condition, readers

experienced comprehension difficulty and reading times slowed, and there were no longer any differences between the incorrect - high and -low overlap conditions. Both conditions, however, were still slower than the correct antecedent condition.

The overall pattern of reading times for the two sentences is consistent with the view that semantic and episodic information become available and are used at different rates during the initial stages of the mapping process. Information about the semantic relation between the antecedent and anaphor appears to be more accessible at first, and episodic information becomes available at a later point. In the incorrect - high overlap condition, mapping the semantic features of the antecedent onto those of the anaphor was relatively easy when the two concepts shared high featural overlap. However, when the episodic trace of the antecedent itself became available, the mapping process became more difficult and readers experience comprehension difficulty.

The results of this experiment are important for two reasons. First, the mapping process that occurs during antecedent retrieval is similar to the mapping process that occurs in the Moses Illusion. At first, high-related distorted anaphors do not tend to lead to comprehension problems – the mapping process is not perfect. More important, at least during the initial stage of the mapping process, the semantic relation between the concepts involved seems to be more accessible than the actual episodic memory trace. That is, semantic information appears to become available and is integrated at a faster rate than information from episodic memory, although both types of information are presumably signaled in parallel (e.g., Myers & O'Brien, 1998; O'Brien & Myers, 1999).

Previous work on the antecedent reinstatement process has focused primarily on

the episodic representation of the text (e.g., McKoon & Ratcliff, 1980; O'Brien, 1987; O'Brien et al., 1986; O'Brien et al., 1990). As described in Chapter Four, factors in the episodic memory representation of the text (e.g., number of mentionings, elaboration, causal relations, distance, etc.) were viewed as the most influential factors in determining the accessibility of an antecedent, and most models of antecedent retrieval focused primarily on the episodic memory trace (e.g., Cirilo, 1981; Clark & Sengul, 1979; Kintsch & van Dijk, 1978; Lesgold et al., 1983; Miller & Kintsch, 1980; O'Brien, 1987). The semantic relation between the anaphor and the antecedent, although important, was presumed to be just one factor of many that influenced reinstatement (e.g., Garrod & Sanford, 1977; Myers & O'Brien, 1998; O'Brien & Albrecht, 1991). However, based on the present results, it appears that information from semantic memory may actually become available before the episodic memory trace during antecedent retrieval. In Experiments 3 and 4, the differences between the correct and incorrect antecedents in the episodic memory trace were increased while the semantic relation between the antecedent and anaphor was held constant in order to test further the issue of the roles of semantic and episodic knowledge during reinstatement.

Experiment 3

The elaboration of the incorrect - high overlap antecedent in Experiments 2a and 2b enhanced the similarities between the correct antecedent and the incorrect - high overlap antecedent. Thus, the similarities between the two concepts were represented in the pre-existing semantic information and the episodic representation of the text, both of

which were stored in long-term memory. The purpose of this experiment was to enhance the dissimilarities between the correct and incorrect - high overlap antecedents, so that the episodic representation of the text would only include the dissimilarities and no information about the similarities (which, presumably, would still be stored in semantic memory). This provided a stronger test of the roles of semantic and episodic knowledge during reinstatement. Consider the example presented in Table 7. The cello in the correct antecedent elaboration was described as a large heavy instrument that Terry had to sit down to play, whereas the violin was described as being small and lightweight, and Terry could dance around while she played it. To the extent that the episodic memory trace is available during reinstatement of the antecedent, attempting to integrate the distorted information in the incorrect - high overlap condition should cause comprehension difficulty during reading of the reinstatement sentence, and reading times should not differ from the incorrect - low overlap condition. If however, the semantic information (i.e., similarities between cello and violin) is more readily accessible during reinstatement than the episodic information (i.e., dissimilarities between cello and violin), then the same pattern of results from Experiments 2a and 2b should occur. Reading times for the incorrect - high overlap condition should be faster than for the incorrect - low overlap condition on the reinstatement sentence. The episodic information may be integrated at a slower rate than the semantic information, so as in Experiments 2a and 2b, the distorted information in the incorrect - high overlap condition may not be processed until the spillover sentence is presented. Thus, there should be no differences between the two incorrect conditions on the spillover sentence, but both should be slower than the correct antecedent condition.

Table 7.

Sample Passage for Experiment 3.

Introduction
Terry loved classical music. She spent most of her waking hours listening to it, either in her room or in the car.

Correct Antecedent
Terry decided that it would be fun to teach herself how to play. She drove to a music shop located in the next town. As she entered the store she saw a beautiful cello. The large instrument was almost bigger than she was. Terry decided she wanted to learn how to play it. She imagined herself sitting down to play the heavy instrument. Terry asked the salesman for a price. After thinking for a few minutes, she decided to buy it that afternoon.

Incorrect - High Overlap Condition
Terry decided that it would be fun to teach herself how to play. She drove to a music shop located in the next town. As she entered the store she saw a beautiful violin. It was very lightweight and fit perfectly between her c 'n and shoulder. She imagined herself dancing as she played beautiful music. Terry asked the salesman for a price. After thinking for a few minutes, Terry decided to buy it that afternoon.

Incorrect - Low Overlap Condition
Terry decided that it would be fun to teach herself to play. She drove to a music shop located in the next town. As she entered the store she saw a beautiful oboe. The keys were bight and shiny, and the case was lined in black velvet. Terry decided she wanted to learn how to play it. She imagined herself fingering the keys to create perfect notes. Terry asked the salesman for a price. After thinking for a few minutes, she decided to buy it that afternoon.

Filler
When Terry arrived home she found a message on her answering machine from her friend Jill. Because Terry hadn't spoken to Jill in over a week, she decided to invite her over for coffee. When Jill came over, she told Terry that she had a new boyfriend. After chatting about Jill's new boyfriend for a while, Jill asked Terry about what was new with her.

Reinstatement and Spillover Sentences
Terry showed her the cello she bought.
She even tried to play a few notes.

Closing
Terry told Jill that she was going to start practicing that very evening.

Method.

Participants. Thirty University of New Hampshire undergraduates enrolled in Introductory Psychology participated in exchange for course credit.

Materials. The materials were the same 24 passages used in Experiments 2a and 2b, with one exception. The elaborations for the antecedent conditions were rewritten so that they focused on the dissimilarities between the correct antecedent and the incorrect - high and - low overlap antecedents. The lengths of the newly rewritten elaboration sections for the correct, incorrect - high, and incorrect - low antecedent conditions were 84.83, 84.54, and 84.71 words, respectively. The elaboration sections were on average only four words longer than in Experiments 2a and 2b. The rest of the passages were exactly the same as in Experiments 2a and 2b. A sample passage appears in Table 7, and a full set of the materials used in this experiment appear in Appendix C.

Three materials sets were constructed such that each set contained eight passages that appeared in each of the three conditions. Across the three materials sets, each passage appeared once in each of the three conditions. In addition, the same eight filler passages from Experiment 2b were included to balance the number of inconsistent and consistent passages.

Procedure. The procedure was the same as that used in Experiments 2a and 2b.

Results and Discussion.

The mean reading times for the reinstatement sentence and the spillover sentence for Experiment 3 appear in Table 8. There was a significant effect of antecedent condition

Table 8.

Mean Reading Times as a Function of Antecedent Condition in Experiment 3.

	Antecedent Condition		
	Correct	Incorrect = High	Incorrect = Low
Reinstatement Sentence	1916	2061	2192
Spillover Sentence	1858	1997	2025

for both the reinstatement sentence, $F_1(2, 54) = 14.20$, MSe = 40,213; $F_2(2, 42) = 6.93$, MSe = 82,258, and the spillover sentence, $F_1(2, 54) = 4.85$, MSe = 49,266; $F_2(2, 42) = 4.04$, MSe = 46,926.

As in Experiments 2a and 2b, planned comparisons revealed that reading times on the reinstatement sentence were faster in the correct antecedent condition than in either the incorrect - high overlap condition, $F_1(1, 27) = 8.39$, MSe = 74,951; $F_2(1, 21) = 5.55$, MSe = 82,015, or the incorrect - low overlap condition, $F_1(1, 27) = 20.08$, MSe = 113,635; $F_2(1, 21) = 9.28$, MSe = 244,804. In addition, the reading times for the reinstatement sentence were faster in the incorrect - high overlap condition than in the incorrect - low overlap condition, $F_1(1, 27) = 9.78$, MSe = 52,692; $F_2(1, 21) = 4.15$, MSe = 166,731.

The pattern of means for the spillover sentence was also the same as in Experiments 2a and 2b. Reading times were faster for the correct antecedent condition than either the incorrect - high overlap condition (although only marginal when based on items variability), $F_1(1, 27) = 4.56$, MSe = 125,539; $F_2(1, 21) = 3.32$, $p = .08$, MSe = 89,585, or the incorrect - low overlap condition, $F_1(1, 27) = 13.95$, MSe = 60,002; $F_2(1, 21) = 12.42$, MSe = 59,579. Again, there was no difference between reading times for the incorrect - high and - low overlap conditions on the spillover sentence, $F_1(1, 27) = .23$, MSe = 110,056; $F_2(1, 21) = .75$, MSe = 132,393.

The results of this experiment replicated those of Experiments 2a and 2b, even though the elaboration sections in the present experiment were changed to focus on the dissimilarities between the correct and incorrect - high overlap antecedents. If the episodic

information from the elaboration section (e.g., the differences between the correct and incorrect - high overlap antecedents) became available and was integrated at the same rate as the semantic information (e.g., the similarities between the two), the information about the differences between the anaphor and the antecedent should have been difficult for readers to integrate with the reinstatement sentence in both the incorrect - high and - low overlap conditions, causing them to slow down. Thus, there should have been no difference between the two conditions. Instead, reading times were still faster in the incorrect - high overlap condition than the incorrect - low overlap condition for the reinstatement sentence. This indicates that the semantic information about the similarities between the correct antecedent and the incorrect - high overlap antecedent must have been more accessible initially in the integration process than the differences in the episodic memory trace surrounding the target antecedent. The episodic memory trace did not appear to be integrated until later, when the spillover sentence was presented. Readers experience comprehension difficulty in the incorrect - high overlap condition on the spillover sentence, and there were no differences between the incorrect - high and - low overlap conditions, although both were slower than in the correct antecedent condition. Thus, although both episodic and semantic information should have been signaled in parallel (e.g., Myers & O'Brien, 1998; O'Brien & Myers, 1999), it appears that the two types of information may have become available and were integrated at different rates.

It is somewhat surprising that the large changes in the episodic memory traces surrounding the target antecedent did not seem to matter. Elaborating on the differences between the correct antecedent and the incorrect - high overlap antecedent had exactly the

same effect as elaborating on the similarities in Experiments 2a and 2b. Reder and Kusbit (1991) found that the more terms there were in Moses Illusion items that differentiated the distorted term from the correct term, the more likely participants were to detect distortions. However, these effects were largely targeted at semantic memory while holding the episodic memory trace relatively constant. In the present work, the episodic memory trace was manipulated. Simply increasing the number of episodic features that differentiate one antecedent from another may not be enough to increase the likelihood that episodic information will become available at the same rate as semantic information and cause problems during integration. One possible reason that needs to be ruled out is that readers simply may not have been paying sufficient attention to the information in the episodic memory trace. One way to increase the likelihood that readers will focus on the episodic memory trace is to manipulate syntactic focus. Bredart and Modolo (1988; Bredart & Docquier, 1999) found that highlighting distorted terms with syntactic focus increased the likelihood of detecting distortions in the Moses Illusion. How syntactic focus affects antecedent reinstatement was investigated in Experiment 4.

Experiment 4

Experiments 2a, 2b, and 3 demonstrated that manipulating the degree of episodic featural overlap between the correct antecedent and the incorrect - high and - low overlap antecedents did not appear to be as influential on antecedent retrieval as the degree of semantic overlap between those concepts. However, if the salience of the episodic memory trace for the targeted antecedent can be increased, then the episodic memory

trace may be more accessible during reinstatement, leading to greater comprehension difficulty ans slower reading times in the incorrect - high overlap condition. Syntactic focus is one factor that has been found to increase the salience of concepts in the text (e.g., Birch, Albrecht, & Myers, in press; Birch & Garnsey, 1995; McKoon, Ward, Ratcliff, & Sproat, 1993). This experiment investigated the effects of syntactic focus on whether distorted anaphors will lead to problems in comprehension during antecedent reinstatement.

Birch and Garnsey (1995) found that the use of syntactic focusing phrases (e.g., *It was the*... or *There was this*...) led to increased memory performance for focused concepts. They found increased priming effects for focused concepts over non-focused concepts, and argued that focusing on a concept with syntax may lead to increased activation on that concept. In addition, Birch et al. (in press) argued that the use of syntactic focus can increase the salience of concepts; they found that response times to focused concepts were faster than to non-focused concepts. Finally, Bredart and Modolo (1988; see also Bredart & Docquier, 1989) demonstrated that when cleft sentence structures were used to syntactically focus key concepts in Moses Illusion questions, Illusion detection rates were higher than when the distorted information was not focused. The goal of Experiment 4 was to determine if syntactic focus can be used to increase the salience of the episodic memory traces surrounding the incorrect - high overlap antecedent, so that the episodic trace will be more accessible during reinstatement, leading to greater comprehension difficulty and thus slower reading times. The same materials from Experiment 3 were used, with the exception that an extra condition was added, in

which the incorrect - high overlap antecedent was highlighted with syntactic focus (e.g., *There was this* beautiful violin that Terry saw as she entered the store.). See Table 9 for a sample passage. If syntactic focus does increase the salience of concepts in the text, the episodic memory trace may be more accessible and should be more difficulty to map onto the distorted anaphor when the incorrect - high overlap antecedent is highlighted with syntactic focus. Thus, reading times on the reinstatement sentence in the incorrect - high overlap with focus condition should not differ from the incorrect - low overlap condition. If syntactic focus does not increase the salience of the episodic memory trace of the incorrect - high overlap antecedent, however, then reading times for this condition should not differ from when no syntactic focus is presented. If the episodic information does not become available until the spillover sentence is presented (as suggested in Experiments 2a - 3), then any comprehension difficulty due to problems integrating this information should not occur until then, and the expectations for the spillover sentence remain the same as in Experiments 2a - 3. Reading times in the correct antecedent condition should be fastest, and the incorrect - high (with and without focus) and - low conditions should not differ.

Method.

Participants. Forty University of New Hampshire undergraduates participated in exchange for course credit.

Materials. The materials were slight modifications of the 24 passages used in Experiment 3. See Appendix C for a full set of the materials used in this experiment. Passages followed the same structure as those used in Experiment 3, with the addition of one elaboration condition, in which the incorrect - high overlap condition used a cleft

Table 9.

Sample Passage for Experiment 4

Introduction

Terry loved classical music. She spent most of her waking hours listening to it, either in her room or in the car.

Correct Antecedent

Terry decided that it would be fun to teach herself how to play. She drove to a music shop located in the next town. As she entered the store she saw a beautiful cello. The large instrument was almost bigger than she was. Terry decided she wanted to learn how to play it. She imagined herself sitting down to play the heavy instrument. Terry asked the salesman for a price. After thinking for a few minutes, she decided to buy it that afternoon.

Incorrect - High Overlap Condition Without Syntactic Focus

Terry decided that it would be fun to teach herself how to play. She drove to a music shop located in the next town. As she entered the store she saw a beautiful violin. It was very lightweight and fit perfectly between her chin and shoulder. She imagined herself dancing as she played beautiful music. Terry asked the salesman for a price. After thinking for a few minutes, Terry decided to buy it that afternoon.

Incorrect - High Overlap Condition With Syntactic Focus

Terry decided that it would be fun to teach herself how to play. She drove to a music shop located in the next town. There was this beautiful violin that she saw as she entered the store. It was very lightweight and fit perfectly between her chin and shoulder. She imagined herself dancing as she played beautiful music. Terry asked the salesman for a price. After thinking for a few minutes, Terry decided to buy it that afternoon.

Incorrect - Low Overlap Condition

Terry decided that it would be fun to teach herself to play. She drove to a music shop located in the next town. As she entered the store she saw a beautiful oboe. The keys were bight and shiny, and the case was lined in black velvet. Terry decided she wanted to learn how to play it. She imagined herself fingering the keys to create perfect notes. Terry asked the salesman for a price. After thinking for a few minutes, she decided to buy it that afternoon.

Filler

Afterwards, Terry went home where she found a message on her answering machine from her friend Jill. Because Terry hadn't spoken to Jill in over a week, she decided to invite her over for some coffee and chocolate cake. When Jill came over, she excitedly told Terry that she had a new boyfriend. After chatting about Jill's new boyfriend for a while, Jill asked Terry what was new with her.

Reinstatement and Spillover Sentences
Terry showed her the cello she bought.
She even tried to play a few notes.

Closing
Terry told Jill that she was going to start practicing that very evening.

---

sentence structure to present the antecedent. The rest of the elaboration for the incorrect - high overlap with focus condition was the same as for the incorrect - high overlap without focus condition. Twelve consistent filler passages similar to those used in Experiments 2b and 3 were added to balance the number of consistent and inconsistent passages. There were an equal number of "yes" and "no" comprehension questions for the filler passages.

Four materials sets were constructed such that each set contained six passages that appeared in each of the four conditions. Across the four materials sets, each passage appeared once in each of the four conditions.

Procedure. Participants were randomly assigned to one of the four materials sets. The rest of the procedure was the same as in Experiments 2a - 3.

Results and Discussion.

The mean reading times for the reinstatement sentence and the spillover sentence for Experiment 4 appear in Table 10. As in the previous experiments, there was a significant effect of antecedent condition for both the reinstatement sentence, $F_1(3, 108) = 15.11$, $MSe = 42,551$; $F_2(3, 60) = 3.46$, $MSe = 37,087$, and the spillover sentence, $F_1(3, 108) = 9.21$, $MSe = 34,641$; $F_2(3, 60) = 8.41$, $MSe = 31,015$.

As reported for Experiments 2a - 3, planned comparisons revealed that the reading times in the correct antecedent condition on the reinstatement sentence were faster than all other conditions, including the incorrect - high overlap without focus condition, $F_1(1, 36) = 16.31$, $MSe = 81,035$; $F_2(1, 20) = 6.43$, $MSe = 65,099$, the incorrect - high overlap with focus condition, $F_1(1, 36) = 14.50$, $MSe = 98,566$; $F_2(1, 20) = 4.49$, $MSe = 89,877$, and the incorrect - low overlap condition, $F_1(1, 36) = 31.12$, $MSe = 121,279$; $F_2(1, 20) = 9.00$,

Table 10.

Mean Reading Times as a Function of Antecedent Condition in Experiment 4.

	Antecedent Condition			
	Correct	Inc. - High w/out Focus	Inc. - High w/ Focus	Inc. - Low
Reinstatement Sent.	1739	1920	1928	2046
Spillover Sent.	1712	1875	1852	1919

MSe = 73,170. Reading times were faster in the incorrect - high overlap without focus condition than in the incorrect - low overlap condition (although only significant when tested against participants variability), $F_1(1, 36) = 10.94$, MSe = 57,485; $F_2(1, 20) = .45$, MSe = 60,238. Reading times were also faster in the incorrect - high overlap with focus condition than in the incorrect - low overlap condition (also only significant when tested against participants variability), $F_1(1, 36) = 7.09$, MSe = 78,768; $F_2(1, 20) = .33$, MSe = 95,103. There was no difference between the two incorrect - high overlap conditions. $F_1(1, 36) = .03$, MSe = 73,479; $F_2(1, 20) = .00$, MSe = 61,565.

Reading times for the spillover sentence were also similar to those in Experiments 2a - 3. Mean reading times for the correct antecedent were faster than for the incorrect - high overlap without focus condition, $F_1(1, 36) = 18.67$, MSe = 56,701; $F_2(1, 20) = 25.10$, MSe = 46,900; the incorrect - high overlap with focus condition, $F_1(1, 36) = 11.24$, MSe = 69,741; $F_2(1, 20) = 11.23$, MSe = 39,734; and the incorrect - low overlap condition, $F_1(1, 36) = 26.07$, MSe = 65,589; $F_2(1, 20) = 16.23$, MSe = 71,725. The contrasts between the means for the three incorrect antecedent conditions were not significant: incorrect - high without focus vs. incorrect - high with focus, $F_1(1, 36) = .26$, MSe = 78,060; $F_2(1, 20) = 2.27$, MSe = 76,595; incorrect - high without focus vs. incorrect - low, $F_1(1, 36) = .85$, MSe = 91,341; $F_2(1, 20) = .00$, MSe = 85,657; and incorrect - high with focus vs. incorrect - low, $F_1(1, 36) = 3.29$, MSe = 54,268; $F_2(1, 20) = 3.28$, MSe = 51,569.

The correct, incorrect - high (without focus), and incorrect - low antecedent conditions replicated those from Experiments 2a - 3. If syntactic focus served to increase

the salience of the episodic traces of focused concepts, the episodic trace in the incorrect - high overlap with focus condition should have been more available, which should have led to greater comprehension difficulty as a result of readers trying to map this information onto the anaphor, and reading times should have been slower than when syntactic focus was not present. However, the addition of syntactic focus to the incorrect - high overlap condition had no effect, since reading times did not differ whether the incorrect - high overlap antecedent received syntactic focus or not; there were no differences between the incorrect - high with or without focus conditions. One possibility is that the effect of syntactic focus is only temporary, so that by the time the reinstatement sentence was presented, any additional advantage for the incorrect-high overlap with focus condition was eliminated.

Regardless of syntactic focus, semantic information about the antecedent appeared to be more accessible early in the integration process than the episodic memory trace. As in the previous experiments, a mismatch between the antecedent and anaphor did not appear to impair reading times when the anaphor shared a high degree of featural overlap with the antecedent; this was reflected in faster reading times for the incorrect - high overlap condition(s) than in the incorrect - low overlap condition. If the episodic memory trace became available and was integrated at the same rate as the semantic information about the antecedent, then readers should have had difficulty processing the distorted anaphor in the reinstatement sentence, regardless of its semantic overlap, and there should have been no differences between the three incorrect overlap conditions. Again, this did not occur. It appears that the episodic information became available and was integrated at

a slower rate than the semantic information, although both should have been initially signaled in parallel. As in Experiments 2a - 3, the distorted information in either incorrect - high overlap condition did not lead to a slowdown in reading times until the spillover sentence was presented, as there were no differences between incorrect - high (with or without focus) and the incorrect - low overlap conditions. Thus, although the semantic information about the antecedent appears to have been more accessible initially during reinstatement than the information from the episodic memory trace, the episodic memory trace does still play a role.

CHAPTER V

GENERAL DISCUSSION

The experiments in this dissertation addressed whether the Moses Illusion extends to antecedent retrieval. O'Brien and Albrecht (1991) found that in the presence of highly supportive context, readers instantiated highly related concepts in place of the correct antecedent during a reinstatement search, even though those concepts did not even appear in the text. In the present experiments, a highly related but distorted anaphor referred to an antecedent concept present in the text. Two main questions concerning this issue were addressed. First, do readers even detect the distortion? Second, if so, what factors affect this process? The factors explored included the semantic relation between the distorted anaphor and its antecedent, as well as information presented in the text itself (i.e., the episodic information).

The Moses Illusion rests on the assumption that the mapping process between the features of the information in semantic memory and the information in the question does not require a perfect match (e.g., Kamas & Reder, 1995; Kamas et al., 1996; Reder & Cleeremans, 1990; Reder & Kusbit, 1991). Under the assumptions of the resonance model (e.g., Myers & O'Brien, 1998; O'Brien, 1995; O'Brien & Myers, 1999), when two concepts share a high degree of featural overlap, they may be mapped onto each other fairly easily. Under these conditions, it may be difficult for readers to detect a distortion in

one of these concepts. When two concepts share less featural overlap, however, mapping the features of one concept onto those of another should become more difficult; even assuming an imperfect mapping process, distortions should be easier to detect. Erickson and Mattson (1981) found that participants often failed to detect the error when "Noah" was replaced with "Moses" in Illusion questions, but almost all participants detected the error when "Noah" was replaced with "Nixon." The features of the highly related concepts Moses and Noah would have been easily mapped onto one another, but this certainly would not be the case for Nixon and Noah – two concepts that share very little featural overlap. The research on the Moses Illusion has been limited to the question answering paradigm, and it largely tests the role of semantic memory in processing distortions. Whether the Illusion extends to longer pieces of text or when the targeted information is present in the text have not been investigated.

Experiments 2a and 2b tested whether readers would detect distortions when the targeted information was in an episodic memory trace instead of just semantic memory. In the incorrect - high overlap condition, the antecedent shared high featural overlap with its distorted anaphor, and the elaboration of the antecedent (e.g., violin) contained similarities between the antecedent and anaphor (e.g., cello). In the incorrect - low overlap condition, the semantic relation between the antecedent and the anaphor was much weaker, and the elaboration contained only dissimilarities between the antecedent (e.g., oboe) and anaphor. If the episodic trace of the antecedent was at least as accessible in memory as information from semantic memory during reinstatement, the distortion should have been detected quickly and easily in both incorrect conditions, and there should have been no differences

in reading times between the two conditions on the reinstatement sentence. However, if the information about the semantic relation between the anaphor and antecedent was more accessible than the episodic trace, the distortion in the incorrect - high overlap condition may have been detected less often than in the incorrect - low overlap condition due to the greater degree of featural overlap between the antecedent and anaphor in the incorrect - high overlap condition. The results for the reinstatement sentence supported the latter hypothesis – readers did not detect the inconsistency as often in the incorrect - high overlap condition as in the incorrect - low overlap condition. This was reflected in faster reading times in the incorrect - high overlap condition. Thus, the information about the semantic relation between the antecedent and anaphor was more accessible in memory, or integrated more quickly, during reinstatement than the actual episodic trace of the antecedent, although both types of information were presumably signaled in parallel. Even when the episodic memory traces surrounding the target antecedent were modified to contain only the differences between the antecedent and the anaphor (Experiment 3) or highlighted with syntactic focus (Experiment 4), reading times for the reinstatement sentence were still faster in the incorrect - high overlap condition than the incorrect - low overlap condition.

The spillover sentence was included in Experiments 2a - 4 in order to determine whether the inconsistency effect in the incorrect - high overlap condition was delayed. In all four experiments, reading times on the spillover sentence were faster in the correct antecedent condition than in both incorrect conditions, and there were no differences between the incorrect - high and - low overlap conditions. Thus, it appears that the

distortion was not fully apparent in the incorrect - high overlap condition until the spillover sentence was presented. That is, the episodic mismatch between the antecedent and the anaphor was not fully detected in the incorrect - high overlap condition until readers had already moved on to the spillover sentence. These results are consistent with the idea that information in the episodic memory trace became available at a slower rate than information from semantic memory. Although the rates at which episodic and semantic information become available and are integrated may differ, it is important to note that episodic and semantic information are not assumed to reside in separate stores (e.g., McKoon & Ratcliff, 1979; McKoon, Ratcliff, & Dell, 1986; but see Tulving, 1984), and that the initial signal in memory should go out to both types of information in long-term memory in parallel (e.g., Myers & O'Brien, 1998; O'Brien, & Myers, 1999). Processing for both types of information should operate in the same fashion, but the speed of reactivation of each may be influenced by such factors as distance, elaboration, or the strength of the individual memory traces.

One possible alternative explanation to differing rates of activation for episodic and semantic information is that readers may have been simply waiting to find out whether the inconsistency in the reinstatement sentence would be resolved in the next sentence (e.g., Thurlow, 1991). When it was not, reading times slowed down considerably on the spillover sentence. However, if readers were waiting for the inconsistency to be resolved, they should have waited for a resolution just as often in the incorrect - low overlap condition as in the incorrect - high overlap condition; there should have been no difference in reading times between the two incorrect conditions for the reinstatement sentence. The

difference between the incorrect - high and - low overlap conditions for the reinstatement sentence was significant in all four experiments. A view in which semantic and episodic information are reactivated and integrated at different rates provides a better explanation of the results of Experiments 2a - 4.

The reading time results of Experiments 2a - 4 are especially interesting in light of the fact that previous work on antecedent retrieval has stressed the importance of the order in which episodic and semantic memory were searched. For example, Kintsch and van Dijk (1978) assumed that when a text required reinstatement of a concept no longer active in memory, readers first searched the episodic representation of the text for an antecedent. If this reinstatement search was unsuccessful, a bridging inference resulted. However, van Dijk and Kintsch (1983) modified their original theory to state that semantic memory was of greater importance than the episodic memory trace and would be searched first. The present results are more consistent with that view. However, most current models of memory view reactivation of concepts from long-term memory as a passive process and assume that both episodic and semantic information are activated in parallel (e.g., Kintsch, 1998; Myers & O'Brien, 1998; O'Brien & Myers, 1999). But, these models have primarily addressed activation of the episodic trace and have for the most remained quiet concerning the activation of information from semantic memory, and about the rates of activation of episodic and semantic information.

Another way to view the reactivation of concepts from long-term memory is to assume that the reader actively searches for information relevant to the current contents of working memory (e.g., Graesser, Singer, & Trabasso, 1994; Singer, Graesser, &

Trabasso, 1994). If this is true, when a reader encounters a sentence that requires the reinstatement of information no longer active in memory, it is reasonable to assume that the episodic memory trace of the text would be searched first. This is because the episodic representation contains the exact concept for which the reader is searching (i.e., the antecedent). In contrast, searching semantic memory first would require a vast search for vague information that might not even be present. In addition, even if the search did result in the reactivation of relevant concepts, the reader would have to engage in inference processes in order to map this information onto the existing memory representation, and the inference may not even be correct (see O'Brien & Albrecht, 1991). On a more general level, it is difficult to envision how an active search mechanism would operate. An active search process would require an additional mechanism that guided and directed the search (e.g., a homunculus).

Previous work on antecedent retrieval has largely focused on the episodic memory trace - general world knowledge was held constant while factors such as distance, elaboration, or causality were systematically varied in the text. Recently, O'Brien, Cook, and Derepentigny (in press) argued that it is becoming increasingly important for researchers to study how episodic and semantic information interact in discourse processing. The experiments presented in this dissertation are one step in this direction. The reading time results of Experiments 2a - 4 indicate that the role of general world knowledge in antecedent retrieval is more important than previously thought and may be more available during integration than the episodic memory trace of the antecedent itself, and that these factors interact. A recent study by Myers, Cook, Kambe, Mason, and

O'Brien (in press) provided additional evidence in support of the interaction of episodic and semantic information during antecedent retrieval. They used texts in which the antecedent was either a typical or atypical exemplar of a specific category (e.g., *candles* or *lanterns*, respectively, for the category, *emergency supplies*) and found that target sentences containing typical exemplars were read faster than those containing atypical exemplars. In addition, episodic accessibility (e.g., distance or elaboration) of the antecedent also influenced reading time. Myers et al. argued that semantic and episodic information were activated in parallel, but that the differences in the effects of each may be a function of processes that occur during integration. Thus, it is clear from both the Myers et al. work and the results presented in this dissertation that both semantic and episodic information interact to influence the reinstatement process. Future research should continue to examine the extent to which general world knowledge influences not only antecedent retrieval, but discourse processing in general.

The combined results of Experiments 2a - 4 indicated that the Moses Illusion can be extended to reading comprehension, and more specifically, to the processes involved in antecedent retrieval; the illusion was still present even when the targeted information appeared in the text. The Moses Illusion effects found in these experiments appear to be more robust even than those found in the original Moses Illusion literature. Factors that led to reduced detection rates in the original Moses Illusion experiments – highlighting dissimilarities between correct and distorted concepts and highlighting distorted concepts with syntactic focus – did not appear to affect reading times in the present experiments. One explanation for this may be that the Moses Illusion items were single sentences, in

which all critical information should have still been active in memory when participants made their responses. Mediating factors such as the use of distinguishing questions or syntactic focusing devices may have had stronger effects in the original Moses Illusion research because they were still active in memory when the distortion was presented.

Perhaps the effect in the incorrect - high overlap condition would have disappeared if the episodic memory trace of the antecedent was still active in memory when the anaphor was presented. It is logical to assume that the episodic trace would dominate the initial stages of the mapping process if it was still active in memory – that is, active episodic information would be integrated more quickly than semantic information that had to be reactivated. The episodic memory trace may only play a more subordinate role than semantic information if it has to be reactivated from long-term memory. In the future, it would be interesting to compare conditions in which the incorrect - high overlap antecedent is either backgrounded or still active in memory when the distorted anaphor is presented. Differences in these conditions would provide some insight into the circumstances under which semantic and episodic information vary in availability and importance during integration.

In conclusion, as stated earlier, the majority of the work on memory retrieval in discourse processing has focused primarily on the role of the episodic memory trace. Research on the involvement of general world knowledge in this process has for the most part been left untouched. It is clear from the present results that episodic and semantic information interact during reading, and that they differ in the rates at which they become available. Future work should continue to investigate the interaction between these two

types of information, the rates at which they are reactivated, and the conditions under which each presides over the early stages of the mapping process.

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APPENDICES

Appendix A

The correct antecedent and incorrect – high and – low antecedent sets used in Experiments 1A and 1B are presented in this Appendix. The correct antecedent was paired with either the incorrect – high or – low overlap antecedents in Experiment 1A. In Experiment 1B, the correct antecedent was paired with either the incorrect – high overlap antecedent, the incorrect – low overlap antecedent, or a neutral prime.

	Antecedent Condition		
	Correct	Incorrect = High	Incorrect = Low
1.	cello	violin	oboe
2.	gold	silver	tin
3.	dictionary	thesaurus	encyclopedia
4.	general	colonel	private
5.	cheetah	jaguar	lion
6.	cotton	flannel	silk
7.	spoon	fork	knife
8.	chair	table	lamp
9.	orange	grapefruit	fig
10.	mayor	governor	sheriff
11.	house	cabin	tent
12.	whiskey	gin	champagne
13.	hammer	mallet	wrench
14.	salt	pepper	oregano
15.	wrestling	boxing	tennis
16.	quarter	nickel	penny
17.	goose	duck	robin
18.	tricycle	bicycle	skateboard
19.	jacks	marbles	ball
20.	broccoli	cauliflower	corn
21.	ant	beetle	fly
22.	chess	checkers	cards
23.	truck	car	bus
24.	cake	pie	pudding
25.	bagel	donut	cereal
26.	ivy	fern	cactus
27.	pen	pencil	crayon
28.	trumpet	trombone	drum
29.	coffee	tea	milk
30.	ruby	sapphire	opal
31.	shoe	boot	sandal
32.	mop	broom	sponge
33.	poster	sign	painting
34.	cookie	cracker	candy
35.	concert	play	ballgame
36.	hat	hood	gloves
37.	book	magazine	poster
38.	toaster	microwave	sink

39.	CD	record	tape
40.	brush	comb	curlers
*41.	robin	sparrow	crow
*42.	radio	stereo	television

* Only appeared in Experiment 1B

Appendix B

The passages used in Experiments 2A and 2B are presented in this Appendix. Each participant only saw one of the three versions of each passage.

Introduction
Terry loved classical music. She spent most of her waking hours listening to it, either in her room or in the car.

Correct Antecedent
Terry decided that it would be fun to teach herself how to play. She drove to a music shop located in the next town. As she entered the store she saw a beautiful cello. It was made of beautiful cherry-stained wood, and the strings were perfectly tuned. She imagined herself pulling the bow across the strings to create perfect notes. Terry asked the salesman for a price. After thinking for a few minutes, she decided to buy it that afternoon.

Incorrect - High Overlap Antecedent
Terry decided that it would be fun to teach herself how to play. She drove to a music shop located in the next town. As she entered the store she saw a beautiful violin. It was made of beautiful cherry-stained wood, and the strings were perfectly tuned. She imagined herself pulling the bow across the strings to create perfect notes. Terry asked the salesman for a price. After thinking for a few minutes, she decided to buy it that afternoon.

Incorrect - Low Overlap Antecedent
Terry decided that it would be fun to teach herself to play. She drove to a music shop located in the next town. As she entered the store she saw a beautiful oboe. The keys on it were bright and shiny, and the case was lined in black velvet. She imagined herself fingering the keys to create perfect notes. Terry asked the salesman for a price. After thinking for a few minutes, she decided to buy it that afternoon.

Filler
Afterwards, Terry went home where she found a message on her answering machine from her friend Jill. Because Terry hadn't spoken to Jill in over a week, she decided to invite her over for some coffee and chocolate cake. When Jill came over, she excitedly told Terry that she had a new boyfriend. After chatting about Jill's new boyfriend for a while, Jill asked Terry what was new with her.

Reinstatement and Spillover Sentences
Terry showed her the cello she bought.
She even tried to play a few notes.

Closing
Terry told Jill that she was going to start practicing that very evening.

Introduction
Shirley had a secretarial job at the local community college. She was reading the newspaper while on her lunch break.

Correct Antecedent
While perusing the paper, Shirley noticed an article about the military base in the next town. Next to the article, there was a photograph. The picture showed a general in full uniform. He had several medals pinned to his uniform and was standing at the head of a large regiment of men. All of the men in the regiment were saluting him. Shirley couldn't help but be impressed. She decided to cut out the photograph, and then she put it in her purse.

Incorrect – High Overlap Antecedent
While perusing the paper, Shirley noticed an article about the military base in the next town. Next to the article, there was a photograph. The picture showed a colonel in full uniform. He had several medals pinned to his uniform and was standing at the head of a large regiment of men. All of the men in the regiment were saluting him. Shirley couldn't help but be impressed. She decided to cut out the photograph, and then she put it in her purse.

Incorrect – Low Overlap Antecedent
While perusing the paper, Shirley noticed an article about the military base in the next town. Next to the article, there was a photograph. The picture showed a private in uniform. His uniform was very plain, and he had no medals at all. He was standing in the middle of a large regiment of men, and they were all at salute. Shirley couldn't help but be impressed. She decided to cut out the photograph, and then she put it in her purse.

Filler
As she continued to look through the paper, Shirley realized her lunch break was over. She went back to her desk and organized some invoices. After that, her boss came by and gave her a list of names and telephone numbers that he wanted her to type up and distribute by the end of the day. By the time she was finished with the list, it was time to go home. Shirley turned off her computer and picked up her purse.

Reinstatement and Spillover Sentences
The picture of the general fell out.
Shirley smiled as she retrieved it.

Closing
She turned off the lights as she headed out the door on her way home.

Introduction
Virgil and his wife decided to redecorate their living room. Their furniture was still in pretty good shape, but the colors and the fabrics were very outdated.

Correct Antecedent
They decided they would start by recovering the sofa. On a Saturday afternoon, they went to the local fabric store. Virgil found a bolt of cotton fabric that he really liked. He thought that it would be durable, strong, and pretty easy to clean. It was in a blue and red plaid design and was also cheap, which Virgil especially liked. Virgil went over to his wife to ask her what she thought. She agreed and they continued to look around the store.

Incorrect - High Overlap Antecedent
They decided they would start by recovering the sofa. On a Saturday afternoon, they went to the local fabric store. Virgil found a bolt of flannel fabric that he really liked. He thought that it would be durable, strong, and pretty easy to clean. It was in a blue and red plaid design and was also cheap, which Virgil especially liked. Virgil went over to his wife to ask her what she thought. She agreed and they continued to look around the store.

Incorrect - Low Overlap Antecedent
They decided they would start by recovering the sofa. On a Saturday afternoon, they went to the local fabric store. Virgil found a bolt of silk fabric that he really liked. He knew that it would be a delicate fabric that was likely to tear, and would be very expensive and difficult to clean. It was woven in a beautiful floral design. Virgil went over to his wife to ask her what she thought. She agreed and they continued to look around the store.

Filler
Virgil's wife was a very good seamstress and often made her own clothes, so she was also using the time at the store to find some patterns for a new dress for herself. She was going to a big banquet and needed something really nice. She had looked through her closet and just wasn't satisfied with anything that she already owned. She found a few patterns and brought them up to the cash register.

Reinstatement and Spillover Sentences
Virgil brought over the bolt of cotton.
He was very happy with his decision.

Closing
After leaving the fabric store, Virgil and his wife decided to go out for lunch.

Introduction
Max had spent the entire day working at the library. He had a paper due in a couple of weeks, and he needed to do lots of research for it.

Correct Antecedent
As he walked outside, he realized that he had been working for six hours and that his stomach was growling. He rummaged through his bag to see if he had anything left over from his lunch. He pulled out an orange from the very bottom of the bag. He sat down and started to peel it, and then he divided it into sections. As he bit into the first section, juice squirted all over his shirt. He laughed and then looked around to see if anyone had noticed.

Incorrect – High Overlap Antecedent
As he walked outside, he realized that he had been working for six hours and that his stomach was growling. He rummaged through his bag to see if he had anything left over from his lunch. He pulled out a grapefruit from the very bottom of the bag. He sat down and started to peel it, and then he divided it into sections. As he bit into the first section, juice squirted all over his shirt. He laughed and then looked around to see if anyone had noticed.

Incorrect – Low Overlap Antecedent
As he walked outside, he realized that he had been working for six hours and that his stomach was growling. He rummaged through his bag to see if he had anything left over from his lunch. He pulled out a fig from the very bottom of the bag. He had picked it from the tree behind his parents' house that morning. He noticed that it sort of resembled a small pear. He laughed and then looked around to see if anyone had noticed.

Filler
When he looked up, he saw his friend Alice approaching. She had been his chemistry lab partner the previous semester, and they had become good friends. He hadn't seen her in several months, so they had a lot of gossip to catch up on. She told him that she was thinking about studying abroad the following year. She was leaving to get something to eat and invited him to go with her.

Reinstatement and Spillover Sentences
He said he had just eaten an orange.
He was still sort of hungry, though.

Closing
Max picked up his bag and walked with Alice to a café downtown.

Introduction
The city was gearing up for its annual fall festival, and there was excitement in the air. Jenny was a newspaper journalist working on a story about the event.

Correct Antecedent
She had heard from one of her sources that some big government officials were going to start off the ceremonies at the festival. Her source had told her that the mayor was going to give a speech at the rally that would start the festival. She recalled that during the election, he walked around the city shaking hands and kissing babies. She had heard that he was a very powerful public speaker. Jenny called her source to find out more information about the story.

Incorrect - High Overlap Antecedent
She had heard from one of her sources that some big government officials were going to start off the ceremonies at the festival. Her source had told her that the governor was going to give a speech at the rally that would start the festival. She recalled that during the election, he walked around the city shaking hands and kissing babies. She had heard that he was a very powerful public speaker. Jenny called her source to find out more information about the story.

Incorrect - Low Overlap Antecedent
She had heard from one of her sources that some big government officials were going to start off the ceremonies that the festival. Her source had told her that the sheriff was going to give a speech at the rally that would start the festival. She recalled that she had seen him riding around in a patrol car and blowing the siren and flashing the lights. She had heard that he was not a very popular public official. Jenny called her source to find out more information.

Filler
Jenny was at her cubicle in the newspaper office when she tried to call. It was so noisy that she could barely hear herself think, so she decided she would put off the call until later. In the meantime, she had to go to a meeting with her boss. He was angry with her about a controversial story she had written a few days ago. She hoped that she would be able to divert his attention.

Reinstatement and Spillover Sentences
She told him about the mayor's speech.
He forgot all about her previous story.

Closing
Jenny's boss gave her a big pat on the back as she left his office.

Introduction
Trevor was in a fantastic mood. It was Friday, and he had the whole weekend ahead of him to think about other things besides work.

Correct Antecedent
After the office closed, he and some of his coworkers decided to go out for drinks. They walked from the office to a bar down the street. When the waitress came to take their orders, Trevor ordered a mixed drink that contained whiskey. The bartender that had made the drink filled the glass halfway with it before he added the mixer. Trevor liked the way it burned all the way down his throat and warmed up his stomach.

Incorrect – High Overlap Antecedent
After the office closed, he and some of his coworkers decided to go out for drinks. They walked from the office to a bar down the street. When the waitress came to take their orders, Trevor ordered a mixed drink that contained gin. The bartender that had made the drink filled the glass halfway with it before he added the mixer. Trevor liked the way it burned all the way down his throat and warmed up his stomach.

Incorrect – Low Overlap Antecedent
After the office closed, he and some of his coworkers decided to go out for drinks. They walked from the office to a bar down the street. When the waitress came to take their orders, Trevor ordered a glass of champagne. The bartender uncorked a bottle of it and the foam flew everywhere. It usually made him feel giddy and sometimes even gave him the hiccups. Afterwards, Trevor felt warm all over.

Filler
After Trevor and his friends finished a round of drinks, they decided to go shoot pool in the back of the bar. Trevor was a bit of a pool shark, so he suggested that they play for money. The last time he had played, he had raked in two hundred dollars in a single night. He won two games, and then decided to just sit while his friends played a third game. When he got up, he felt kind of dizzy.

Reinstatement and Spillover Sentences
The whiskey had really affected him.
He was going to have to walk home.

Closing
That was fine, since he lived just a few blocks down the street from the bar.

Introduction
Maggie was getting ready to move to the big city. She had packed up all of her belongings and they were sitting in boxes in the front yard.

Correct Antecedent
When the movers came to take the boxes and the furniture, Maggie watched them like a hawk. She had a lot of really nice things, and she didn't want anything to get damaged. She saw two movers come out of the house carrying a large heavy table. It was made of beautiful shining oak, and the varnish was flawless. The legs on it were intricately carved to look like lions' feet. Maggie was very nervous as she watched the movers carry her things out of the house.

Incorrect - High Overlap Antecedent
When the movers came to take the boxes and the furniture, Maggie watched them like a hawk. She had a lot of really nice things, and she didn't want anything to get damaged. She saw two movers come out of the house carrying a large heavy chair. It was made of beautiful shining oak, and the varnish was flawless. The legs on it were intricately carved to look like lions' feet. Maggie was very nervous as she watched the movers carry her things out of the house.

Incorrect - Low Overlap Antecedent
When the movers came to take the boxes and the furniture, Maggie watched them like a hawk. She had a lot of really nice things, and she didn't want anything to get damaged. She saw a mover come out of the house carrying a small iron lamp. It had a shade made of stained glass designed to look like magnolias. It was small, but it emitted a great deal of light. Maggie was very nervous as she watched the movers carry her things out of the house.

Filler
While she was watching the men work, her neighbor from across the street came over. He had become good friends with Maggie over the years, and he was sorry to see her leave. He had packed her a little basket of snacks for her to take with her in the car while she was driving to her new home. He stood with Maggie for a while and watched the man who was working in the truck.

Reinstatement and Spillover Sentences
The movers were handing him the table.
The man finally got it into the truck.

Closing
Maggie breathed a sigh of relief and turned to give her neighbor a sad hug goodbye.

Introduction
John was a wealthy investment banker getting ready for his summer vacation. He had decided to take the entire summer off to go live in the woods.

Correct Antecedent
John hadn't made any plans as to where he would stay yet, but he figured he would take a drive to see what he could find. He turned onto a dirt road that led into the woods, and around the first bend he saw a house for sale. It was small and looked like something that might have once been a summer home. It had a sign posted on the front door. John wrote down the name and number of the owner that were written on the sign.

Incorrect - High Overlap Antecedent
John hadn't made any plans as to where he would stay yet, but he figured he would take a drive to see what he could find. He turned onto a dirt road that led into the woods, and around the first bend he saw a cabin for sale. It was small and looked like something that might have once been a summer home. It had a sign posted on the front door. John wrote down the name and number of the owner that were written on the sign.

Incorrect - Low Overlap Antecedent
John hadn't made any plans as to where he would stay yet, but he figured he would take a drive to see what he could find. He turned onto a dirt road that led into the woods, and around the first bend he saw a tent for sale. It was made of nylon and was held in place by large wooden stakes. It had a sign taped to the side. John wrote down the name and number of the owner that were written on the sign.

Filler
Because it was such a nice afternoon, John decided to drive further into the woods. After he had driven about 20 miles, he realized he was lost. He had driven by the same crooked oak tree three times in the last fifteen minutes. At least he was able to laugh it off and enjoy the scenery while he drove along. John finally found his way again and picked up his car phone.

Reinstatement and Spillover Sentences
He was calling about the house for sale.
He hoped that he would get a good price.

Closing
The line was busy, so John hung up and decided that he would try to call again later.

Introduction
Rick had just bought a new house. He had lived in apartments all of his life, so he didn't have all of the tools he knew he would need for minor home repairs.

Correct Antecedent
In fact, all his toolbox contained were some old rusty screws, a tape measure, and a tangled up ball of string. He went to the hardware store down the street in search of a good hammer. He looked down every row until he finally found what he wanted. It had an iron head and a wooden handle, onto which was stamped the name of the manufacturer. It was a little too heavy, but Rick decided that he didn't care.

Incorrect - High Overlap Antecedent
In fact, all his toolbox contained were some old rusty screws, a tape measure, and a tangled up ball of string. He went to the hardware store down the street in search of a good mallet. He looked down every row until he finally found what he wanted. It had an iron head and a wooden handle, onto which was stamped the name of the manufacturer. It was a little too heavy, but Rick decided that he didn't care.

Incorrect - Low Overlap Antecedent
In fact, all his toolbox contained were some old rusty screws, a tape measure, and a tangled up ball of string. He went to the hardware store down the street in search of a good wrench. He looked down every row until he finally found what he wanted. It was made of metal and came with a free carrying case. It was adjustable, too, so Rick would only have to buy one. Rick was happy with his choice.

Filler
As he was looking around the store, he ran into his good friend Tony. Tony had been having car trouble and was looking for some parts to fix his fan belt. Rick didn't really know anything about cars, so he just smiled and nodded as Tony explained what he thought the problem was. Tony invited Rick to drop by his house later for a few beers. Rick happily accepted and headed toward the front of the store.

Reinstatement and Spillover Sentences
He handed the hammer to the cashier.
Rick had just enough cash to buy it.

Closing
Rick thanked the cashier and left the store to go run a few more errands.

Introduction
Kelly was a sports fanatic. She spent all of her free time watching sports on TV, going to sporting events, and playing sports.

Correct Antecedent
For example, she was planning on spending this evening planted in front of the TV. There was a great wrestling match on, and she did not want to miss a single minute. It was her favorite sport because she loved watching the men work up a sweat as they fought. She hoped one day she could go see it in person so that she could sit right next to the ring. She thought that would be the ultimate experience.

Incorrect - High Overlap Antecedent
For example, she was planning on spending this evening planted in front of the TV. There was a great boxing match on, and she did not want to miss a single minute. It was her favorite sport because she loved watching the men work up a sweat as they fought. She hoped one day she could go see it in person so that she could sit right next to the ring. She thought that would be the ultimate experience.

Incorrect - Low Overlap Antecedent
For example, she was planning on spending this evening planted in front of the TV. There was a great tennis match on, and she did not want to miss a single minute. She loved watching the ball bounce back and forth across the net as it was played. She thought that it required a skill and grace that not many other kinds of athletes could claim. Kelly hoped that one day she would be able to acquire those same skills.

Filler
Kelly went to the grocery store to get some snacks for the big night. She first picked up some popcorn and soda, and then went into the frozen foods aisle. She debated about whether to get some frozen pizzas or chocolate ice cream, but she finally decided that what she really wanted were french fries. She loaded up her cart and went through the express line. She impatiently waited for the cashier to ring up her bill.

Reinstatement and Spillover Sentences
She was excited about the wrestling match.
She hoped that she would not be too late.

Closing
When she got home, she put away her groceries and turned on the TV. She was just in time.

Introduction
It was a gorgeous spring day, and Chelsea's mother brought her to the park. The park was Chelsea's favorite place, because she could see all kinds of interesting animals there.

Correct Antecedent
Today, they were sitting on a bench by the pond. Chelsea was plaguing her mother with questions about everything she saw. Suddenly, a goose swam into view. Chelsea loved how it glided gracefully through the water. Then it suddenly dove under water to catch a fish, and Chelsea only saw webbed feet wiggling above the water. Chelsea could not stop from laughing, and even her mother giggled a little as they continued to watch.

Incorrect - High Overlap Antecedent
Today, they were sitting on a bench by the pond. Chelsea was plaguing her mother with questions about everything she saw. Suddenly, a duck swam into view. Chelsea loved how it glided gracefully through the water. Then it suddenly dove under water to catch a fish, and Chelsea only saw webbed feet wiggling above the water. Chelsea could not stop from laughing, and even her mother giggled a little as they continued to watch.

Incorrect - Low Overlap Antecedent
Today, they were sitting on a bench by the pond. Chelsea was plaguing her mother with questions about everything she saw. Suddenly, a robin flew past them. It landed on a tree branch nearby, where there was a nest. Chelsea watched it pull some twigs and string into the nest, all the while chirping a cheerful song. Chelsea could not stop from laughing, and even her mother giggled a little as they continued to watch.

Filler
It was getting late, and Chelsea's mother told her that it was time to go home for dinner. As they walked back home, Chelsea asked her mother what they were going to have for dinner and how they were going to cook it. Her mother patiently explained that they were going to have tuna casserole and that they would bake it in the oven. When they arrived home, Chelsea's father was there to greet them.

Reinstatement and Spillover Sentences
Chelsea told him all about the goose.
He laughed as she imitated the bird.

Closing
Chelsea's father read her three books before it was finally time to eat dinner.

Introduction
Jonas was about to turn five years old. His favorite uncle was asking him what kind of present he wanted for his birthday.

Correct Antecedent
Jonas had to think hard about this, because he didn't want to ask for just anything. Then he remembered a shiny new tricycle he had seen in a store window. It was red, with a white seat and handlebars. The wheels were made of shiny black rubber. Jonas had imagined how fast he could travel down the sidewalk riding it. He thought that he would be the envy of all of the kids in his kindergarten class.

Incorrect - High Overlap Antecedent
Jonas had to think hard about this, because he didn't want to ask for just anything. Then he remembered a shiny new bicycle he had seen in a store window. It was red, with a white seat and handlebars. The wheels were made of shiny black rubber. Jonas had imagined how fast he could travel down the sidewalk riding it. He thought that he would be the envy of all of the kids in his kindergarten class.

Incorrect - Low Overlap Antecedent
Jonas had to think hard about this, because he didn't want to ask for just anything. Then he remembered a cool new skateboard he had seen in a store window. It was black, with bright stickers and designs all over. The four wheels were small and white. Jonas had imagined how fast he could travel down the sidewalk on it. He thought that he would be the envy of all of the kids in his kindergarten class.

Filler
He had also seen a new baseball glove that he wanted. It was made of real leather, and had fit his hand just right. His big brother had a really nice glove, but he would never let Jonas use it. Jonas really wanted one of his own, because he would be starting Little League in the spring. But Jonas also wanted a new toy firetruck, some Legos, and a new robot. He thought that he deserved to get them all.

Reinstatement and Spillover Sentences
He told his uncle about the tricycle.
He really hoped that he would get it.

Closing
Jonas' uncle smiled at him and said that he would try to keep that in mind.

Introduction
Maria had not been feeling well lately. She thought it might have been because she had been eating a lot of fast food.

Correct Antecedent
She decided she needed a good home-cooked meal, so she went to the market to buy some fresh vegetables. She debated over what to get until she saw a whole bin full of fresh broccoli. She loved to serve it broken up into little florets, covered with a fresh cream sauce. The only thing she didn't like was the way it smelled while cooking and made her whole house stink. She decided that the healthy meal would be worth the trouble.

Incorrect - High Overlap Antecedent
She decided she needed a good home-cooked meal, so she went to the market to buy some fresh vegetables. She debated over what to get until she saw a whole bin full of fresh cauliflower. She loved to serve it broken up into little florets, covered with a fresh cream sauce. The only thing she didn't like was the way it smelled while cooking and made her whole house stink. She decided that the healthy meal would be worth the trouble.

Incorrect - Low Overlap Antecedent
She decided she needed a good home-cooked meal, so she went to the market to buy some fresh vegetables. She debated over what to get until she saw a whole bin full of fresh ears of corn. She loved to serve it steamed, and dripping with fresh butter. The only thing she didn't like was the way that the little kernels got stuck between her teeth when she was eating it. She decided that the healthy meal would be worth the trouble.

Filler
She suddenly remembered that the next day was her dad's birthday. She had forgotten to buy him a present, but she decided that she would surprise him with a homemade cake. She picked out flour, sugar, baking powder, eggs, and chocolate icing. Then she picked up a box of birthday candles. When she walked up to the checkout, her cart tipped over and all of her groceries fell out and rolled all over the place.

Reinstatement and Spillover Sentences
The broccoli rolled under a magazine rack.
She had to bend over to pick it up.

Closing
Maria was still blushing when she picked up the last of her items from the floor.

Introduction
Henry and Arthur had been friends all of their lives. Even when they retired, they still spent large parts of each day together.

Correct Antecedent
It was a beautiful spring day, so Henry suggested to Arthur that they go sit on a bench in Central Park. As they strolled through the park, they saw another pair of elderly men sitting at a table playing chess. The game appealed to Henry because of its checkered board and the colored pieces for the two players. He also liked the part of it when he could capture his opponent's pieces. Henry and Arthur decided that they wanted to play, too.

Incorrect - High Overlap Antecedent
It was a beautiful spring day, so Henry suggested to Arthur that they go sit on a bench in Central Park. As they strolled through the park, they saw another pair of elderly men sitting at a table playing checkers. The game appealed to Henry because of its checkered board and the colored pieces for the two players. He also liked the part of it when he could capture his opponent's pieces. Henry and Arthur decided that they wanted to play, too.

Incorrect - Low Overlap Antecedent
It was a beautiful spring day, so Henry suggested to Arthur that they go sit on a bench in Central Park. As they strolled through the park, they saw another pair of elderly men sitting at a table playing a game of cards. It looked like a lot of fun, but Henry wasn't sure who was winning. It was a very evenly matched game. One of the men called, "Gin!" just as Henry and Arthur decided that they wanted to play, too.

Filler
Henry was getting hungry, though, so he recommended that he and Arthur go get some lunch. They went to Henry's house, because Henry's wife was a better cook. She made them grilled cheese sandwiches and a really good creamy tomato soup. Arthur ate at their house as often as he could. He thanked Henry's wife as they headed out the door. Arthur told Henry he wanted to go back to the park.

Reinstatement and Spillover Sentences
He reminded Henry about the chess game.
He thought he would be able to beat him.

Closing
Henry went back into the house to look for the game, while Arthur waited on the porch.

Introduction
Monica was the chef at a new five star restaurant in town. She had been hired for her innovative ideas about healthy desserts.

Correct Antecedent
Monica was very nervous this evening, because a famous food critic was eating in the restaurant. She wanted to make him a dessert he would never forget. She had just developed a recipe for a fabulous cake, so she decided to make that. It had only been out of the oven for a few minutes when the critic ordered his dessert. She cut him a generous slice of it, and put a little sprig of mint on the side.

Incorrect - High Overlap Antecedent
Monica was very nervous this evening, because a famous food critic was eating in the restaurant. She wanted to make him a dessert he would never forget. She had just developed a recipe for a fabulous pie, so she decided to make that. It had only been out of the oven for a few minutes when the critic ordered his dessert. She cut him a generous slice of it and put a little sprig of mint on the side.

Incorrect - Low Overlap Antecedent
Monica was very nervous this evening, because a famous food critic was eating in the restaurant. She wanted to make him a dessert he would never forget. She had just developed a recipe for a fabulous pudding, so she decided to make that. She had just taken it out of the refrigerator when the critic ordered his dessert. She spooned a generous portion of it into a bowl and put a little sprig of mint on the side.

Filler
While she nervously waited for the critic's opinion, the head bus boy came in with a load of dishes. He must have slipped on something, because the next thing Monica knew, his feet were up in the air, and there were broken dishes everywhere. Monica helped him up and they both started to pick up the broken plates and glasses. Then a waitress came in and told Monica she was wanted in the front.

Reinstatement and Spillover Sentences
The critic had really liked the cake.
He told Monica it was just wonderful.

Closing
Monica thanked him and told him that it was her own special recipe.

Introduction
Mark had just moved into a new neighborhood. He didn't know too many of his neighbors, so he decided to throw a party and invite all of them.

Correct Antecedent
He was having a great time meeting everyone. He was very surprised when one lady walked up to him and handed him a potted ivy. It was a beautiful plant, with soft green leaves that trailed in all directions out of the pot. The woman told Mark that it would need a lot of light and water. Mark thanked her and asked her if she would like to get something to drink. Then he walked with her to the bar.

Incorrect - High Overlap Antecedent
He was having a great time meeting everyone. He was very surprised when one lady walked up to him and handed him a potted fern. It was a beautiful plant, with soft green leaves that trailed in all directions out of the pot. The woman told Mark that it would need a lot of light and water. Mark thanked her and asked her if she would like to get something to drink. Then he walked with her to the bar.

Incorrect - Low Overlap Antecedent
He was having a great time meeting everyone. He was very surprised when one lady walked up to him and handed him a potted cactus. It was a rather ugly plant, with prickly leaves that shot out in all directions from the pot. The woman told Mark that it hardly needed any light or water at all. Mark thanked her and asked her if she would like to get something to drink. Then he walked with her to the bar.

Filler
He was just about to ask her how long she had lived in the neighborhood, when another man walked up and put his arm around her. She introduced the man to Mark as her husband. Mark shook his hand and then decided he should go mingle some more. He wanted to find some good looking single women to talk to. He noticed a very pretty lady standing by the window, and he went over to say hello.

Reinstatement and Spillover Sentences
She was admiring the ivy he had gotten.
She told him that it was a rare species.

Closing
He asked her if she would tell him more about the plant and about herself over dinner that Saturday night.

Introduction
It was Lorenzo's first day of high school. He had been unpopular in junior high, but he decided that was going to change in high school.

Correct Antecedent
He thought one way that he might become more popular was by joining the band. He went to the band practice room and looked around. His mind was made up the minute he saw a shiny new trumpet laying on a table. He picked it up and fingered the keys a little. Then he put it to his mouth and blew. He made a terrible sound, but he knew that once he learned to play, he would sound really great.

Incorrect - High Overlap Antecedent
He thought one way that he might become more popular was by joining the band. He went to the band practice room and looked around. His mind was made up the minute he saw a shiny new trombone laying on a table. He picked it up and fingered the keys a little. Then he put it to his mouth and blew. He made a terrible sound, but he knew that once he learned to play, he would sound really great.

Incorrect - Low Overlap Antecedent
He thought one way that he might become more popular was by joining the band. He went to the band practice room and looked around. His mind was made up the minute he saw a brand new drum laying on a table. He picked it up and thumped out a few beats. Then he really started to pound on it. He had absolutely no rhythm, but he knew that once he learned to play, he would sound really great.

Filler
He decided he would try to find the band instructor after school. Right now, though, he was late for study hall. He walked into the library and saw that almost all of the chairs were full. There was one empty seat in the back next to a senior guy. Lorenzo sat down in the chair and started to talk to the guy. They chatted for a while about what kinds of things they liked to do when they weren't in school.

Reinstatement and Spillover Sentences
Lorenzo told him all about the trumpet.
He thought the guy seemed impressed.

Closing
Lorenzo was thrilled when the senior leaned over and invited him to eat lunch at his table in the cafeteria.

Introduction
Martha, a very well-known nuclear physics professor, was on her way to a conference to give an invited talk. She had decided to fly instead of driving.

Correct Antecedent
After the plane had reached its cruising altitude, the stewardess came through with a drink cart. Martha was pretty thirsty, so she ordered a cup of coffee. The stewardess handed her a cup, and warned Martha that it was very hot. Martha took a long sip of the dark liquid, and smiled as its rich aroma drifted into the air. She thanked the stewardess and decided to read a novel to make the time go by more quickly.

Incorrect - High Overlap Antecedent
After the plane had reached its cruising altitude, the stewardess came through with a drink cart. Martha was pretty thirsty, so she ordered a cup of tea. The stewardess handed her a cup, and warned Martha that it was very hot. Martha took a long sip of the dark liquid, and smiled as its rich aroma drifted into the air. She thanked the stewardess and decided to read a novel to make the time go by more quickly.

Incorrect - Low Overlap Antecedent
After the plane had reached its cruising altitude, the stewardess came through with a drink cart. Martha was pretty thirsty, so she ordered a carton of milk. The stewardess handed her the carton, and warned Martha that it was very cold. Martha took a long sip of the white liquid, and laughed as she wiped it off of her upper lip. She thanked the stewardess and decided to read a novel to make the time go by more quickly.

Filler
Martha got tired of reading the novel and put it in her bag. She took out the notes for the talk she was supposed to give. She was kind of nervous, because some really famous people were supposed to be in the audience. She wanted to make sure that she knew her talk backwards and forwards so that she would not make any mistakes. As she read, the plane encountered a bit of turbulence.

Reinstatement and Spillover Sentences
Martha's coffee spilled all over her lap.
Her dress was completely ruined by it.

Closing
The stewardess rushed over and handed Martha a bunch of napkins so that she could clean off her dress.

Introduction
Howard worked late at night as a janitor in a large computer company. He liked wandering around the mazes of cubicles as he cleaned.

Correct Antecedent
This evening, as he was cleaning a row of cubicles, he saw a large rat run across the floor. He grabbed his mop to use to catch the rat. He tried to use its long handle to reach the rat, who had run under the desk. It was still dirty from cleaning the floor, so Howard had to be careful or he would get dirty as well. He still couldn't reach the rat, so he had to find another method to catch him.

Incorrect - High Overlap Antecedent
This evening, as he was cleaning a row of cubicles, he saw a large rat run across the floor. He grabbed his broom to use to catch the rat. He tried to use its long handle to reach the rat, who had run under the desk. It was still dirty from cleaning the floor, so Howard had to be careful or he would get dirty as well. He still couldn't reach the rat, so he had to find another method to catch him.

Incorrect - Low Overlap Antecedent
This evening, as he was cleaning a row of cubicles, he saw a large rat run across the floor. He grabbed his sponge to use to catch the rat. It was extra heavy from soaking up a lot of water, so Howard hoped he could hit the rat with it and knock him out. Even if the rat wasn't hurt, Howard figured maybe he would ran more slowly if he was wet. He missed the rat, so he had to find another method to catch him.

Filler
He went back to his cleaning cart to see what else he could use. He saw his bucket and had a good idea. If he could corner the rat, then he could just throw the bucket over him and then release him outside. It took a while, but Howard was finally able to catch the rat this way. After he put the rat outside, he went back to cleaning the same row of cubicles.

Reinstatement and Spillover Sentences
He went back over and picked up the mop.
He hoped he would not see any more rats.

Closing
Luckily, he did not, and he was even able to finish his work early.

Introduction
Jill was going out on a blind date with a friend of one of her coworkers. She was really nervous, because she didn't know anything about the guy.

Correct Antecedent
Jill's date picked her up at six o'clock. They went out for a nice Italian dinner and then went to a concert. It was being put on by a group that was very well known in that area. It was something that Jill had been wanting to go to for a long time. Jill noticed how nicely everyone in the audience was dressed. She was glad that she had dressed up for her date.

Incorrect - High Overlap Antecedent
Jill's date picked her up at six o'clock. They went out for a nice Italian dinner and then went to a play. It was being put on by a group that was very well known in that area. It was something that Jill had been wanting to go to for a long time. Jill noticed how nicely everyone in the audience was dressed. She was glad that she had dressed up for her date.

Incorrect - Low Overlap Antecedent
Jill's date picked her up at six o'clock. They went out for hot dogs and beer at a local pub, and then went to a ballgame being played in Fenway Park. It was the Yankees versus the Red Sox, and Jill was rooting for the Y kees. It was supposed to be a very exciting game. Jill noticed how casually everyone in the stands was dressed. She was glad that she had dressed casually for her date.

Filler
They were a little early, so they found their seats and chatted for a while. It turned out that Jill and her date had quite a bit in common. He was interested in the same kinds of things she liked to do, such as hiking and camping, going to see movies, and mountain bike riding. They were just about to make a date to go to a movie together the next weekend, when someone made an announcement.

Reinstatement and Spillover Sentences
The concert would begin in five minutes.
Jill was starting to get really excited.

Closing
She and her date resumed their conversation and finished making plans for their next date.

Introduction
Beth had just moved to New England from Florida to go to college. The winter weather was a big adjustment for her to make.

Correct Antecedent
She didn't have any warm winter clothes, so she decided to spend the day shopping for some. She went to the L. L. Bean factory store, where she bought a jacket with a matching hat. It was made of dark brown fleece and covered her whole head. Beth hoped that it wouldn't mess her hair up too much. She had to walk to campus everyday, and she wanted to make sure that she stayed warm on her way to class.

Incorrect - High Overlap Antecedent
She didn't have any warm winter clothes, so she decided to spend the day shopping for some. She went to the L. L. Bean factory store, where she bought a jacket with a matching hood. It was made of dark brown fleece and covered her whole head. Beth hoped that it wouldn't mess her hair up too much. She had to walk to campus everyday, and she wanted to make sure that she stayed warm on her way to class.

Incorrect - Low Overlap Antecedent
She didn't have any warm winter clothes, so she decided to spend the day shopping for some. She went to the L. L. Bean factory store, where she bought a jacket with matching gloves. They were made of dark brown fleece and matched her winter parka. Beth liked the way they fit her fingers perfectly. She had to walk to campus everyday, and she wanted to make sure that she stayed warm on her way to class.

Filler
After she got back from shopping, her boyfriend called to say he was coming over. They decided they would stay in that night and rent movies. They made popcorn and snuggled on the couch while they watched the latest Lethal Weapon movie. After the movie, they talked for a while and then Beth's boyfriend asked her about her shopping trip. Beth happily brought out the item that she had purchased.

Reinstatement and Spillover Sentences
She even modeled the new hat for him.
He told her it looked great on her.

Closing
She smiled and thanked him and continued to show him everything else she had gotten that day.

Introduction
Matt loved living in New York City. He liked watching the people swarming on the street as they went about their daily business.

Correct Antecedent
One of his favorite things about living in the city was riding the subway. Today he was riding the subway downtown, where he was going to meet some of his friends for dinner. It was about a fifteen minute ride, so he brought along a book to read. It was all about computers. It had lots of pictures, so Matt flipped the pages quickly. He had just gotten to the end when he realized he was at his stop.

Incorrect - High Overlap Antecedent
One of his favorite things about living in the city was riding the subway. Today he was riding the subway downtown, where he was going to meet some of his friends for dinner. It was about a fifteen minute ride, so he brought along a magazine to read. It was all about computers. It had lots of pictures, so Matt flipped the pages quickly. He had just gotten to the end when he realized he was at his stop.

Incorrect - Low Overlap Antecedent
One of his favorite things about living in the city was riding the subway. Today he was riding the subway downtown, where he was going to meet some of his friends for dinner. He sat down and noticed a poster taped to the window. It was advertising a benefit concert for school books for inner city children. It was brightly colored and had lots of pictures. Matt had just finished reading when he realized he was at his stop.

Filler
When he walked off the subway, he saw one of the friends he was meeting. They walked together toward the restaurant. It was a new Burmese restaurant that was supposed to have really good food at decent prices. Matt was excited because he had never had Burmese food before. He didn't even know what to expect. He and his friend got to the restaurant early and sat around and talked while waiting for the rest of their friends to arrive.

Reinstatement and Spillover Sentences
Matt described the book he had read.
He thought it was really interesting.

Closing
Just then, the rest of their friends arrived, so they called the waitress over to give her their orders.

Introduction
Greg was going to redo his kitchen. He had been looking at the same old wallpaper and cabinets for years and was really getting sick of them.

Correct Antecedent
He decided he was going to replace absolutely everything. He went to the store to price some of the newest appliances on the market. As soon as he walked in the door, he saw a toaster that he really wanted. It had several temperature settings and came in a variety of colors. It would fit perfectly in the space between the stove and the refrigerator. Greg was extremely satisfied with his choice.

Incorrect - High Overlap Antecedent
He decided he was going to replace absolutely everything. He went to the store to price some of the newest appliances on the market. As soon as he walked in the door, he saw a microwave that he really wanted. It had several temperature settings and came in a variety of colors. It would fit perfectly in the space between the stove and the refrigerator. Greg was extremely satisfied with his choice.

Incorrect - Low Overlap Antecedent
He decided he was going to replace absolutely everything. He went to the store to price some of the newest items on the market. As soon as he walked in the door, he saw a sink that he really wanted. It was made of beautiful white porcelain and had a shiny stainless steel faucet. Greg thought it would look stunning against the dark counter tops. He was extremely satisfied with his choice.

Filler
While he was at the store, he also wanted to look at wallpaper. He went through several books until he finally found a pattern that he liked. The pattern he picked had a charming country scene on it, with cows and chickens grazing in the yard of an old-fashioned farmhouse. Greg thought it would add a nice touch to his kitchen. He went in search of a salesman to help him with his order.

Reinstatement and Spillover Sentences
He also told him about the toaster.
He got all of the items Greg asked for.

Closing
The bill was a little more than he could afford, but he figured it was worth the money.

Introduction
Sylvia was entering a beauty pageant. She thought she had a pretty good chance of winning, especially in the talent competition.

Correct Antecedent
The tension in the dressing room was really high. All of the contestants were hurriedly trying to get themselves ready. Sylvia needed to fix her hair for the next part of the contest. Her hair was tangled, so she tried to find her brush. After using it to get rid of the worst of the tangles, she ran it through her hair several more times. She wanted to look absolutely perfect when she walked out onto the runway.

Incorrect - High Overlap Antecedent
The tension in the dressing room was really high. All of the contestants were hurriedly trying to get themselves ready. Sylvia needed to fix her hair for the next part of the contest. Her hair was tangled, so she tried to find her comb. After using it to get rid of the worst of the tangles, she ran it through her hair several more times. She wanted to look absolutely perfect when she walked out onto the runway.

Incorrect - Low Overlap Antecedent
The tension in the dressing room was really high. All of the contestants were hurriedly trying to get themselves ready. Sylvia needed to fix her hair for the next part of the contest. Her hairdo had gone completely flat, so she tried to find her curlers. She almost burned her fingers taking them out, but they made her hair look great. She wanted to look absolutely perfect when she walked out onto the runway.

Filler
As she finished getting ready, a fellow contestant ran into the dressing room. Sylvia's friend was late in getting ready and was really upset. Sylvia didn't know if her friend was going to make it in time for the next competition. Her friend had lost her cosmetics bag and did not have any beauty supplies to use. Sylvia tried to help her friend by handing her the dress and shoes that she would need.

Reinstatement and Spillover Sentences
She loaned her the brush she was using.
Sylvia's friend smiled gratefully at her.

Closing
Sylvia smiled back and left the dressing room. She was next up on the stage.

Appendix C

The passages used in Experiments 3 and 4 are presented in this appendix. Each participant only read one of the three versions of each passage. In addition, the Incorrect – High Overlap With Focus Condition was used only in Experiment 4.

Introduction
Terry loved classical music. She spent most of her waking hours listening to it, either in her room or in the car.

Correct Antecedent Condition
Terry decided that it would be fun to teach herself how to play. She drove to a music shop located in the next town. As she entered the store she saw a beautiful cello. The large instrument was almost bigger than she was. Terry decided she wanted to learn how to play it. She imagined herself sitting down to play the heavy instrument. Terry asked the salesman for a price. After thinking for a few minutes, she decided to buy it that afternoon.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
Terry decided that it would be fun to teach herself how to play. She drove to a music shop located in the next town. As she entered the store she saw a beautiful violin. The small instrument fit perfectly between her chin and shoulder. Terry decided she wanted to learn how to play it. She imagined herself dancing as she played the lightweight instrument. Terry asked the salesman for a price. After thinking for a few minutes, she decided to buy it that afternoon.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
Terry decided that it would be fun to teach herself how to play. She drove to a music shop located in the next town. There was this beautiful violin that she saw as she entered the store. The small instrument fit perfectly between her chin and shoulder. Terry decided she wanted to learn how to play it. She imagined herself dancing as she played the lightweight instrument. Terry asked the salesman for a price. After thinking for a few minutes, she decided to buy it that afternoon.

Incorrect - Low Overlap Antecedent
Terry decided that it would be fun to teach herself how to play. She drove to a music shop located in the next town. As she entered the store she saw a beautiful oboe. The keys were bight and shiny, and the case was lined in black velvet. Terry decided she wanted to learn how to play it. She imagined herself fingering the keys to create perfect notes. Terry asked the salesman for a price. After thinking for a few minutes, she decided to buy it that afternoon.

Filler
Afterwards, Terry went home where she found a message on her answering machine from her friend Jill. Because Terry hadn't spoken to Jill in over a week, she decided to invite her over for some coffee and chocolate cake. When Jill came over, she excitedly told Terry that she had a new boyfriend. After chatting about Jill's new boyfriend for a while, Jill asked Terry what was new with her.

Reinstatement and Spillover Sentences
Terry showed her the cello she bought.

She even tried to play a few notes.

Closing
Terry told Jill that she was going to start practicing that very evening.

Introduction
Shirley had a secretarial job at the local community college. She was reading the newspaper while on her lunch break.

Correct Antecedent
While perusing the paper, Shirley noticed an article about the military base in the next town. Next to the article, there was a photograph. The picture showed a general in full uniform. There were had several medals pinned to his uniform and there were five gold stars on the sleeve of the jacket. All of the other men in the photograph were saluting him. Shirley couldn't help but be impressed. She decided to cut out the photograph, and then she put it in her purse.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
While perusing the paper, Shirley noticed an article about the military base in the next town. Next to the article, there was a photograph. The picture showed a colonel in full uniform. He had a few medals on the uniform, but there were no stars on the sleeve, unlike the senior officer standing nearby. In fact, he was saluting the senior officer. Shirley couldn't help but be impressed. She decided to cut out the photograph, and then she put it in her purse.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
While perusing the paper, Shirley noticed an article about the military base in the next town. Next to the article, there was a photograph. There was this colonel in full uniform that the picture showed. He had a few medals on the uniform, but there were no stars on the sleeve, unlike the senior officer standing nearby. In fact, he was saluting the senior officer. Shirley couldn't help but be impressed. She decided to cut out the photograph, and then she put it in her purse.

Incorrect- Low Overlap Antecedent
While perusing the paper, Shirley noticed an article about the military base in the next town. Next to the article, there was a photograph. The picture showed a private in uniform. The uniform was very plain, and he had no medals at all. He was standing in the middle of a large regiment of men, and they were all at salute. Shirley couldn't help but be impressed. She decided to cut out the photograph, and then she put it in her purse.

Filler
As she continued to look through the paper, Shirley realized her lunch break was over. She went back to her desk and organized some invoices. After that, her boss came by and gave her a list of names and telephone numbers that he wanted her to type up and distribute by the end of the day. By the time she was finished with the list, it was time to go home. Shirley turned off her computer and picked up her purse.

Reinstatement and Spillover Sentences
The picture of the general fell out.

Shirley smiled as she retrieved it.

Closing
She turned off the lights as she headed out the door on her way home.

Introduction
Virgil and his wife decided to redecorate their living room. Their furniture was still in pretty good shape, but the colors and the fabrics were very outdated.

Correct Antecedent
They decided they would start by recovering the sofa. On a Saturday afternoon, they went to the local fabric store. Virgil found a bolt of cotton fabric that he really liked. He thought that it would be durable, strong, and pretty easy to clean. It would be cool in the summer and was also priced very cheap, which Virgil especially liked. Virgil went over to his wife to ask her what she thought. She agreed and they continued to look around the store.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
They decided they would start by recovering the sofa. On a Saturday afternoon, they went to the local fabric store. Virgil found a bolt of flannel fabric that he really liked. He wasn't sure if it could be used for upholstery, since the normal use was for things like shirts or sheets. He liked the soft fuzzy feel of it, though. Virgil went over to his wife to ask her what she thought. She agreed and they continued to look around the store.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
They decided they would start by recovering the sofa. On a Saturday afternoon, they went to the local fabric store. There was this bolt of flannel fabric that Virgil found and really liked. He wasn't sure if it could be used for upholstery, since the normal use was for things like shirts or sheets. He liked the soft fuzzy feel of it, though. Virgil went over to his wife to ask her what she thought. She agreed and they continued to look around the store.

Incorrect - Low Overlap Antecedent
They decided they would start by recovering the sofa. On a Saturday afternoon, they went to the local fabric store. Virgil found a bolt of silk fabric that he really liked. He knew that it would be a delicate fabric that was likely to tear, and would be very expensive and difficult to clean. He liked the smooth feel of it on his skin. Virgil went over to his wife to ask her what she thought. She agreed and they continued to look around the store.

Filler
Virgil's wife was a very good seamstress and often made her own clothes, so she was also using the time at the store to find some patterns for a new dress for herself. She was going to a big banquet and needed something really nice. She had looked through her closet and just wasn't satisfied with anything that she already owned. She found a few patterns and brought them up to the cash register.

Reinstatement and Spillover Sentences
Virgil brought over the bolt of cotton.
He was very happy with his decision.

Closing

After leaving the fabric store, Virgil and his wife decided to go out for lunch.

Introduction
Max had spent the entire day working at the library. He had a paper due in a couple of weeks, and he needed to do lots of research for it.

Correct Antecedent
As he walked outside, he realized that he had been working for six hours and that his stomach was growling. He rummaged through his bag to see if he had anything left over from his lunch. He pulled out an orange from the very bottom of the bag. He sat down and started to peel it, and then he divided it into sections. As he bit into the first section, the sweet taste made him smile. He laughed and then looked around to see if anyone had noticed.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
As he walked outside, he realized that he had been working for six hours and that his stomach was growling. He rummaged through his bag to see if he had anything left over from his lunch. He pulled out a grapefruit from the very bottom of the bag. As he cut it in half and used a spoon to eat it. As he took a bite, the bitter taste made him grimace. He laughed and then looked around to see if anyone had noticed.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
As he walked outside, he realized that he had been working for six hours and that his stomach was growling. He rummaged through his bag to see if he had anything left over from his lunch. There was this grapefruit that he pulled out from the very bottom of the bag. As he cut it in half and used a spoon to eat it. As he took a bite, the bitter taste made him grimace. He laughed and then looked around to see if anyone had noticed.

Incorrect - Low Overlap Antecedent
As he walked outside, he realized that he had been working for six hours and that his stomach was growling. He rummaged through his bag to see if he had anything left over from his lunch. He pulled out a fig from the very bottom of the bag. He had picked it from the tree behind his parents' house that morning. He noticed that it sort of resembled a small pear. He laughed and then looked around to see if anyone had noticed.

Filler
When he looked up, he saw his friend Alice approaching. She had been his chemistry lab partner the previous semester, and they had become good friends. He hadn't seen her in several months, so they had a lot of gossip to catch up on. She told him that she was thinking about studying abroad the following year. She was leaving to get something to eat and invited him to go with her.

Reinstatement and Spillover Sentences
He said he had just eaten an orange.
He was still sort of hungry, though.

Closing

Max picked up his bag and walked with Alice to a café downtown.

Introduction
The city was gearing up for its annual fall festival, and there was excitement in the air. Jenny was a newspaper journalist working on a story about the event.

Correct Antecedent
She had heard from one of her sources that some big government officials were going to start off the ceremonies at the festival. Her source had told her that the mayor was going to give a speech at the rally that would start the festival. He had made many campaign promises to do great things for the city, and that he would even start construction on a new city park. Jenny called her source to find out more information about the story.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
She had heard from one of her sources that some big government officials were going to start off the ceremonies at the festival. Her source had told her that the governor was going to give a speech at the rally that would start the festival. He was well-known throughout the state, and had already been a state senator. People were saying that he was going to do great things for the state in the future. Jenny called her source to find out more information about the story.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
She had heard from one of her sources that some big government officials were going to start off the ceremonies at the festival. There was this governor that her source told her was going to give a speech at the rally that would start the festival. He was well-known throughout the state, and had already been a state senator. People were saying that he was going to do great things for the state in the future. Jenny called her source to find out more information about the story.

Incorrect - Low Overlap Antecedent
She had heard from one of her sources that some big government officials were going to start off the ceremonies that the festival. Her source had told her that the sheriff was going to give a speech at the rally that would start the festival. She recalled that she had seen him riding around in a patrol car and blowing the siren and flashing the lights. She had heard he was very tough on criminals in the city. Jenny called her source to find out more information.

Filler
Jenny was at her cubicle in the newspaper office when she tried to call. It was so noisy that she could barely hear herself think, so she decided she would put off the call until later. In the meantime, she had to go to a meeting with her boss. He was angry with her about a controversial story she had written a few days ago. She hoped that she would be able to divert his attention.

Reinstatement and Spillover Sentences
She told him about the mayor's speech.

He forgot all about her previous story.

Closing
Jenny's boss gave her a big pat on the back as she left his office.

Introduction
Trevor was in a fantastic mood. It was Friday, and he had the whole weekend ahead of him to think about other things besides work.

Correct Antecedent
After the office closed, he and some of his coworkers decided to go out for drinks. They walked from the office to a bar down the street. When the waitress came to take their orders, Trevor ordered a mixed drink that contained whiskey. Trevor's favorite brand was Jack Daniels, and he liked the smoky dark brown color of it. The taste was just so good. It made Trevor feel like he was some kind of cowboy right out of the Old West.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
After the office closed, he and some of his coworkers decided to go out for drinks. They walked from the office to a bar down the street. When the waitress came to take their orders, Trevor ordered a mixed drink that contained gin. Trevor usually drank the clear alcohol in martinis or mixed with soda water. It made him feel very adult and quite sophisticated. He liked the way it burned all the way down his throat and warmed up his stomach.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
After the office closed, he and some of his coworkers decided to go out for drinks. They walked from the office to a bar down the street. There was this gin that Trevor ordered in a mixed drink when the waitress came to take their orders. Trevor usually drank the clear alcohol in martinis or mixed with soda water. It made him feel very adult and quite sophisticated. He liked the way it burned all the way down his throat and warmed up his stomach.

Incorrect - Low Overlap Antecedent
After the office closed, he and some of his coworkers decided to go out for drinks. They walked from the office to a bar down the street. When the waitress came to take their orders, Trevor ordered a glass of champagne. Trevor liked to drink it to celebrate even the smallest of occasions. The bartender uncorked the bottle and the foam flew everywhere. It usually made him feel giddy and sometimes even gave him the hiccups. Afterwards, Trevor felt warm all over.

Filler
After Trevor and his friends finished a round of drinks, they decided to go shoot pool in the back of the bar. Trevor was a bit of a pool shark, so he suggested that they play for money. The last time he had played, he had raked in two hundred dollars in a single night. He won two games, and then decided to just sit while his friends played a third game. When he got up, he felt kind of dizzy.

Reinstatement and Spillover Sentences
The whiskey had really affected him.

He was going to have to walk home.

Closing
That was fine, since he lived just a few blocks down the street from the bar.

Introduction
Maggie was getting ready to move to the big city. She had packed up all of her belongings and they were sitting in boxes in the front yard.

Correct Antecedent
When the movers came to take the boxes and the furniture, Maggie watched them like a hawk. She had a lot of really nice things, and she didn't want anything to get damaged. She saw two movers come out of the house carrying a large heavy table. It had a marble top and a smooth finish. Maggie could seat 10 people at it when she had big dinner parties. Maggie was very nervous as she watched the movers carry her things out of the house.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
When the movers came to take the boxes and the furniture, Maggie watched them like a hawk. She had a lot of really nice things, and she didn't want anything to get damaged. She saw two movers come out of the house carrying a small light chair. It had a padded seat and was the most comfortable piece of furniture she owned. Everyone who came over fought to sit in it. Maggie was very nervous as she watched the movers carry her things out of the house.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
When the movers came to take the boxes and the furniture, Maggie watched them like a hawk. She had a lot of really nice things, and she didn't want anything to get damaged. There was this small light chair that she saw two movers come out of the house carrying. It had a padded seat and was the most comfortable piece of furniture she owned. Everyone who came over fought to sit in it. Maggie was very nervous as she watched the movers carry her things out of the house.

Incorrect - Low Overlap Antecedent
When the movers came to take the boxes and the furniture, Maggie watched them like a hawk. She had a lot of really nice things, and she didn't want anything to get damaged. She saw a mover come out of the house carrying a small iron lamp. It had a shade made of stained glass designed to look like magnolias. It was small, but emitted a great deal of light. Maggie was very nervous as she watched the movers carry her things out of the house.

Filler
While she was watching the men work, her neighbor from across the street came over. He had become good friends with Maggie over the years, and he was sorry to see her leave. He had packed her a little basket of snacks for her to take with her in the car while she was driving to her new home. He stood with Maggie for a while and watched the man who was working in the truck.

Reinstatement and Spillover Sentences

The movers were handing him the table.
The man finally got it into the truck.

Closing
Maggie breathed a sigh of relief and turned to give her neighbor a sad hug goodbye.

Introduction
John was a wealthy investment banker getting ready for his summer vacation. He had decided to take the entire summer off to go live in the woods.

Correct Antecedent
John hadn't made any plans as to where he would stay yet, but he figured he would take a drive to see what he could find. He turned onto a dirt road that led into the woods, and around the first bend he saw a house for sale. It was large, with about three bedrooms and a garage attached. It had a sign posted on the front door next to the doorbell. John wrote down the name and number of the owner written on the sign.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
John hadn't made any plans as to where he would stay yet, but he figured he would take a drive to see what he could find. He turned onto a dirt road that led into the woods, and around the first bend he saw a cabin for sale. It was small and made entirely of logs. It looked like a retreat for some kind of hermit. There was a sign on the makeshift door. John wrote down the name and number of the owner written on the sign.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
John hadn't made any plans as to where he would stay yet, but he figured he would take a drive to see what he could find. He turned onto a dirt road that led into the woods. There was this cabin for sale that he saw around the first bend. It was small and made entirely of logs. It looked like a retreat for some kind of hermit. There was a sign on the makeshift door. John wrote down the name and number of the owner written on the sign.

Incorrect - Low Overlap Antecedent
John hadn't made any plans as to where he would stay yet, but he figured he would take a drive to see what he could find. He turned onto a dirt road that led into the woods, and around the first bend he saw a tent for sale. It was made of nylon and was held in place by large wooden stakes. It had a sign taped to the side. John wrote down the name and number of the owner that were written on the sign.

Filler
Because it was such a nice afternoon, John decided to drive further into the woods. After he had driven about 20 miles, he realized he was lost. He had driven by the same crooked oak tree three times in the last fifteen minutes. At least he was able to laugh it off and enjoy the scenery while he drove along. John finally found his way again and picked up his car phone.

Reinstatement and Spillover Sentences
He was calling about the house for sale.
He hoped that he would get a good price.

Closing

The line was busy, so John hung up and decided that he would try to call again later.

Introduction
Rick had just bought a new house. He had lived in apartments all of his life, so he didn't have all of the tools he knew he would need for minor home repairs.

Correct Antecedent
In fact, all his toolbox contained were some old rusty screws, a tape measure, and a tangled up ball of string. He went to the hardware store down the street in search of a good hammer. He looked down every row until he finally found what he wanted. Its wooden handle fit right into the palm of his hand. It had an iron head with a part to pull out nails. Rick thought he was really ready to be a homeowner now.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
In fact, all his toolbox contained were some old rusty screws, a tape measure, and a tangled up ball of string. He went to the hardware store down the street in search of a good mallet. He looked down every row until he finally found what he wanted. It had a long wooden handle that Rick had to swing over his head to use. Its rubber head was stuck to the end. Rick thought he was really ready to be a homeowner now.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
In fact, all his toolbox contained were some old rusty screws, a tape measure, and a tangled up ball of string. There was this mallet that he went in search of at the hardware store down the street. He looked down every row until he finally found what he wanted. It had a long wooden handle that Rick had to swing over his head to use. Its rubber head was stuck to the end. Rick thought he was really ready to be a homeowner now.

Incorrect - Low Overlap Antecedent
In fact, all his toolbox contained were some old rusty screws, a tape measure, and a tangled up ball of string. He went to the hardware store down the street in search of a good wrench. He looked down every row until he finally found what he wanted. It was made of metal and even came with a free plastic carrying case. It was adjustable, too, so Rick would only have to buy one. Rick thought he was really ready to be a homeowner now.

Filler
As he was looking around the store, he ran into his good friend Tony. Tony had been having car trouble and was looking for some parts to fix his fan belt. Rick didn't really know anything about cars, so he just smiled and nodded as Tony explained what he thought the problem was. Tony invited Rick to drop by his house later for a few beers. Rick happily accepted and headed toward the front of the store.

Reinstatement and Spillover Sentences
He handed the hammer to the cashier.
Rick had just enough cash to buy it.

Closing

Rick thanked the cashier and left the store to go run a few more errands.

Introduction
Kelly was a sports fanatic. She spent all of her free time watching sports on TV, going to sporting events, and playing sports.

Correct Antecedent
For example, she was planning on spending this evening planted in front of the TV. There was a great wrestling match on, and she did not want to miss a single minute. It was her favorite sport because she liked the crazy costumes that the men sometimes wore. She liked to watch them grab each other bv the arms and legs and throw each other across the ring. Kelly thought that it was more exciting than any sport she had ever seen.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
For example, she was planning on spending this evening planted in front of the TV. There was a great boxing match on, and she did not want to miss a single minute. It was her favorite sport because she loved watching the men work up a sweat as they fought. She liked the way the men almost danced around the ring as they threw their punches. She had been thinking about trying it herself, and had even bought a pair of gloves.

Incorrect - High Overlap Antecedent. With Syntactic Focus (Experiment 4 only)
For example, she was planning on spending this evening planted in front of the TV. There was this great boxing match on, and she did not want to miss a single minute. It was her favorite sport because she loved watching the men work up a sweat as they fought. She liked the way the men almost danced around the ring as they threw their punches. She had been thinking about trying it herself, and had even bought a pair of gloves.

Incorrect - Low Overlap Antecedent
For example, she was planning on spending this evening planted in front of the TV. There was a great tennis match on, and she did not want to miss a single minute. She loved to watch the ball bounce rapidly back and forth across the net as it was played. She thought that it required a skill and grace that not many other kinds of athletes could claim. Kelly hoped that one day she would be able to acquire those same skills.

Filler
Kelly went to the grocery store to get some snacks for the big night. She first picked up some popcorn and soda, and then went into the frozen foods aisle. She debated about whether to get some frozen pizzas or chocolate ice cream, but she finally decided that what she really wanted were french fries. She loaded up her cart and went through the express line. She impatiently waited for the cashier to ring up her bill.

Reinstatement and Spillover Sentences
She was excited about the wrestling match.
She hoped that she would not be too late.

Closing

When she got home, she put away her groceries and turned on the TV. She was just in time.

Introduction
It was a gorgeous spring day, and Chelsea's mother brought her to the park. The park was Chelsea's favorite place, because she could see all kinds of interesting animals there.

Correct Antecedent
Today, they were sitting on a bench by the pond. Chelsea was plaguing her mother with questions about everything she saw. Suddenly, a goose swam into view. It was a very large white bird, and let out a loud "Honk!" as it swam through the water. Chelsea's mother told her she thought the bird might be on the way south for the winter from Canada. Chelsea could not stop from laughing, and even her mother giggled a little as they continued to watch.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
Today, they were sitting on a bench by the pond. Chelsea was plaguing her mother with questions about everything she saw. Suddenly, a duck swam into view. The bird was small and brightly colored, and let out a loud "Quack!" as it swam through the water. Chelsea asked her mother if she thought that it was related to Mickey Mouse's friends Donald and Daisy. Chelsea could not stop from laughing, and even her mother giggled a little as they continued to watch.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
Today, they were sitting on a bench by the pond. Chelsea was plaguing her mother with questions about everything she saw. There was this duck that suddenly swam into view. The bird was small and brightly colored, and let out a loud "Quack!" as it swam through the water. Chelsea asked her mother if she thought that it was related to Mickey Mouse's friends Donald and Daisy. Chelsea could not stop from laughing, and even her mother giggled a little as they continued to watch.

Incorrect - Low Overlap Antecedent
Today, they were sitting on a bench by the pond. Chelsea was plaguing her mother with questions about everything she saw. Suddenly, a robin flew past them. It landed on a tree branch nearby, where there was a nest. Chelsea watched it pull some twigs and string into the nest, all the while chirping a cheerful song. There were even some bright blue eggs in the nest. Chelsea could not stop from laughing, and even her mother giggled a little as they continued to watch.

Filler
It was getting late, and Chelsea's mother told her that it was time to go home for dinner. As they walked back home, Chelsea asked her mother what they were going to have for dinner and how they were going to cook it. Her mother patiently explained that they were going to have tuna casserole and that they would bake it in the oven. When they arrived home, Chelsea's father was there to greet them.

Reinstatement and Spillover Sentences
Chelsea told him all about the goose.
He laughed as she imitated the bird.

Closing
Chelsea's father read her three books before it was finally time to eat dinner.

Introduction
Jonas was about to turn five years old. His favorite uncle was asking him what kind of present he wanted for his birthday.

Correct Antecedent
Jonas had to think hard about this, because he didn't want to ask for just anything. Then he remembered a shiny new tricycle he had seen in a store window. It was red, with a white seat and handlebars. Its two wheels in back were very small, but the single wheel in the front was a bit larger. Jonas thought he would sit on the seat and pedal as fast as he could down the sidewalk, so that he would be the envy of all his friends.

Incorrect – High Overlap Antecedent (Without Syntactic Focus – Experiment 4)
Jonas had to think hard about this, because he didn't want to ask for just anything. Then he remembered a shiny new bicycle he had seen in a store window. It was red, with a white seat and handlebars. It had two large wheels and the breaks were on the handlebars. Jonas liked how he was up high when he sat on the seat. He wanted to pedal as fast as he could down the sidewalk, so that he would be the envy of all his friends.

Incorrect – High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
Jonas had to think hard about this, because he didn't want to ask for just anything. There was this shiny new bicycle he remembered he had seen in a store window. It was red, with a white seat and handlebars. It had two large wheels and the breaks were on the handlebars. Jonas liked how he was up high when he sat on the seat. He wanted to pedal as fast as he could down the sidewalk, so that he would be the envy of all his friends.

Incorrect – Low Overlap Antecedent
Jonas had to think hard about this, because he didn't want to ask for just anything. Then he remembered a cool new skateboard he had seen in a store window. It was black, with bright stickers and designs all over the top and bottom. The four wheels were small and white. Jonas imagined standing on it and pushing off with his foot. He wanted to go as fast as he could down the sidewalk, so that he would be the envy of all his friends.

Filler
He had also seen a new baseball glove that he wanted. It was made of real leather, and had fit his hand just right. His big brother had a really nice glove, but he would never let Jonas use it. Jonas really wanted one of his own, because he would be starting Little League in the spring. But Jonas also wanted a new toy firetruck, some Legos, and a new robot. He thought that he deserved to get them all.

Reinstatement and Spillover Sentences
He told his uncle about the tricycle.
He really hoped that he would get it.

Closing
Jonas' uncle smiled at him and said that he would try to keep that in mind.

Introduction
Maria had not been feeling well lately. She thought it might have been because she had been eating a lot of fast food.

Correct Antecedent
She decided she needed a good home-cooked meal, so she went to the market to buy some fresh vegetables. She debated over what to get until she saw a whole bin full of fresh broccoli. She liked how the little green florets of it sort of looked like little trees. The thick stalk was really good, too, but Maria knew that it always took a little longer to cook. She decided that the vitamins she would get from the healthy meal would be worth the trouble.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
She decided she needed a good home-cooked meal, so she went to the market to buy some fresh vegetables. She debated over what to get until she saw a whole bin full of fresh cauliflower. She liked how the whole head of it looked sort of like a big bumpy white cloud. Its taste was pretty mild, so Maria decided that she would have to add lots of spices for extra flavoring. She decided that the healthy meal would be worth the trouble.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
She decided she needed a good home-cooked meal, so she went to the market to buy some fresh vegetables. There was this bin of fresh cauliflower that she saw as she debated over what to get. She liked how the whole head of it looked sort of like a big bumpy white cloud. Its taste was pretty mild, so Maria decided that she would have to add lots of spices for extra flavoring. She decided that the healthy meal would be worth the trouble.

Incorrect - Low Overlap Antecedent
She decided she needed a good home-cooked meal, so she went to the market to buy some fresh vegetables. She debated over what to get until she saw a whole bin full of fresh ears of corn. She loved to serve it steamed, and dripping with fresh butter. The only thing she didn't like was the way that the little kernels got stuck between her teeth when she was eating it. She decided that the healthy meal would be worth the trouble.

Filler
She suddenly remembered that the next day was her dad's birthday. She had forgotten to buy him a present, but she decided that she would surprise him with a homemade cake. She picked out flour, sugar, baking powder, eggs, and chocolate icing. Then she picked up a box of birthday candles. When she walked up to the checkout, her cart tipped over and all of her groceries fell out and rolled all over the place.

Reinstatement and Spillover Sentences
The broccoli rolled under a magazine rack.
She had to bend over to pick it up.

Closing

Maria was still blushing when she picked up the last of her items from the floor.

Introduction
Henry and Arthur had been friends all of their lives. Even when they retired, they still spent large parts of each day together.

Correct Antecedent
It was a beautiful spring day, so Henry suggested to Arthur that they go sit on a bench in Central Park. As they strolled through the park, they saw another pair of elderly men sitting at a table playing chess. The game appealed to Henry because of all of its different intricately carved pieces. He liked the kings and the bishops the best. He also liked the part of it when he could yell, "Checkmate!" Henry and Arthur decided that they wanted to play, too.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
It was a beautiful spring day, so Henry suggested to Arthur that they go sit on a bench in Central Park. As they strolled through the park, they saw another pair of elderly men sitting at a table playing checkers. The game appealed to Henry because of its cute little red and black round pieces. He liked to use the black ones the best. He also liked the part of it when he could yell, "King me!" Henry and Arthur decided that they wanted to play, too.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
It was a beautiful spring day, so Henry suggested to Arthur that they go sit on a bench in Central Park. They strolled through the park. There was this game of checkers that they saw another pair of elderly men sitting at a table playing. The game appealed to Henry because of its cute little red and black round pieces. He liked to use the black ones the best. He also liked the part of it when he could yell, "King me!" Henry and Arthur decided that they wanted to play, too.

Incorrect - Low Overlap Antecedent
It was a beautiful spring day, so Henry suggested to Arthur that they go sit on a bench in Central Park. As they strolled through the park, they saw another pair of elderly men sitting at a table playing a game of cards. One man had a lot of really good ones, but the other man had a mix of club and diamond ones. One of the men yelled out, "Gin!" just as Henry and Arthur decided that they wanted to play, too.

Filler
Henry was getting hungry, though, so he recommended that he and Arthur go get some lunch. They went to Henry's house, because Henry's wife was a better cook. She made them grilled cheese sandwiches and a really good creamy tomato soup. Arthur ate at their house as often as he could. He thanked Henry's wife as they headed out the door. Arthur told Henry he wanted to go back to the park.

Reinstatement and Spillover Sentences
He reminded Henry about the chess game.

He thought he would be able to beat him.

Closing
Henry went back into the house to look for the game, while Arthur waited on the porch.

Introduction

Monica was the chef at a new five star restaurant in town. She had been hired for her innovative ideas about healthy desserts.

Correct Antecedent

Monica was very nervous this evening, because a famous food critic was eating in the restaurant. She wanted to make him a dessert he would never forget. She had just developed a recipe for a fabulous cake, so she decided to make that. She took it out of the oven and decided the decorations would be chocolate icing and some cut strawberries. It had a rich velvety texture and held together perfectly. Monica served the dessert with a small scoop of vanilla ice cream.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)

Monica was very nervous this evening, because a famous food critic was eating in the restaurant. She wanted to make him a dessert he would never forget. She had just developed a recipe for a fabulous pie, so she decided to make that. She took it out of the oven and cut some slits in the top to let the steam out. When she sliced it, the warm fragrant filling spilled out all over the plate. Monica served the dessert with a small scoop of vanilla ice cream.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)

Monica was very nervous this evening, because a famous food critic was eating in the restaurant. She wanted to make him a dessert he would never forget. There was this fabulous pie that she had just developed a recipe for, so she decided to make that. She took it out of the oven and cut some slits in the top to let the steam out. When she sliced it, the warm fragrant filling spilled out all over the plate. Monica served the dessert with a small scoop of vanilla ice cream.

Incorrect - Low Overlap Antecedent

Monica was very nervous this evening, because a famous food critic was eating in the restaurant. She wanted to make him a dessert he would never forget. She had just developed a recipe for a fabulous pudding, so she decided to make that. The dessert was cool and creamy when she removed it from the refrigerator. She spooned a generous portion of it into a bowl and put a little sprig of mint on the side. She made a little swirl in the top with her spoon.

Filler

While she nervously waited for the critic's opinion, the head bus boy came in with a load of dishes. He must have slipped on something, because the next thing Monica knew, his feet were up in the air, and there were broken dishes everywhere. Monica helped him up and they both started to pick up the broken plates and glasses. Then a waitress came in and told Monica she was wanted in the front.

Reinstatement and Spillover Sentences
The critic had really liked the cake.
He told Monica it was just wonderful.

Closing
Monica thanked him and told him that it was her own special recipe.

Introduction
Mark had just moved into a new neighborhood. He didn't know too many of his neighbors, so he decided to throw a party and invite all of them.

Correct Antecedent
He was having a great time meeting everyone. He was very surprised when one lady walked up to him and handed him a potted ivy. It was a beautiful plant, with soft green leaves that trailed in all directions out of the pot. The leaves all looked sort of like little hearts, and some of the vines hung all the way down to the floor. Mark hoped that he would be able to keep it alive. He thanked the woman and asked her if she wanted a drink.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
He was having a great time meeting everyone. He was very surprised when one lady walked up to him and handed him a potted fern. It was a beautiful plant, with soft green leaves that stuck out in all directions from the pot. The leaves all looked sort of like graceful green feathers, and they broke off very easily. Mark hoped that he would be able to keep it alive. He thanked the woman and asked her if she wanted a drink.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
He was having a great time meeting everyone. There was this potted fern that a lady walked up and handed to him, surprising him. It was a beautiful plant, with soft green leaves that stuck out in all directions from the pot. The leaves all looked sort of like graceful green feathers, and they broke off very easily. Mark hoped that he would be able to keep it alive. He thanked the woman and asked her if she wanted a drink.

Incorrect - Low Overlap Antecedent
He was having a great time meeting everyone. He was very surprised when one lady walked up to him and handed him a potted cactus. The plant was rather ugly, with prickly leaves that shot out in all directions from the pot. He knew that it would hardly need any light or water, so keeping it alive would not be an issue. Mark hoped that he would prick himself on the needles. He thanked the woman and asked her if she wanted a drink.

Filler
He was just about to ask her how long she had lived in the neighborhood, when another man walked up and put his arm around her. She introduced the man to Mark as her husband. Mark shook his hand and then decided he should go mingle some more. He wanted to find some good looking single women to talk to. He noticed a very pretty lady standing by the window, and he went over to say hello.

Reinstatement and Spillover Sentences
She was admiring the ivy he had gotten.
She told him that it was a rare species.

Closing

He asked her if she would tell him more about the plant and about herself over dinner that Saturday night.

Introduction
It was Lorenzo's first day of high school. He had been unpopular in junior high, but he decided that was going to change in high school.

Correct Antecedent
He thought one way that he might become more popular was by joining the band. He went to the band practice room and looked around. His mind was made up the minute he saw a shiny new trumpet laying on a table. He picked it up and fingered the keys a little. He wondered how long it would take him to learn to play "Taps" on it. He made a terrible sound, but he knew that once he learned to play, he would sound really great.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
He thought one way that he might become more popular was by joining the band. He went to the band practice room and looked around. His mind was made up the minute he saw a shiny new trombone laying on a table. He picked it up and fingered the keys a little. He moved the long slide around, but he still couldn't figure it out. He made a terrible sound, but he knew that once he learned to play, he would sound really great.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
He thought one way that he might become more popular was by joining the band. He went to the band practice room and looked around. There was this shiny trombone that he saw laying on a table that made up his mind. He picked it up and fingered the keys a little. He moved the long slide around, but he still couldn't figure it out. He made a terrible sound, but he knew that once he learned to play, he would sound really great.

Incorrect - Low Overlap Antecedent
He thought one way that he might become more popular was by joining the band. He went to the band practice room and looked around. His mind was made up the minute he saw a brand new drum laying on a table. He picked it up and started to thump out a few beats. Then he really started to pound on it with the sticks that were laying nearby. He had absolutely no rhythm, but he knew that once he learned to play, he would sound really great.

Filler
He decided he would try to find the band instructor after school. Right now, though, he was late for study hall. He walked into the library and saw that almost all of the chairs were full. There was one empty seat in the back next to a senior guy. Lorenzo sat down in the chair and started to talk to the guy. They chatted for a while about what kinds of things they liked to do when they weren't in school.

Reinstatement and Spillover Sentences
Lorenzo told him all about the trumpet.
He thought the guy seemed impressed.

Closing

Lorenzo was thrilled when the senior leaned over and invited him to eat lunch at his table in the cafeteria.

Introduction
Martha, a very well-known nuclear physics professor, was on her way to a conference to give an invited talk. She had decided to fly instead of driving.

Correct Antecedent
After the plane had reached its cruising altitude, the stewardess came through with a drink cart. Martha was pretty thirsty, so she ordered a cup of coffee to help her wake up. The stewardess handed her a cup, and warned Martha that it was very hot. There were still a few grounds at the bottom of the cup. She just added lots of creamer and sugar to mask its taste. She thanked the stewardess and decided to read a novel to make the time go by more quickly.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
After the plane had reached its cruising altitude, the stewardess came through with a drink cart. Martha was pretty thirsty, so she ordered a cup of tea to help her calm down. The stewardess handed her a cup, and warned Martha that it was very hot. Martha let the bag sit in the cup to steep for a while. When it was ready, she added lemon and sugar. She thanked the stewardess and decided to read a novel to make the time go by more quickly.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
After the plane had reached its cruising altitude, the stewardess came through with a drink cart. Martha was pretty thirsty. There was this tea she ordered to help calm her down. The stewardess handed her a cup, and warned Martha that it was very hot. Martha let the bag sit in the cup to steep for a while. When it was ready, she added lemon and sugar. She thanked the stewardess and decided to read a novel to make the time go by more quickly.

Incorrect - Low Overlap Antecedent
After the plane had reached its cruising altitude, the stewardess came through with a drink cart. Martha was pretty thirsty, so she ordered a carton of milk. The stewardess handed her the carton, and warned Martha that it was very cold. Martha took a long drink of the white liquid, and quickly wiped it off her upper lip. This was 2% fat and she usually drank skim, but she didn't mind. She thanked the stewardess and decided to read a novel to make the time go by quickly.

Filler
Martha got tired of reading the novel and put it in her bag. She took out the notes for the talk she was supposed to give. She was kind of nervous, because some really famous people were supposed to be in the audience. She wanted to make sure that she knew her talk backwards and forwards so that she would not make any mistakes. As she read, the plane encountered a bit of turbulence.

Reinstatement and Spillover Sentences
Martha's coffee spilled all over her lap.
Her dress was completely ruined by it.

Closing

The stewardess rushed over and handed Martha a bunch of napkins so that she could clean off her dress.

Introduction
Howard worked late at night as a janitor in a large computer company. He liked wandering around the mazes of cubicles as he cleaned.

Correct Antecedent
This evening, as he was cleaning a row of cubicles, he saw a large rat run across the floor. He grabbed his mop to use to catch the rat, who was now under the desk. The cleaning end of it was still kind of wet, and the strings were flinging water and soap all over the place. Howard wrung it out so that he wouldn't make such a mess. He still couldn't reach the rat, so he had to find another method to catch him.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
This evening, as he was cleaning a row of cubicles, he saw a large rat run across the floor. He grabbed his broom to use to catch the rat. The bristles at the end of it were still dirty from sweeping the floor, and dirt and dust were getting all over the place. Howard brushed it off so that he wouldn't make such a mess. He still couldn't reach the rat, so he would have to find another way to catch him.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
This evening, as he was cleaning a row of cubicles, he saw a large rat run across the floor. There was this broom that he grabbed to use to catch the rat. The bristles at the end of it were still dirty from sweeping the floor, and dirt and dust were getting all over the place. Howard brushed it off so that he wouldn't make such a mess. He still couldn't reach the rat, so he would have to find another way to catch him.

Incorrect - Low Overlap Antecedent
This evening, as he was cleaning a row of cubicles, he saw a large rat run across the floor. He grabbed his sponge to use to catch the rat. It was extra heavy from soaking up a lot of water, so Howard hoped that he could hit the rat with it and knock him out. Howard accidentally made a fist and water squirted all over the place. Howard missed the rat anyway, so he had to find another method to catch him.

Filler
He went back to his cleaning cart to see what else he could use. He saw his bucket and had a good idea. If he could corner the rat, then he could just throw the bucket over him and then release him outside. It took a while, but Howard was finally able to catch the rat this way. After he put the rat outside, he went back to cleaning the same row of cubicles.

Reinstatement and Spillover Sentences
He went back over and picked up the mop.
He hoped he would not see any more rats.

Closing
Luckily, he did not, and he was even able to finish his work early.

Introduction
Jill was going out on a blind date with a friend of one of her coworkers. She was really nervous, because she didn't know anything about the guy.

Correct Antecedent
Jill's date picked her up at six o'clock. They went out for a nice Italian dinner and then went to a concert. It was being put on by a group that was very well known in that area. It was going to be a one night event that was being held in the local university's hockey arena. The band would be playing selections from some of Jill's favorite rock and roll artists. Jill was so happy that her date picked such a great activity for the evening.

Incorrect - High Overlap Antecedent (Without Syntactic Focus = Experiment 4)
Jill's date picked her up at six o'clock. They went out for a nice Italian dinner and then went to a play. It was being put on by a group that was very well known in that area. It would be showing all week long in a small theater that was located on the university campus. The theater group would be doing excerpts from several Shakespearian pieces. Jill was so happy that her date picked such a great activity for the evening.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
Jill's date picked her up at six o'clock. There was this play that they went to after going out for a nice Italian dinner. It was being put on by a group that was very well known in that area. It would be showing all week long in a small theater that was located on the university campus. The theater group would be doing excerpts from several Shakespearian pieces. Jill was so happy that her date picked such a great activity for the evening.

Incorrect - Low Overlap Antecedent
Jill's date picked her up at six o'clock. They went out for hot dogs and beer at a local pub, and then went to a ballgame being played in Fenway Park. It was the Yankees versus the Red Sox, and Jill was rooting for the Yankees. It was supposed to be a very exciting game. Both teams had been doing very well this season, and the fans were going wild. Jill was so happy that her date picked such a great activity for the evening.

Filler
They were a little early, so they found their seats and chatted for a while. It turned out that Jill and her date had quite a bit in common. He was interested in the same kinds of things she liked to do, such as hiking and camping, going to see movies, and mountain bike riding. They were just about to make a date to go to a movie together the next weekend, when someone made an announcement.

Reinstatement and Spillover Sentences
The concert would begin in five minutes.
Jill was starting to get really excited.

Closing

She and her date resumed their conversation and finished making plans for their next date.

Introduction
Beth had just moved to New England from Florida to go to college. The winter weather was a big adjustment for her to make.

Correct Antecedent
She didn't have any warm winter clothes, so she decided to spend the day shopping for some. She went to the L. L. Bean factory store, where she bought a jacket with a matching hat. It covered her whole head and had a dark brown brim. Beth figured that she could use hairpins to hold it on if it was too windy out. She had to walk to campus everyday, and she wanted to make sure that she stayed warm on her way to class.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
She didn't have any warm winter clothes, so she decided to spend the day shopping for some. She went to the L. L. Bean factory store, where she bought a jacket with a matching hood. It attached to the jacket with a zipper for increased versatility. Beth figured that she could just pull the strings tighter to hold it on if it was too windy out. She had to walk to campus everyday, and she wanted to make sure that she stayed warm on her way to class.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
She didn't have any warm winter clothes, so she decided to spend the day shopping for some. There was this hood that matched the jacket she bought at the L. L. Bean factory store. It attached to the jacket with a zipper for increased versatility. Beth figured that she could just pull the strings tighter to hold it on if it was too windy out. She had to walk to campus everyday, and she wanted to make sure that she stayed warm on her way to class.

Incorrect - Low Overlap Antecedent
She didn't have any warm winter clothes, so she decided to spend the day shopping for some. She went to the L. L. Bean factory store, where she bought a jacket with matching gloves. They were made of dark brown fleece and had a string that could be worn around her neck.. Beth liked the way they fit perfectly around her hands and fingers. She had to walk to campus everyday, and she wanted to make sure that she stayed warm on her way to class.

Filler
After she got back from shopping, her boyfriend called to say he was coming over. They decided they would stay in that night and rent movies. They made popcorn and snuggled on the couch while they watched the latest Lethal Weapon movie. After the movie, they talked for a while and then Beth's boyfriend asked her about her shopping trip. Beth happily brought out the item that she had purchased.

Reinstatement and Spillover Sentences
She even modeled the new hat for him.

He told her it looked great on her.

Closing
She smiled and thanked him and continued to show him everything else she had gotten that day.

Introduction
Matt loved living in New York City. He liked watching the people swarming on the street as they went about their daily business.

Correct Antecedent
One of his favorite things about living in the city was riding the subway. Today he was riding the subway downtown, where he was going to meet some of his friends for dinner. It was about a fifteen minute ride, so he brought along a book to read. It had a beautiful leather cover that Matt loved the feel of. In addition, the pages in it were printed on acid free paper. Matt had just gotten to the end when he realized he was at his stop.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
One of his favorite things about living in the city was riding the subway. Today he was riding the subway downtown, where he was going to meet some of his friends for dinner. It was about a fifteen minute ride, so he brought along a magazine to read. It had a picture of a model on the front, and it was filled with advertisements. Matt thought the articles were pretty good too. He had just gotten to the end when he realized he was at his stop.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
One of his favorite things about living in the city was riding the subway. Today he was riding the subway downtown, where he was going to meet some of his friends for dinner. There was this magazine that he brought along to read, since it was about a fifteen minute ride. It had a picture of a model on the front, and it was filled with advertisements. Matt thought the articles were pretty good too. He had just gotten to the end when he realized he was at his stop.

Incorrect - Low Overlap Antecedent
One of his favorite things about living in the city was riding the subway. Today he was riding the subway downtown, where he was going to meet some of his friends for dinner. He sat down and noticed a poster taped to the window. It was advertising a benefit concert for inner city children. It was brightly colored and had lots of pictures. The information about the concert was printed at the bottom. Matt had just finished reading when he realized he was at his stop.

Filler
When he walked off the subway, he saw one of the friends he was meeting. They walked together toward the restaurant. It was a new Burmese restaurant that was supposed to have really good food at decent prices. Matt was excited because he had never had Burmese food before. He didn't even know what to expect. He and his friend got to the restaurant early and sat around and talked while waiting for the rest of their friends to arrive.

Reinstatement and Spillover Sentences
Matt described the book he had read.

He thought it was really interesting.

Closing
Just then, the rest of their friends arrived, so they called the waitress over to give her their orders.

Introduction
Greg was going to redo his kitchen. He had been looking at the same old wallpaper and cabinets for years and was really getting sick of them.

Correct Antecedent
He decided he was going to replace absolutely everything. He went to the store to price some of the newest appliances on the market. As soon as he walked in the door, he saw a toaster that he really wanted. There were slots for four slices of bread and a variety of darkness settings. It was even small enough that Greg would be able to put it away in the cabinet when he was finished. Greg was extremely satisfied with his choice.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
He decided he was going to replace absolutely everything. He went to the store to price some of the newest appliances on the market. As soon as he walked in the door, he saw a microwave that he really wanted. It had a digital clock and settings for everything from popcorn and pizza to baked potatoes and roasted turkey. It was heavy and big, but Greg thought he had room between the refrigerator and the stove. Greg was extremely satisfied with his choice.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
He decided he was going to replace absolutely everything. He went to the store to price some of the newest appliances on the market. There was this microwave that he saw as soon as he walked in the door. It had a digital clock and settings for everything from popcorn and pizza to baked potatoes and roasted turkey. It was heavy and big, but Greg thought he had room between the refrigerator and the stove. Greg was extremely satisfied with his choice.

Incorrect - Low Overlap Antecedent
He decided he was going to replace absolutely everything. He went to the store to price some of the newest items on the market. As soon as he walked in the door, he saw a sink that he really wanted. It was made of beautiful white porcelain and had a shiny stainless steel faucet. The hot and cold knobs were shaped like little stars. Greg thought it would look stunning set into the dark counter tops. He was extremely satisfied with his choice.

Filler
While he was at the store, he also wanted to look at wallpaper. He went through several books until he finally found a pattern that he liked. The pattern he picked had a charming country scene on it, with cows and chickens grazing in the yard of an old-fashioned farmhouse. Greg thought it would add a nice touch to his kitchen. He went in search of a salesman to help him with his order.

Reinstatement and Spillover Sentences
He also told him about the toaster.
He got all of the items Greg asked for.

Closing

The bill was a little more than he could afford, but he figured it was worth the money.

Introduction
Sylvia was entering a beauty pageant. She thought she had a pretty good chance of winning, especially in the talent competition.

Correct Antecedent
The tension in the dressing room was really high. All of the contestants were hurriedly trying to get themselves ready. Sylvia needed to fix her hair for the next part of the contest. Her hair was tangled, so she tried to find her brush. The bristles of it ran through her hair and removed most of the tangles. She gave her head about twenty strokes with it before she was finally satisfied. She wanted to look absolutely perfect when she walked out onto the runway.

Incorrect - High Overlap Antecedent (Without Syntactic Focus - Experiment 4)
The tension in the dressing room was really high. All of the contestants were hurriedly trying to get themselves ready. Sylvia needed to fix her hair for the next part of the contest. Her hair was tangled, so she tried to find her comb. Its teeth got caught in her hair and she had a terrible time getting it out. She was able to get all of the tangles out just in time. She wanted to look absolutely perfect when she walked out onto the runway.

Incorrect - High Overlap Antecedent With Syntactic Focus (Experiment 4 only)
The tension in the dressing room was really high. All of the contestants were hurriedly trying to get themselves ready. Sylvia needed to fix her hair for the next part of the contest. There was this comb that she tried to find, because her hair was tangled. Its teeth got caught in her hair and she had a terrible time getting it out. She was able to get all of the tangles out just in time. She wanted to look absolutely perfect when she walked out onto the runway.

Incorrect - Low Overlap Antecedent
The tension in the dressing room was really high. All of the contestants were hurriedly trying to get themselves ready. Sylvia needed to fix her hair for the next part of the beauty contest. Her hairdo had gone completely flat, so she tried to find her curlers. She almost burned her fingers taking each of them out, but the beautiful ringlets they put in her hair looked just fantastic. She wanted to look absolutely perfect when she walked out onto the runway.

Filler
As she finished getting ready, a fellow contestant ran into the dressing room. Sylvia's friend was late in getting ready and was really upset. Sylvia didn't know if her friend was going to make it in time for the next competition. Her friend had lost her cosmetics bag and did not have any beauty supplies to use. Sylvia tried to help her friend by handing her the dress and shoes that she would need.

Reinstatement and Spillover Sentences
She loaned her the brush she was using.

Sylvia's friend smiled gratefully at her.

Closing
Sylvia smiled back and left the dressing room. She was next up on the stage.

Appendix D

For all experiments reported in this dissertation, approval for use of human subjects was obtained from the University of New Hampshire Psychology Department Internal Review Board. Forms demonstrating proof of approval are included in this Appendix.

UNIVERSITY OF NEW HAMPSHIRE

INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN RESEARCH SUBJECTS

PROTOCOL REVIEW FORM

Project Director: Ed O'Brien IRB#:

Department: Psychology Reviewer

Project Title: The Moses Illusion in Reading Comprehension Date:

Reviewer: Please write comments, if any, on the reverse side of this form. Return completed form to OSR, 107 Service Building.

EXEMPT REVIEW

PROTOCOL IS APPROVED AS EXEMPT PER SUBSECTION:

- ✓ 46.101(b)(1) Research conducted in established educational setting using normal educational procedures
- ___ 46.101(b)(2) Educational tests, surveys, interviews, observation of public behavior/no risk
- ___ 46.101(b)(3) Educational tests, surveys, interviews, observation of public behavior not exempt under Subsection 2. above, if public official or if confidentiality mandated by federal statutes
- ___ 46.101(b)(4) Study of existing data
- ___ 46.101(b)(5) Study of public benefits or service programs
- ___ 46.101(b)(6) Taste and food studies

___ PROTOCOL IS NOT APPROVED ___ PROTOCOL RECOMMENDED FOR FULL BOARD REVIEW

EXPEDITED REVIEW

PROTOCOL IS APPROVED AS EXPEDITED PER SUBSECTION:

- ___ 46.110(b)(1)(1) Collection of hair, nail, teeth in non-disfiguring manner
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- ___ 46.110(b)(1)(10) Research on drugs or devices for which an investigational drug or device exemption is not required

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MODIFICATION (REVISION) REVIEW

- ___ Protocol approved
- ___ Further action recommended (specify)

CONTINUING (TIME EXTENSION) REVIEW

- ___ Extension approved
- ___ Further action recommended: (specify)

Signature of IRB Reviewer Date 9/17/99

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PROTOCOL REVIEW FORM

roject Director: Ed O'Brien IRB#: 13

epartment: Psychology Reviewer:

roject Title: The Moses Illusion in Reading Comprehension Date:

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DIFICATION (REVISION) REVIEW

- ___ Protocol approved
- ___ Further action recommended: (specify)

NTINUING (TIME EXTENSION) REVIEW

- ___ Extension approved
- ___ Further action recommended: (specify)

John Landry 9/23/99

ature of IRB Reviewer Date

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INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN RESEARCH SUBJECTS

PROTOCOL REVIEW FORM

Project Director: O'Brien IRB#: 18

Department: Psychology Reviewer

Project Title: The Moses Illusion in Reading Comprehension Date:

Reviewer: Please write comments, if any, on the reverse side of this form. Return completed form to OSR, 107 Service Building.

EXEMPT REVIEW

PROTOCOL IS APPROVED AS EXEMPT PER SUBSECTION.

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MODIFICATION (REVISION) REVIEW

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CONTINUING (TIME EXTENSION) REVIEW

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Signature of IRB Reviewer Date 12/7/94

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INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN RESEARCH SUBJECTS

PROTOCOL REVIEW FORM

Project Director: Ed O'Brien IRB#: 032

Department: Psychology Reviewer

Project Title: The Noise Division in Reading Comprehension Date:

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EXEMPT REVIEW

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MODIFICATION (REVISION) REVIEW

- ___ Protocol approved
- ___ Further action recommended: (specify)

CONTINUING (TIME EXTENSION) REVIEW

- ___ Extension approved
- ___ Further action recommended: (specify)

John Lumber 10/22/99

Signature of IRB Reviewer Date

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INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN RESEARCH SUBJECTS

PROTOCOL REVIEW FORM

Project Director: Anne Cook IRB#:

Department: Psychology Reviewer:

Project Title: The Moses Illusion & Reading Comprehension Date:

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EXEMPT REVIEW

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CONTINUING (TIME EXTENSION) REVIEW

- ___ Extension approved
- ___ Further action recommended: (specify)

Signature of IRB Reviewer Date 1/5/2000

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INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN RESEARCH SUBJECTS

PROTOCOL REVIEW FORM

Project Director: Anne Cook — IRB#:

Department: Psychology — Reviewer:

Project Title: The Moses Illusion in Reading Comprehension — Date:

Reviewer: Please write comments, if any, on the reverse side of this form. Return completed form to OSR, 107 Service Building

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___ Extension approved
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